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IDENTIFICATION OF PROSPECTIVE INDUSTRIAL CLUSTERS IN SLOVAKIA

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A B S T R A C T

Clusters became an integral part of regional policies intended to build and strengthen competitive advantages within specifically identified geographical areas. They are still considered crucial for economic development and employment, although their orientation has slightly changed as the distance and geographical boundaries lost their importance. This article analyses crucial regional data that indicates potentially beneficial economic concentrations as an assumption for the preparation of prospective clusters in Slovakia. Potential clusters were identified based on significant employment concentrations of particular regional industries that appear extraordinary when compared with national employment and the dynamic development within the selected time frame. Prospective clusters were identified, and opportunities of their development were described, including the harmonisation with the current regional and urban strategy. Analysing absolute and relative quantities in employment, sections and divisions of SK NACE were used for the proper identification of industries. The location quotient served as a tool for the spatial concentration of employment in the Banská Bystrica region, the threshold value for the selection of cluster candidates was set to 2. The shift–share analysis was used for the identification of long-term changes in employment, and 10% of the most dynamic industries were presented at the level of divisions once and then, at the level of sections of SK NACE. Forestry and logging, the manufacture of wood products and the manufacture of basic metals were confirmed by both methods as significant concentrations. The result partially corresponded with the previously active and currently inactive cluster in Banská Bystrica, which was focused on mechanical engineering, still significant when considering numbers of companies and employees as well as sales. Forestry was the most concentrated industry, while the wholesale and retail trades were the most dynamic. Forestry, logging and manufacture of wood products might be strongly interlinked with the current entrepreneurial and social strategy of self-governing regions that is still at the stage of potential cluster identification and fitting to its priorities. The article assumed basic quantitative methods utilised for the identification of prospective clusters. It confirmed the practicality of their application, the gravity of data processing and also certain possible limitations due to the extraordinary focus on the employment concentration. According to the analysis and gained results, the former cluster in the Banská Bystrica region was confirmed as the potentially significant actor in the regional policy (although, currently, having no industrial or public interest) and the new cluster candidates were identified. Outcomes indicated the need to continue the research with a more detailed examination of qualitative aspects that could complete the effort by focusing on clusters not only having higher employment statistics but also the support from regional institutions, also reflecting the preferences of businesses.

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INTRODUCTION

The concept of cluster development is considered an important element in the national economic structure of the European Union (EU) Member States. The main task of a cluster is to obtain a local, regional and global synergistic effect of a group of interrelated institutions. Clustering should help to increase the operational effectiveness of entities that are members of a cluster as well as increase their competitiveness,

innovation, development, production and dissemination of knowledge and experience, and to contribute to the overall economic growth of the region. In developed EU countries, current trends in the planning of regional development policy are based on supporting the creation and cluster building. Trends represent a significant shift from the traditional approach, such as the creation of regional development programmes aimed at promoting the development of individual enterprises, to regional policies based on cluster support. A cluster-based policy understands businesses and the industry as a system. It focuses on developing strategies designed to promote an efficient allocation of scarce resources for the economic development of regions and provide tools to strengthen the industry in the region.

The history of clusters in Slovakia is relatively short. The first cluster was introduced in 2004, the next industrial clusters emerged in 2008 and were followed by others. After the period of intensive state support of cluster establishment in 2008–2012, the frequency of cluster establishment declined in Slovak regions. The difference in the structure of the industry in Slovak regions and their unequal development played a part in the diverse intensity of clusters creation. Since 2004, only one industrial cluster was established in the Banská Bystrica region, which only operated for several years. Due to the expiration of support from the EU Structural Funds, regional and municipal support stopped, and the cluster has been only hibernating. After the years of factual non-existence of industrial clusters in the Banská Bystrica region, with the introduction of RIS 3 strategy and other initiatives, the need and effort arose to identify and establish new industrial clusters.

The paper aims to analyse the historical aspects of cluster establishment in the Banská Bystrica region, to identify the prospective clusters based on the shift-share analysis and the location quotient and compare the results with the current regional and urban strategy. The research results present the scientific approach to the identification of prospective (potential) industrial clusters as the basis for managing regional strategies.

