REGIONAL BUSINESS STRUCTURE AS THE FACTOR AFFECTING THE INNOVATION POTENTIAL OF THE REGIONS IN SLOVAKIA

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Abstract

The innovation performance of the region seems to the determinant of the regional economic development in the long-run. In order to increase economic growth regions have to focus more on innovation support. However, there are several circumstances that could significantly affect the innovation potential of any region. The sectoral structure of business in the region seems to be a very important one. Our research is focused on identifying the key similarities and differences in sectoral business structure in the regions of Slovakia. We analyse the current situation in NUTS 4 regions and applied cluster analysis in order to group these regions into clusters based on observed similarities in business structure. These could be useful, especially for setting the regional innovation policy and innovation support in the regions. Our results suggest that regions in Slovakia could be divided at least into 7 groups according to business structure. Each group have some specific characteristics and therefore should be treated separately in respect to their innovation potential. Furthermore, the regional innovation policy should also be adapted to specific conditions within the regions.

Key words: innovation potential, business structure, business sectors, regional development, regional differences.

JEL Code: R Urban, Rural, Regional, Real Estate, and Transportation Economics, R5 Regional Government Analysis

Introduction

Object of our contribution is regional innovation, more specifically of regional business structure in context of regional innovation potential and regional innovation performance. With innovation potential of regions is understood in accordance with the definition of Pokorny et al. (2008) "the ability of the region under the circumstances effective usage of its own internal resources to respond flexibly to external development initiatives, create and develop activities with higher added value, and thus acquire new, hierarchically higher quality."

By identifying the innovative potential / assumptions in the regions it should be monitored:

- demographic, educational and (macro) economic characteristics of regions

- The economic structure of the regions, especially high-tech and medium-tech industries, industrial zones, including financial aspects - venture capital and programs to promote entrepreneurship,

- Capacities human, financial and material, research and development institutions in the regions and the application of research and development in practice

- Regional Innovation environment, public support for innovation of all kinds (not only business but also social innovation), legislation, policies, strategies, networking, cooperation.

We distinguish traditional and modern factors of regional development and innovation. Traditional "Weber´s" location factors (availability of labour, transportation costs, raw materials) are being replaced by soft factors such as the ability to create and use new knowledge and innovation, quality of human resources and capacity of mutual cooperation between economic entities each other and the importance of institutions, social environment, "rooting" and so on.

It is necessary to talk about multifactor conditional innovation and development potential of regions. We can speak and endogenous potential, wherein the resulting interaction of the above factors also depends on the internal environment of the region, formed by the action of effective relations in the region, by atmosphere of work ethic, confidence and mutual trust.

1 Regional and sub-regional level of innovation potential detection

Slovakia is a distinctively intra-regionally differentiated country. It has different types of regions (top-economic leaders, old industrial or peripheral regions). For research purposes of regional development potential - especially of the regions' ability to create, to take over and implement innovations, it is "innovation potential of the regions" – we chose a sub-regional / district / LAU1 level. We have progressed our research and at the same level and in chapter 2 we list some comparable research in the given research area at regional and sub-regional levels in the Czech Republic and the Slovak Republic.

Regional development depends on a number of external and internal qualitative attributes, formal and informal institutions, regional innovation system, knowledge base, social capital, innovation governance, etc. The attributes can be summarised for both regions by

defining problem areas and Regional innovation system deficiencies based on several studies (Todtling, Trippl 2005, Cooke 2004, Asheim and Gertler, 2004, Hudec, Urbancikova, 2009).

By research of regional innovation determinants is needed to distinguish the methodological specifics for different geographical levels in terms of methodology and a range of indicators of innovation. In this paper we search determinants of innovation on LAU I (NUTS IV) level. On this sub-regional level is available considerably narrower range of indicators than on regional level and decreases reliability of statistical data. Sample surveys do not allow going to the spatial detail. Reliability is problematic even in exhaustive surveys.

On local/micro regional/sub-regional level is useful to search information about: population size and migration, flexible and skilled workforce, entrepreneurship, about the quality of public administration and its activities, which tend to concentrate in medium and large cities - business services, high technology manufacturing industry, unions and educational institutions, network structure (Huggins, Prokop, 2017), learning cities and regions and knowledge transfer (Maskell and Malmberg, 1999). One of the most important indicators of regional innovation potential and for detecting of regional development perspectives is information about economic activity, structure of business subjects which operate in region.

