

Effective Support of Transfer Technology on Regional Level

Pavla MATULOVÁ, Jan HRUŠKA

University of Hradec Kralove, Hradec Kralove, Czech Republic
pavla.matulova@gmail.com
jan.hruska.3@uhk.cz

Abstract: In recent years, there has been a rapid expansion of the regional government role in economic development. This has resulted in the fact that technology transfer is taking place within an increasingly complex network of regional stakeholders. And in order to efficiently design programs that support enterprise innovation, entrepreneur's and corporate's environment needs to be constantly monitored and analyzed. These analyses are an effective platform for transfer technology support. Knowledge of the innovative environment in the context of its gradual development is crucial for the effective application of the region's innovation strategy and its tools. One of the questions is to set up indicators of support and measures for transfer technology, research, development and innovation on regional level. At the same time is need determinate an appropriate way of identifying the innovation potential and absorption R&D capacity. The optimization of the system and holistic approach seems to be essential as a basis for setting tools for effective support and measures of transfer technology on regional level.

Keywords: Regional Strategy, Transfer Technology, Governmental Support.

1 The Regional Government Role in Economic Development

The regional development strategy is a basic document of the regional policy at the level of the state forming the regional policy. It summarizes the objectives, problematic areas and priorities that will be required in the frame of ensuring the regional development policy including business and innovation grow. A political consensus of all involved stakeholder determinate a significant advantage in the system supporting the innovative business and very important part is transfer technology. The regional political representation, universities, and representatives of the major cities in region have to manage to find a common base and came to an agreement regarding goals that are mentioned the Regional Innovation Strategy – RIS of each region [3]. The regional innovation system (RIS) approach provides a useful framework for such a differentiated approach [2]. It draws attention to the firms, clusters, university, research centers and institutions of an innovation system, to the interdependencies [12]. Important role play also regional innovation centers, which can play role as a implementation agency of

supporting programs and the effective implementation of tools that support the development of transfer technology involving both corporate companies and start-up companies and also the field of well-established and fully-developed companies focusing on own R&D [1]. A number of effective programs include, for example, the innovative vouchers. The aim of innovative vouchers is to initiate transfer technology and to bring high added value in implementation in practice. A big commitment is to ensure the greatest possible benefits of investing in research centers for the regional economy [4]. The key approach how to improve the situation is to support innovative small and medium enterprises with a high added value and their attention is focused on innovative and better products and services and also to the introduction of new sell or management approaches [7]. One of the questions is to set up indicators on how to set up support measures for research, development and innovation (R&D). At the same time, it is necessary to choose the appropriate way to identify the innovation potential and absorption capacity of R&D entities and to follow the feedback between the state intervention and its direct impact to the regions. It is essential to set up optimization options for the system to serve as a basis for setting up other supposed proposals for effective support.

2 Research Objective

The aim of the research was to analyze the innovative ecosystem of companies in one of the fastest economical grow region within the Czech Republic, including the socio-economic factors that influence it. In addition, an effort was made to describe the behavior of companies in the field of innovation implementation and transfer technology to follow factors such as the export rate, the number of employees employed in the development activities of the company, the share of university educated employee and the share of investments in own R&D activities. Identify the correlation between the owner/manager's innovation aspirations to create a segmentation that is important for creating a specific supply of transfer technology policy tools to the target group.

3 Description of Data Source

In the work was applied a combination of quantitative and qualitative research and the mutual penetration of these two methods. In the simplified model of the three phases of such mixed research, the sample structure is as follows: determination of research questions, secondly data collection and thirdly data analysis. The basis of the research activity for the work was a structured background for interviews, not a questionnaire, but a sophisticated interview, which had to be properly prepared in advance, to study the documents for each company, for example from the annual reports of companies. There were involved 50 companies. A two-hour interview could only be carried out with the company owner, in the case of foreign companies, it was possible to conduct the interview with the CEO or general manager only. In both cases, the most important criterion was that the manager/owner is responsible of the company's innovation