The methodology for the identification of potential clusters in the region is diverse and continues to change with new emerging approaches. The paper used the location quotient and the shift–share analysis. Even though they are relatively simple, the methods are proved and can be applied to a region with a limited scope of quantitative characteristics of the industry.

1. THEORETICAL BACKGROUND FOR CLUSTERING

Already in the early 20th century, the great British economist Alfred Marshall addressed the issue of corporate grouping in certain sectors in specific geographical areas (districts). This was due to localisation economies which manifested as an attraction (benefit) for companies supplying inputs and specialised services for the industry, allowing the creation of a specialised workforce with the necessary knowledge and skills in the sector, but also an effective transfer of knowledge between companies.

Clusters represent a complex form of a (mostly) industrial organisation, in which social ties (the community), productive networks of local enterprises, and the web of local institutions and collective agents form a co-operative and competitive density. Porter (1998) defined a cluster as a geographically close group of interconnected businesses, specialised suppliers, service providers and associated institutions in a particular sector and businesses in related industries that are competing, collaborating and sharing common features. The OECD (2001) defined a cluster as a network of interdependent companies and institutions producing knowledge or geographically concentrated similar or related companies active in business transactions, communication and dialogue, sharing specialised infrastructure, labour markets and services, and having common opportunities and threats. The European Commission (2007) defined a cluster as a group of cooperating and competing independent companies and associated institutions locally concentrated in one or several regions; however, clusters may also be of global scope, specialised in specific industrial sectors linked by common technologies and knowledge, and be either knowledge or industrial.

Initial definitions of clusters included two important criteria by which a cluster was defined. Firstly, businesses could be cooperating within a region (spatial area) or across borders, and secondly, the cooperation was between enterprises of the same industry. This concept was outgrown long ago, as both geographical and industrial restrictions were a limitation of further growth and common cooperation.

Enterprises do not cooperate only with each other but also with research institutes, universities and local governments (Ferencz, Dugas & Turisová, 2013; Sölvell, Lindqvist & Ketels, 2006). Authors John

and Pouder (2006) specified the form of such a collaborative network as an industrial cluster, although stakeholders may also cooperate in different modes and forms (Šebestová et al., 2017). Local actors, in addition to suppliers, competitors and customers, may include complementary institutions, such as banks, research institutions and vocational training organisations (Amin & Thrift, 1994, cited in Andersen & Bøllingtoft, 2011). Localised advantages and global competitive advantage are often combined. Clusters facilitate knowledge spillovers as they are mediated by the proximity and multiplex relationships between enterprises and other institutions (Andersen & Bøllingtoft, 2011). The mixture of potential stakeholders offers plenty of opportunities for ways how a cluster may be organised and on which activities to be focused. Thus, nowadays, strictly technological clusters engage with non-manufacturing actors, forming various knowledge, financial, culture or creative types of clusters. A typical manufacturing cluster lost its popularity in the period of the knowledge economy and following the industry 4.0 to meet new trends leading towards the mass customisation and servitisation (Park, 2018).

Growth or decline in any of the sectors where a cluster may be established certainly have a significant impact. In the case of positive development, new clusters may arise due to technological innovations, capital and labour productivity, location benefits, changes in product demand, and shifts in input costs which directly or indirectly affect the overall growth of the economy (Bartik, 2004). Thus, such potential heterogeneity of influences requires clusters to be dynamic, with some necessarily condemned to finish their life-cycle and others newly emerging, setting them apart depending on technological progress or changes in the lifestyle of society.

The core of all successful clusters consists of many common elements and bonds, of which the most significant is the understanding that clusters should be led by business and public leaders and the understanding of the importance of cooperation and competition between cluster members as well as knowing that the cluster approach is a system where all participants play an equally important role.

Several authors agree that companies tend to concentrate near similar businesses (including direct competitors) and institutions and build mutually beneficial relationships. This is a fundamental difference between a concentration and a sectoral cluster. The main feature of a cluster is that it is based on a systematic relationship between businesses as opposed to a simple concentration. These relationships are built on similar or complementary products, production processes, technologies and demand for natural resources, specific qualifications or distribution channels. A geographical concentration of economic actors allows personal contacts but also cheaper and more flexible deliveries (SIEA, 2009). It is indubitable that a purely quantity-oriented approach is incorrect as it could lead to forcibly created artificial clusters; on the other hand, the literature emphasises a more in-depth understanding of industry linkages (Munnich & Iacono, 2016) or a mix of quantitative and qualitative factors (Täucher & Laudien, 2018). In this article, the concentration of businesses is considered the basis for the identification of potential clusters, supplemented with a proper linkage to current strategic perspectives and priorities of regional self-governance institutions.