2   Current empirical research of the issues at the intra-regional level in Bohemia and Slovakia

Some comparable research in the given research area of intraregional differences and innovation were realised in the Czech Republic and the Slovak Republic. The most extensive and comprehensive are following: researches of Czech Academy of Sciences – Technological Centre (Pokorny et al., 2008); other were realised or ordered by central government authorities responsible for national strategies for implementation of support from the EU Structural Funds (see *Regional economic data for the RPS and NSRF evaluation and for regional development analyses. Subproject. Methodology of evaluation of the economic and development potential of the territory* (Ministry of local development of Czech Republic); *Analysis of the development potential of Slovak regions and their territorial differences with the projection of the thematic concentration of ESFS in the Slovak Republic's Partnership Agreement 2014-2020*).

The second group of subjects in the Czech and Slovak Republics performing similar research is the public and private professional associations (the Slovak Innovation and Energy Agency SIEA, Association of Innovative Entrepreneurship of the Czech Republic) (see more in Balog, M., 2013; Švejda, P., 2010).

Third group of researchers of regional development and innovation in Slovak and Czech Republic are public scientific institution and universities. In bibliography summary: Radvanský, M., Workie Tiruneh, M., et al. (2010), Pokorny et al. (2008). Regional differences and regional innovation research is the subject of their scientific and pedagogical interest.

3   Data and methodology

As we have stated the main aim of our paper is to cluster the NUTS 4 regions based on the sectoral structure of companies into several groups. The analysis aims to identify the key similarities and differences in the share of companies from different sectors between the regions. This could be helpful when determining the innovation potential at regional level. Regions with different sectoral representation should be treated differently with respect to innovation potential. Furthermore the innovation policies need to be tailored according to the needs of every group of regions. We used the data on structural business statistic. The data are cross-sectional and they are valid for the year 2015. These data are retrieved from the database of the Statistical Office of the Slovak Republic. All business sectors included in the analysis are summarized in the Table 1.

Tab 1 Business sectors included in the analysis

Administration and support services	Industry – total
Real estate activities	Industrial production
Electricity, gas, steam and air conditioning	Construction
Water supply, cleaning and waste-water treatment, waste management and remediation activities	Mining and quarrying
Transport and Storage	Accommodation and food services
Financial and insurance activities	Arts, entertainment and recreation
Information and communication	Wholesale and retail trade; repair of motor vehicles and motorcycles
Professional, scientific and technical activities	Education
Other activities	Health care and social assistance
Agriculture, forestry and fishing	

Source: Authors.

We measure and compare the share of firms in each sector on overall number of firms located in the region. In order to classify similar regions into same clusters we conducted hierarchical cluster analysis. The shares of each sector in the regions have been used as 19 classification variables. In order to measure distance in multidimensional space was used square Euclidian distance method. The data are standardized to Z-score. We apply hierarchical cluster analysis using the Ward clustering method, which has high statistical power and is very often

used in the literature so far. In the next section we describe the most important parts of our analysis.

4   Results

In the analytical section we examine the structure of companies, according to different sectors in NUTS 4 regions in Slovakia. Firstly, we focused our attention on Professional, scientific and technical activities. This sector supposes to be the leading one when talking about innovation. Professional, scientific and technical activities either directly create innovation or at least form the basis for innovation. We can also say that this sector is an essential one for most of the high-tech or sophisticated innovation created in the region. The innovation potential of well-developed region could be partially derived from the share of this sector on regional economic. However, this perhaps could not be the case of less-developed regions in the current stage, where innovation is mostly only new to the local market. In such a region, innovation activities contain mostly the acceptance of knowledge from outside and imitation. The shares of Professional, scientific and technical activities in top performing regions are shown in Figure 1. All regions of Bratislava are at the top places followed by Senec, Pezinok, Banska Bystrica, Košice I. and Zvolen. Thus we can also assume that the innovation potential is the highest in these regions.

In the next step we conduct hierarchical cluster analysis based on the variables capturing the shares of all sectors. Thus 19 classification variables have been used. The dendrogram, which is the graphical illustration of the results, is shown in Appendix. As we can see, all regions of Bratislava are grouped in separate cluster, very far from other regions. The classification of regions into clusters is described also in the Table 2.