strategy and is holder of transfer technology strategy in company. For the selection of companies, three main criteria have been identified, which are described below. This was a multi-criteria selection. The first criterion was the company's knowledge intensity, this criterion was given by the minimum volume of investments in own research or development activities, depending on the company's performance, emphasis was given on rapidly growing technological SMEs. In the Czech Republic, there are 419, 444 trading companies, which were registered in total in 2014. There were 2, 391 R&D workplaces. 629 companies invested more than CZK 10 million in R&D in 2015 [11]. The resulting sample for the interview was designed to include companies with relatively high R&D expenditures to the company's total turnover. The reason for emphasis on the knowledge intensity of firms is the fact that the innovative capacity of the company in the higher level of innovation determines to a large extent the critical size of financial, technical and other capacities concentrated in R&D. However, this does not mean that insufficient attention is paid to innovations that do not require their own R&D. Another criterion was the level of active involvement in R&D projects during the last 3 years. Last criterion was classification according to the Classification of Economic Activities (CZ-NACE). This criterion was based on the key sectors for the Czech economy according to the NACE classification. For selected data were use results of Annual report of The Czech Statistical Office (CZSO) is a central body of the state administration of the Czech Republic [10]. The following areas of NACE were selected: 28 - mechanical engineering, 26 - electronics, 29 - automotive, 25 - metalworking, 62 - IT.

Description of Region

The South Moravian region has a traditionally strong and expanding base in the research and development area of higher education students and scientists and industry. It is currently one of the most economically growing regions of the Czech Republic and one of the most dynamic regions in Central Europe. According to the extent of R&D capacity, the South Moravian Region has the most suitable conditions for the development of the knowledge economy. Its share in total expenditure on R&D in 2015 amounted to 20.3% of total expenditures in the Czech Republic. The share of GDP is 10.5%. The share of the South Moravian region in the Czech Republic according to the R&D capacities in the sector of "high education" reached 27.4% according to the employees and 33.8% according to R&D expenditure in 2015. The large difference in the share of expenditures and employment in R&D in the higher education sector is related to extraordinary investments of research centers [8]. This information was drawn from the Regional Innovation Strategy of the South Moravian Region 2014-2020.

4 Methodology

4.1 Software Used

There were selected IBM's software, named IBM SPSS Statistics. This software provides tools for the statistical analytical process, including reports and outputs important and useful not only for statistics but also for company management and their employees, and can also serve municipalities in decision-making on strategic regional development. The name of this software was derived from the Statistical Package for Social Sciences (SPSS) as a statistical package for social sciences, reflecting the original focus on a particular market, but today it is used in other areas including health and marketing, development and innovation.

4.2 Statistical Methods

Data was processed and analyzed using the following methods. A correlation analysis illustrates the statistical dependence of two quantitative variables and measures the mutual relationship of two variables. Both variables are correlated if certain values of one variable tend to occur together with certain values of the second variable. The aim of the correlation analysis is to determine the linear dependence between the variables. The first idea of the dependence of the characters X and Y can be obtained by observing these characters in statistical units and showing the data with a point diagram. It is a diagram in which each pair of observations (x_i, y_i) is represented as a point in a rectangular coordinate system where a scale of the x and a vertical scale of the y values are located on the horizontal axis. The points drawn are then a set from which to trace the characteristic features of both characters [6]. The correlation shows the statistical dependence of two quantitative variables (it measures the mutual relationship of two variables.) The two variables are correlated if certain values of one variable tend to occur together with certain values of the second variable [5]. The original data source is .xls files and contains numeric variables. Which were imported into IBM SPSS Statistics software. In the work was applied a combination of quantitative and qualitative research and the mutual combination of these two methods.

4.3 Data File Variables

The following variables were tracked: Export of company in % of total turnover, expenditure on research activities % of turnover. Company own resources for research activities in % to all sources R&D, subsidies % of total R&D expenditures, the number of R&D expenditures for the last 3 years. Ownership structure, Czech, mixed (share of foreign owners below 50%). The share of university educated employees.

4.4 Set the Hypothesis

H0: The rate of export does not correlate to how the firm invests in its own research and development.

H1: The rate of export correlate to how the firm invests in its own research and development.

H0: The level of university educated employees does not correlate with the amount of R&D expenditure and transfer technology.

H1: The level of university educated employees correlate with the amount of R&D expenditure and transfer technology

H0: The level of university-educated employee does not affect the rate of export.

H1: The level of university-educated employee affects the rate of export

5 Result of Research Analysis

Table 1. Table captions should be placed above the tables. Correlation of individual variables.