Geographically clustered enterprises must cooperate while they compete (Mesquita, 2007, cited in Felzensztein et al., 2012). Institutional aspects, formal organisations such as trade associations and the presence or absence of social capital, may play a critical role in creating the right environment and then influencing the climate for cooperation in regional clusters (Bergman & Feser, 1999). Entrepreneurship in cluster formation is important with respect to new products and approaches to new markets. It is well known that entrepreneurs with business experience are more likely to build a sustainable business in a cluster (Lesáková, 2014). The public policy support of this entrepreneurial behaviour in clusters is also a very important element for successful clusters (Stam, 2009, cited in Felzensztein et al., 2012).

It has been argued by various authors that clustering confers many advantages to participating enterprises (Jacobs, 1969; Moretti, 2011). It is well known that co-location results in lower transportation and transaction costs as travel, time and increased trust should produce lower costs. Clusters can also attract the required skilled labour, the mobility of which can enhance the exchange of ideas and knowledge throughout the cluster. There is also a possibility of un-traded benefits, such as cooperation, learning and resource sharing. They are sometimes referred to as either embedded benefits or "un-traded interdependencies." The literature on clusters also emphasises numerous benefits for small businesses. This is especially the case given their resource constraints, the absence of internal specialisation and relatively weak supplier and market power (Blackburn & Conway, 2008, cited in Felzensztein et al., 2012). Many

recent studies focused on different aspects of cluster influence on enterprises (enterprises inside and outside the cluster). Most of them consider the innovation intensity and productivity (Hervas-Oliver et al., 2018; Knoben et al., 2016; Rigby & Brown, 2015) or employment, including labour mobility and wages (Power & Lundmark, 2014).

On the other hand, potential clusters should also consider threats or disadvantages. Lee (2009) found that being in a cluster has a negative effect on the intensity of a company's research and development (R&D) or some enterprises in clusters may face difficulties accessing resources at reasonable terms (Arthur, 1990). The same was stated by Žižka and Rydvalová (2014) mentioning that there were more variables supporting the intensity of innovations than just a cluster membership, and there were no significant changes in the growth of implemented innovations. It must be aded that for various reasons, wages were usually higher in clusters when compared with those of employees working for more isolated enterprises (Freedman, 2008). Moreover, a relatively high probability of conflict was determined, which was mainly due to the coexistence and interaction of streams of cooperation and competition in the relationship between concentrated parties (Cygler & Sroka, 2016), even more so in the case of direct competitors.

Some of the above-stated relations, pros and cons of cluster activities were difficult to examine under Slovak conditions due to the lack of data. The low number of active clusters, their higher/lower importance within the regional economics, a low number of clustered companies and short cluster history resulted in insufficient data for certain generalisation (Lesáková et al., 2017). Consequently, in the case of prospective clusters, it is even more important to consider all aspects of cluster establishment (advantages and disadvantages) to avoid the potential wasting of time and capital, expecting unfeasible results.

2. Methods for identification of prospective clusters

The methodology for the identification of prospective clusters is rather varied, considering either quantitative or qualitative approaches, both having certain limitations and disadvantages. New methods or indices are constantly created, based on different statistical processing or different entry data. Most of the methods identify cluster opportunities only based on the geographical concentration of industrial activities while ignoring the relations between companies, on which clusters are conceptually based (Malmberg & Maskell, 1997). The international scientific literature on cluster identification (Lindqvist et al., 2008; Sölvell et al., 2009) offers the methodology based on the territorial concentration of such economic indicators as the number of enterprises, availability of labour force, the total employment or the concentration of added value, summarised depending on a regional area, namely, a region, state, district or land (Maggioni & Riggi, 2008). Other authors also explain the unequal distribution of specific economic activity in space (Bottazzi et al., 2007; Bottazzi & Gragnolati, 2015), although different definitions of space/spatial issues, economic activity, threshold values and common relations between stakeholders make it impossible to identify a generally acceptable approach.