Fig. 1 The proportion of firms focused on Professional, scientific and technical activities
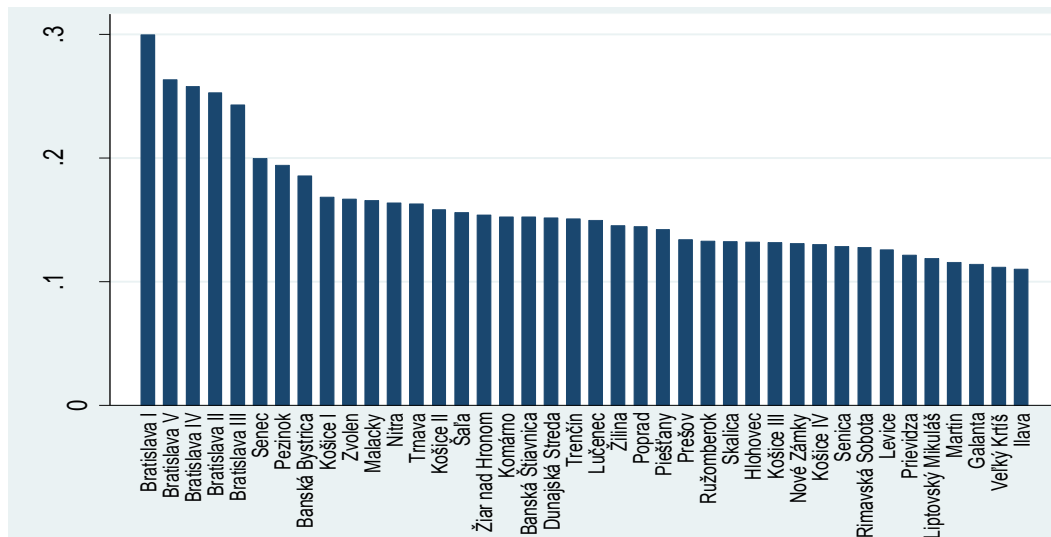
Source: Own calculation based on the data from the Statistical Office of the Slovak Republic.

Tab. 2 Results of cluster analysis

Longer distance (10)	*Shorter distance (5)*	*Regions included into each cluster:*
Cluster I	Cluster 1	Bratislava I, Bratislava II, Bratislava III, Bratislava IV, Bratislava V
Cluster II	Cluster 2	Svidník, Vranov nad Topľou, Snina, Bardejov, Kysucké Nové Mesto, Stará Ľubovňa, Bytča, Sabinov, Humenné, Stropkov, Levoča, Medzilaborce
	Cluster 3	Žarnovica, Žiar nad Hronom, Lučenec, Rožňava, Tvrdošín
	Cluster 4	Trebišov, Veľký Krtíš, Sobrance, Čadca
Cluster III	Cluster 5	Gelnica, Myjava, Banská Štiavnica
	Cluster 6	Levice, Topoľčany, Bánovce nad Bebravou, Nové Mesto nad Váhom, Púchov, Považská Bystrica, Ilava, Partizánske
	Cluster 7	Kežmarok, Poprad, Krupina, Turčianske Teplice, Michalovce, Prešov, Prievidza, Ružomberok, Liptovský Mikuláš, Dolný Kubín, Spišská Nová Ves, Rimavská Sobota, Brezno, Detva, Hlohovec, Senica, Skalica, Košice - okolie
Cluster IV	Cluster 8	Žilina, Zvolen, Trenčín, Martin, Banská Bystrica, Košice I, Košice II, Košice III, Košice IV
	Cluster 9	Nitra, Trnava, Piešťany, Pezinok, Senec, Malacky
	Cluster 10	Dunajská Streda, Nové Zámky, Šaľa, Komárno, Galanta, Zlaté Moravce

Source: Own calculation based on the data from the Statistical Office of the Slovak Republic.

The interpretation of results of cluster analysis could be often difficult. However, we know the fact that regions which are similar with respect to sectoral structure are included into same cluster. The regions in first cluster are clearly the most developed ones. Than we have also other better developed regions, especially in cluster 8 and cluster 9. For example the share of professional, scientific and technical activities as well as industry sector is relatively high here. There are also some regions with some focus on agricultural, forestry and fishing. These regions could be seen especially in Cluster 10. The geographically neighbouring regions are mostly included into same clusters as well. For example most of the regions from East Slovakia are clustered in Cluster 2. Similarly, regions from south-west Slovakia are included in Cluster 9 and Cluster 10.

Conclusions

The business structure according to different sectors seems to be an important factor affecting current innovation potential of the regions. NUTS 4 regions with higher proportion of Professional, scientific and technical activities are often the leading ones in innovation potential. This could be true especially due to knowledge creation and acquisition which is inevitable circumstance for creation of innovation. Our analysis shown, that in Slovakia there are rather significant regional differences with respect. As expected, especially the regions of Bratislava have significantly higher share of firms with the focus on professional, scientific or technical activities. On the other hand, especially some region in the east of Slovakia is significantly lagging behind in this indicator.