		Expenditure	Export	University Employee	Firms Source	Subsidies
Expenditure	Pearson Corr.	1	.289*	.378**	.277	-.277
	Sig. (2-tailed)		.049	.009	.059	.059
Export	Pearson Corr.	.289*	1	.368*	.050	-.050
	Sig. (2-tailed)	.049		.011	.737	.737
University Employee	Pearson Corr.	.378**	.368*	1	-.117	.117
	Sig. (2-tailed)	.009	.011		.432	.432
Firms Source RD	Pearson Corr.	.277	.050	-.117	1	-1.000**
	Sig. (2-tailed)	.059	.737	.432		0.000
Subsidies	Pearson Corr.	-.277	-.050	.117	-1.000**	1
	Sig. (2-tailed)	.059	.737	.432	0.000	
Last 3years Increasing	Pearson Corr.	.265	-.234	.079	-.048	.048
	Sig. (2-tailed)	.071	.113	.599	.751	.751

*Correlation is significant at the 0.05 level (2-tailed). **Correlation is significant at the 0.01 level (2-tailed).

*Expenditures - R&D expenditure % of turnover, Export – Export % of total turnover
University employee -% university share of all employees, Firm Source RD - Own resources of R & D company %
Firm Source RD - Own resources of R & D company %*

*Subsidies - R & D subsidies obtained from the total R & D expenditure
Development of the last 3 years - The rate of increase in R & D expenditure over the
last 3 years*

H0: The rate of export does not correlate to how the firm invests in its own research and development.

H1: The rate of export correlate to how the firm invests in its own research and development.

Result: Reject null hypothesis, accept H1

H0: The level of university educated employees does not correlate with the amount of R&D expenditure and transfer technology.

H1: The level of university educated employees correlate with the amount of R&D expenditure and transfer technology

Result: Reject null hypothesis, accept H1

H0: The level of university-educated employee does not affect the rate of export.

H1: The level of university-educated employee affects the rate of export

Result: Reject null hypothesis, accept H1

6 Interpretation and Usability of Results

When we are monitoring the correlation between the export rate of firms and investment in its own research and development, a statistically significant correlation can be observed in this case, the correlation value is 0.289. This result confirms that exports (in particular to demanding markets such as the USA and Japan), are a significant stimulus for investment in own R& D activities and support global business and innovation ambitions. There is an obvious correlation between R&D expenditure and the number of employees that the company has, the correlation value here is 0.378. The third statistically significant correlation that has emerged is between exports and the number of university employees with a value of 0.368. It can therefore be assumed that factors such as the rate of export and the number of university educated employed workers are also related to the degree of innovation that the company involved into the production process. In the case of monitoring the ownership structure, it is interesting to see the correlation between the ownership structure and access to its own R & D. Interestingly, companies with foreign capital are trying to invest more than Czech origin companies. In part, this finding may rebut the assertion that the Czech Republic would be just assembly companies. This finding is probably due to the fact that the region, where was conducted the research, is region where foreign companies have their development center in the Czech Republic, not just production and assembly. Many companies are in the process of generational exchange, and this is also related to the form of a strategy that is not expansionary in these cases, but rather to maintaining existing positions. Several factors pursued by the European Commission have been followed up in this research (see methodology). Below is a graph showing the comparison of aspirations to national innovations, prepared within the Report Union Scoreboard 2017. The graph shows that the Czech Republic, from the point of view of

the aspiration to innovation, holds the position of so-called moderate innovation, which was proven also in frame of this research.

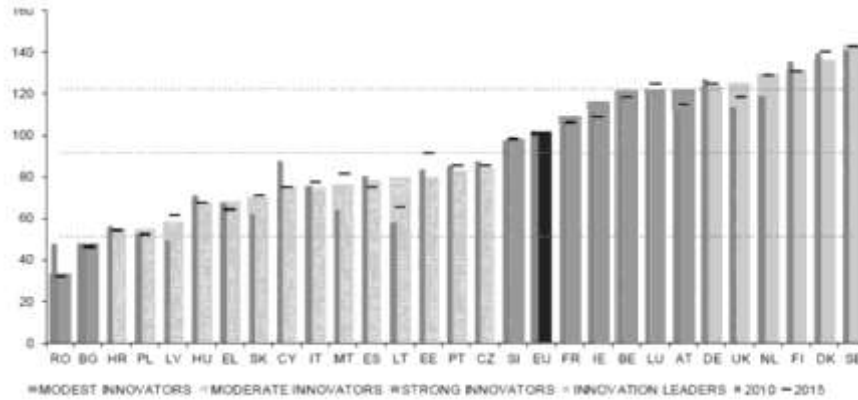


Fig. 1. Performance of EU Members State's innovation system. Source: Report Union Scoreboard 2017. (From left side: moderate innovation, modest innovation, strong innovation, innovations leader) [9].