The Gini coefficient (Krugman, 1991) is considered one of the simplest methods for the identification of geographical concentration. The Ellison-Glaeser index is more sophisticated as it also involves the size of enterprises and measures the overall manufacturing clustering and industrial concentration, whose values are comparable across industries and levels of the geographic aggregation (Ellison & Glaeser, 1997). Duranton and Overman (2005) focused on distance-based measurement, developing an index using the bilateral distance density. They measured the distribution of geographical distances between pairs of enterprises in industry and compared these distributions with a hypothetical random distribution.

The location quotient is also one of the simpler methods as it quantifies the regional specialisation and the strength of a cluster while being applied on national or regional levels (Brenner 2006; Crawley et al., 2013). Stronger localisation of the certain industry makes good assumptions for the prospective cluster establishment (such approaches for the identification of clusters are used also by the US Cluster Mapping and the European Cluster Observatory). A similar spatial orientation is examined within the G Statistics or the shift-share analysis.

The G Statistics quantifies whether a region and the surrounding regions show high or low values of activity. It considers activities in the surrounding regions for estimating the cluster strength in a region (Getis & Ord, 1992). The shift-share method, which analyses regional growth, was offered by Creamer in

the 1940s and summarised by Dunn in 1960s (Shi & Yang, 2008). It does not only consider employment but also analyses its dynamics in time.

On the other hand, methods are available that identify the linkages between industries and the intensity of supply chain relations (the input–output analysis). But all methods are considerably dependable on available data, as the extent and details of a dataset influence the punctuality of the research. NUTS or other similar classifications are more detailed, offering more data yet requiring more effort for more complex processing. However, even the region's specialisation is more accurately explained.

Other authors (Täuscher & Laudien, 2018; Munnich & Iacono, 2016; McRae, 2004) stressed the necessity to identify clusters according to the combination of quantitative and qualitative characteristics, which means that in the case of qualitative research, expert methods must be used to process the data that is impossible to be measured directly in a numerical way. As the following analysis did not focus on primary questioning and other qualitative approaches, therefore, these methods were not described in detail; however, the authors were aware that the preparation and establishment of a cluster could not be subjected to a pure spatially intensive business activity but should also consider other factors (non-numeric). Nevertheless, the use of various methods to ask local actors about what they see as dominant or vital to the economy can reinforce or alter the results of the quantitative analyses (Britton, 2003). Thus, in the end, the outcomes from the analysis were confronted with the strategic priorities of the self-governing Banská Bystrica region.

3. Research methodology

The method of documentary analysis was used to study the literature related to clusters and relevant methods for prospective cluster identification. The industry's homogeneity (sections and divisions of SK NACE), the geographical area (the Banská Bystrica region) and the quantity (absolute and relative quantities of employment) were used as criteria for potential clusters. From the methodological perspective, the location quotient was used based on the total employment and the shift–share analysis (certain simplification in their application was considered and the results were presented individually and compared at the end).

The location quotient represented the local extent, to which the region was specialised in the appropriate industry. It expressed the uniqueness of such industry in comparison to its position in the national economy or the national average employment. In most cases, it was expressed as the relative importance of employment in the region in comparison to its national importance.

The location quotient of 1.0 meant that the region was not specialised in such industry and its employment was comparable with its development on the national level (the standard distribution close to the normal distribution of employment in regions). The index bigger than 1.0 represented the higher importance of the industry's employment and identified a potential cluster of similar companies on the regional level. It was assumed then that the regional cluster cumulated the economic activity of the same type. For the identification of potential clusters, authors like Bergman and Feser (1999) recommended the location quotient of 1.25 and Isaksen (1996) suggested more than 3.0. The following analysis relied on the recommendation of the European Cluster Observatory, according to which the location quotient should exceed the value of 2.0. Such a statement was confirmed even by Sölvell (2008). Thus, the potential clusters in the Banská Bystrica region were be identified based on the number of employees in each sector (divisions and sections of SK NACE).