As we have found there are significant differences among the regions in the shares of different sectors. The results of cluster analysis suggest that all NUTS 4 regions of Bratislava are significantly different from the other regions. We can also identify other 9 different clusters. The similar regions which are in the same cluster could be threated similarly with respect to innovation potential. This is the key recommendation for national and local innovation policies arising from our analysis.

Endogenous factors as agglomeration and clustering is a critical driving force for achieving increased regional productivity and thus the tailoring of polices to support regional endogenous development and growth.

Acknowledgment

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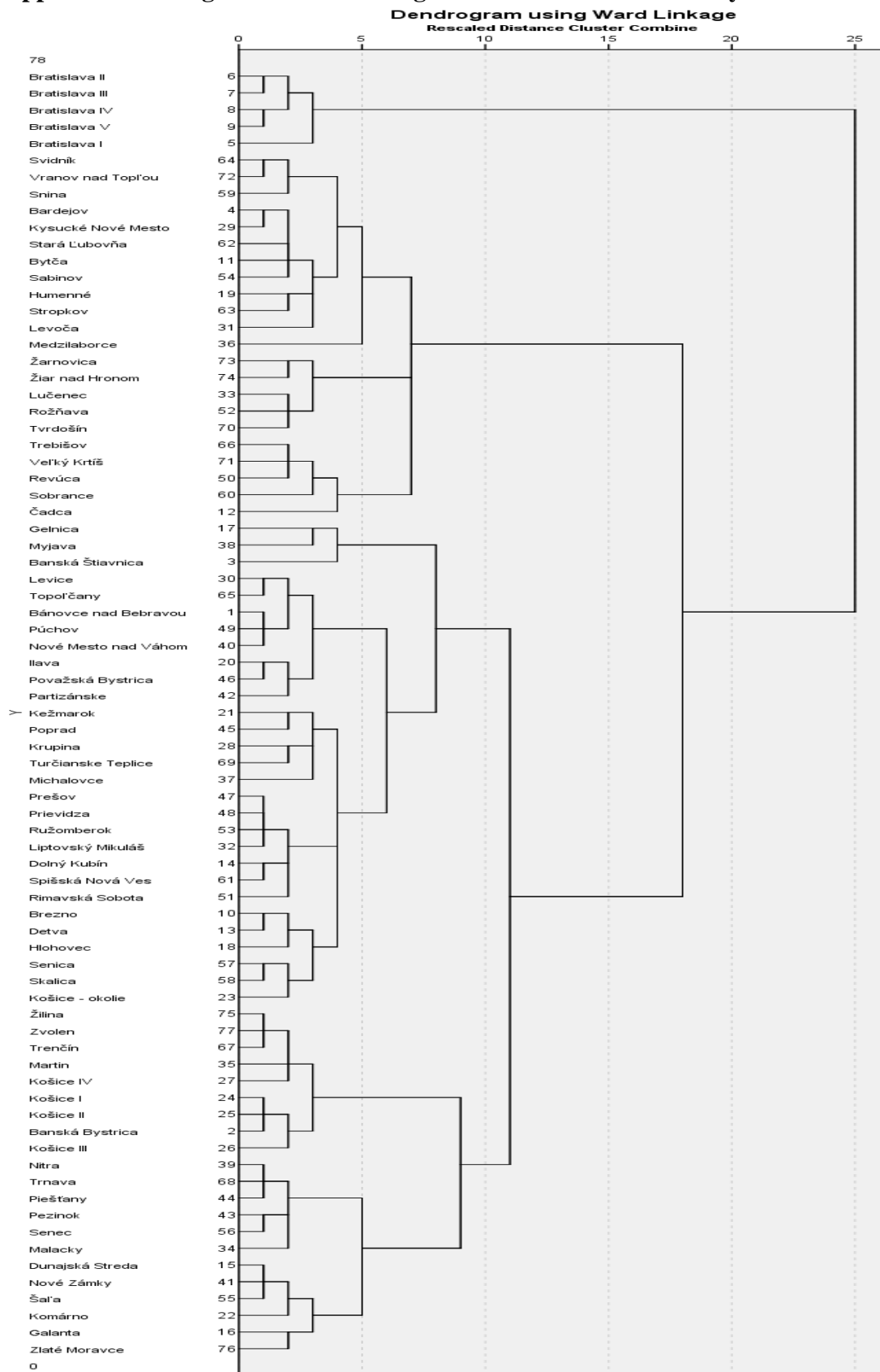
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Appendix Dendrogram of NUTS 4 regions in Slovakia clustered by

Source: Own calculation based on the data from the Statistical Office of the Slovak Republic.