7 Conclusion

Factors influencing the degree of innovation and transfer technology focus in companies and thereby increasing their added value on the market are several and have a different character. The presented research shows that there are different linkages and correlations between the different factors. Precisely mapping and analyzing can be one of the guides to effectively set up innovation policy and to choose the appropriate instruments to support transfer technology on regional base level and support innovation policy at regional and national level as well. As it has been already emerged from the research for the future innovation capacity of the Czech Republic, it is important that it significantly boosts the segment of companies that decide autonomously on their overall strategy and strategic innovation. It is advisable to support high added value companies and target their export to demanding foreign markets. The rate of innovation is significantly influenced by the overall business vision. The corporate aspirations and goals of the owners in terms of assessing the innovation capacity of the economy are very important. They form the focus and boundaries of the company's innovation efforts. Due to the effective setting of regional policy instruments, it is interesting to note that the most important innovation barriers in companies with high innovation potential are not financial barriers but are manifested in the area of human resources. New instruments to support the transfer technology should be devised in this respect. Of course, for the final design of long-term effective mechanisms, we need to build on this research and map out the details of each area in detail, so that investing in supporting the innovation capacity brings a significant overall contribution to the economy. (As was the case with, for example, the above-mentioned innovative vouchers). In order to be able to continue to efficiently design programs that support enterprise innovation, we need to constantly monitor the

corporate environment, analyze and then choose effective public support methods. Knowledge of the innovative environment in the context of its gradual development is crucial for the effective application of the region's innovation strategy and effective transfer technology support. According the research support exchange programs between university and companies in the field of human resources can be seen as effective tools of support transfer technology on regional level.

It is clear that well-defined public support programs for applied research and the support of the innovation process can not only benefit to develop research cooperation, but also increase the share of production with high added value overall.

Acknowledgements. This work was supported by the Technology Agency the Czech Republic TL02000066 "Effective knowledge transfer management "and internal specific research "Investments under the Industry 4.0 concept. "

References

1. Autio, E.: Evaluation of RTD in regional systems of innovation. *European Planning Studies* 6, 131–140 (1998).
2. Braczyk, H. J., Cooke, P., Heidenreich, M.: *Regional Innovation Systems*. UCL Press, London (1998).
3. Cooke, P., Memedovic, O.: *Strategies for Regional Innovation Systems: Learning Transfer and Applications*. Policy Papers, UNIDO, Vienna, (2003).
4. Csank, P.: *Interim Evaluation Results*, South Moravian Centre (2013).
5. Hendl, J.: *Overview of statistical methods: Analysis and meta-analysis of data*. Prague, Portal, (2009).
6. Correl analysis. <http://kps.pedf.cuni.cz/skalouda/pokrocili/korelacni.htm>. Last accessed 2018/11/23.
7. Matulova, P.: *Innovation Voucher Programme: Effective Tools of Transfer Technology and Open Innovation*. In: Soliman, K.S. (ed.) *CRAFTING GLOBAL COMPETITIVE ECONOMIES: 2020 VISION STRATEGIC PLANNING & SMART IMPLEMENTATION* proceedings of the 24th International-Business-Information-Management-Association Conference, pp. 536-541, Milan, Italy (2014).
8. *Regional innovation strategy of The South Moravian Region for 2014–2020*, <https://www.kr-jihomoravsky.cz/Default.aspx?ID=247486&TypeID=2>. Last accessed 2018/11/23.
9. Report of the European Union scoreboard 017 https://www.rvo.nl/sites/default/files/2017/06/European_Innovation_Scoreboard_2017.pdf. Last accessed 2018/11/23.
10. The Czech Statistical Office, <http://www.statistikaamy.cz/2015/10/metropoli-vedy-se-stava-brno>. Last accessed 2018/11/23.
11. The Technology Agency of the Czech Republic https://www.tacr.cz/dokums_raw/prezentace/inka.pdf. Last accessed 2018/11/23.
12. Tödting, F., Trippel, M.: One size fits all?: Towards a differentiated regional innovation policy approach, *Research Policy*, Elsevier, Volume 34, Issue 8, pp. 1203-1219 (2005).