The shift–share analysis revealed that part of employment in the industry or cluster (based on the number of employees), which resulted from national, regional or sectoral trends (or competitive advantages). It helped to consider the overall regional performance in comparison to other regions and identify cross-regional problems that could be considered by all policymakers on regional or national levels (Potomová & Letková, 2011). The shift–share analysis quantified the total change in employment and split it into national, industrial and regional effect (Karlsson, 1999; Matáková & Stejskal, 2012).

The limited validity in time is the main disadvantage of such a method (Yasin et al., 2004), as well as its predictability, which is close to none. It may only have some theoretical contribution when applied without considering the regional situation. The identified effects stem from the following relations:

$$NS_{ir}^{t} = E_{ir}^{t-1} x \left(\frac{E_{SK}^{t}}{E_{SK}^{t-1}} - 1 \right) \qquad (1)$$

$$IM_{ir}^{t} = E_{ir}^{t-1} \times \left[\left(\frac{E_{iSK}^{t}}{E_{iSK}^{t-1}} \right) - \left(\frac{E_{SK}^{t}}{E_{SK}^{t-1}} \right) \right] \qquad (2)$$

$$RS_{ir}^{t} = E_{ir}^{t-1} \times \left[\left(\frac{E_{ir}^{t}}{E_{ir}^{t-1}} \right) - \left(\frac{E_{iSK}^{t}}{E_{iSK}^{t-1}} \right) \right] \qquad (3)$$

where:
NS = national share,
IM = industrial share,
RS = regional share,
t = time period
i = industry
r = region
ESK = total employment in Slovakia
EiSK = total employment in industry
Eir = total employment in the region

Although some authors prefer the dynamic shift-share analysis as a more appropriate research method splitting longer period into shorter seasons (Barff & Knight, 1988), this article used its static form.

4. RESEARCH RESULTS AND DISCUSSION

4.1. HISTORY AND THE CURRENT STATE OF CLUSTERS IN THE BANSKÁ BYSTRICA REGION

The first cluster initiatives in Slovakia started after 2004, with most clusters created in 2008, 2009 and 2012. These years correspond to the periods when support schemes for the emergence and functioning of clusters were announced, allocating financial resources mainly from the EU funds. Since 2004, the government issued several documents to support the emergence and functioning of clusters: the Innovation Strategy of the Slovak Republic for 2007–2013 (consisting of two consecutive innovation policies) and the Research and Innovation Strategy for Smart Specialization of the Slovak Republic (RIS 3). RIS 3 is the framework strategy document for the promotion of research and innovation in the programming period 2014–2020 and serves as the basis for the development of operational programmes. The issue of cluster development in Slovakia is a part of RIS 3, while the growth of existing and creation of new cluster initiatives is included under the measure 1.1.

The development of innovative capacities through cooperation between companies and research institutions is under measure 3.2. Supporting research and innovation in environmental matters, including adaptation to climate change.

Since the year 2004, only one cluster was officially established in the Banská Bystrica region, namely, the First Slovak Engineering Cluster. It was created in 2008 as an initiative of the local authority of the region. The memorandum was signed by the local authority of the Banská Bystrica region, ten engineering companies, one research and development organisation, one consultancy company, eight secondary schools focused on engineering and the Technical University of Zvolen. In the beginning, the cluster had 22 members. Unfortunately, the cluster operated only for several years, and after the decrease in the financial support provided by the local authority of the region, the cluster stopped all the activities.

The Banská Bystrica region also had another cluster initiative centred around the aluminium processing of (not yet a formalised cluster organisation). The cluster formed around the aluminium producer ZSNP in Žiar nad Hronom. This innovative cluster motivated the establishment of the scientific competence and innovation centre INOVAL by the Slovak Academy of Science (Institute of Materials and Machine Mechanics) in 2011 to cooperate with the companies in the area of scientific research and innovation projects as well as the commercialisation of innovative solutions.

Despite evident effects of cluster operations, they have insufficient support in Slovakia as well as no systemic approach to this issue. Although many official documents declare the importance of clusters for the economic growth and competitiveness as well as the need to support them, the real implementation of incentives aimed at the creation and development of clusters in practice inexistent (Klement et al., 2016). Therefore, clusters in the Slovak Republic primarily result from natural needs, especially sectoral collaboration, rather than targeted state support of cluster initiatives.

4.2. IDENTIFICATION OF PROSPECTIVE CLUSTERS IN THE BANSKÁ BYSTRICA REGION ACCORDING TO THE EMPLOYMENT CONCENTRATION

The analysis was based on the data gained from the Statistical Office of the Slovak Republic. The data

Employment structure according to regions in 2016
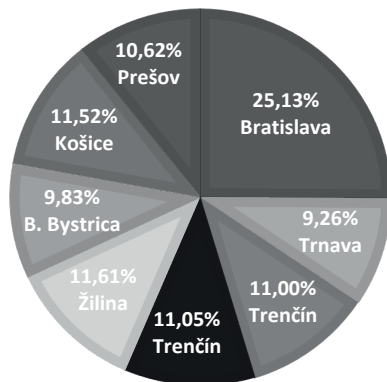
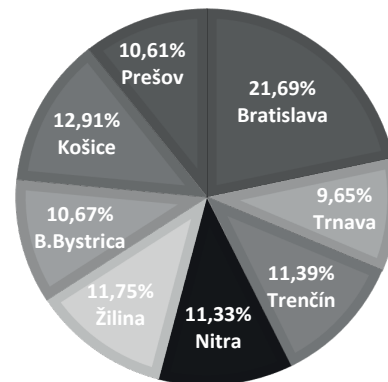Employment structure according to regions in 2009

Fig. 1. Structure of employment according to regions in 2016 and 2009
Source: elaborated by the authors based on data of the Statistical Office of the Slovak Republic.

covered the development of employment in the Banská Bystrica region during 2012–2016, so the analysis also focused on changes in time. Employment data covered all types of companies and other organisations regardless of the company size and according to their prevailing activity. Data did not cover employees of self-employed business owners.

The total employment in Slovakia went up by 0.32% in 2016 compared to 2015. In comparison to 2009, the shift was even higher and reached + 15%. In both years, the Bratislava region had the biggest share on the total employment (25.13% in 2016, 24.24% in 2015, 21.69% in 2009), the smallest share in the total employment belonged to the Trnava region (9.26% in 2016, 9.67% in 2015, 9.65% in 2009).

During last two years, an increase in employment was noticed in all regions except for Trnava and Košice, while the Bratislava region had the biggest increase (+6.9%) and the Trenčín region had significant growth as well (+5.5%). In Trnava and Košice regions, the employment was in decline (-1.2% and -1.24%, resp.).

Employment in the Banská Bystrica region indicated the same trend as in most other regions, namely, a gradual, although a slight increase in employment. The industrial production had the biggest share of the total employment (30%). The shares of particular industries in the total industrial production were rather low, which indicated a lower regional industrial specialisation and rather general distribution of employment within the region. The manufacture of basic metals had the biggest share (4.11%) of employment, while the total industrial production had 30%. Wholesale and retail trade (according to the SK

NACE division) was the second biggest employer in the region with 13.88%, and the public administration had 12.17%, which ranked it third.

In comparison with 2015, the significant decrease in employment was quantified in financial and insurance activities (-29%), real estate activities (-17%), transportation (-9.85%) and agriculture (-7%). Industrial production/manufacturing grew by 8.5%, water supply by 69%, administrative and support activities by 32% and construction by 14%, although some minor sectors had lower initial employment, thus the increase may have seemed significant.

As already mentioned, firstly, the location quotient was used to identify prospective clusters. According to processed data, there were four potential clusters in 2016, 2015, 2013 and three in 2014, 2012, although the industries changed a bit. Other industries with lower quotients are not presented in the chart, as the analysis focused only on potential clusters and the gap in quotients was too big in the case of remaining industries.

In 2016, the importance of forestry and logging grew, but the manufacture of wood significantly declined, which indicated the growth in timber harvesting or "raw wood" production and limited processing ability of the region as the manufacture of wood products declined. On the other hand, the manufacture of furniture is not presented in the chart, as it was under the level of the desired quotient, but its value increased since 2015 by 0.62 and reached 1.86. Therefore, the above-mentioned statement should be amended and interpreted also in the frame of this even more sophisticated production.
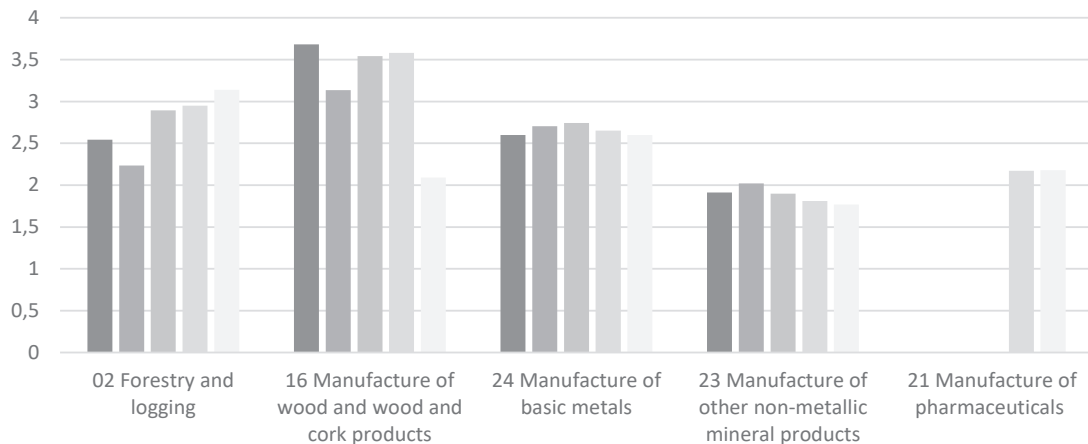
Fig. 2. The highest location quotients in Banská Bystrica region

Source: elaborated by the authors based on data of the Statistical Office of the Slovak Republic.

It should be mentioned that the Statistical Office of the Slovak Republic did not publish forestry data of one region; thus, the employment of the previous year was used instead. As employment in the Banská Bystrica region continually grew while it declined in the missing region, it is probable that the calculated quotient was underestimated. The manufacture of basic metals was rather stable in time, while the manufacture of other non-metallic mineral products was not considered a cluster candidate in recent years. On the other hand, in 2015 and 2016, the manufacture of pharmaceuticals emerged among potential clusters. According to Fig. 2, this industry was not presented in previous years because similarly to the case with the forestry, the related employment data in the Banská Bystrica region was not published by the Statistical Office of the Slovak Republic due to some confidentiality reasons. Values from the past were not used as the trend (increase or decrease) was not obvious.

According to Fig. 2, wood processing activities recorded the biggest downfall in the quotient's value (not the total employment, but the regional importance of employment after it was compared with the national employment). It went down by 1.6. The opposite trend was noticed in forestry and logging (+0.6). On the other hand, the manufacture of basic metals slightly fell (-0.003), and the quotient for the manufacture of non-metallic mineral products indicated a non-prospective cluster candidate (-0.14).

4.3. Identification of prospective clusters in the Banská Bystrica region according to the shift–share analysis

While the previous chapter identified potential clusters according to the development of employment (although including some dramatic changes during the long-term period, but still fixed individually in each year), the shift-share analysis considered even a longer period, and its outcomes were influenced preferably by the dynamics in the regional employment between 2009 and 2016.

This method was (similarly to the location quotient) based on the employment data as according to Isaksen (1998), clusters are more probably to be found in the case of extraordinary employment or more concentrated production, which enables the regional specialisation and establishment of local production networks. On the other hand, this analysis was not limited only to industrial sections (even though their dominance was confirmed in the previous chapter), as they can also be effectively supplemented by various commercial or public services.

The wholesale and retail trade section was the most dynamically developed activity in the Banská Bystrica region during 2009–2016, with a regional contribution of +2295 working places (the total employment grew by 8326 employees). Except for the sale of household goods, these activities cover the maintenance of motor vehicles and supplementary trade activities (deliveries assembling, packaging or holding in storage).

Tab. 1. Prospective clusters in the Banská Bystrica region

SECTION/DIVISION	NATIONAL EFFECT	SECTORAL EFFECT	REGIONAL EFFECT	TOTAL
A - Agriculture, forestry and fishing	873	-1858	490	-496
E - Water supply, sewerage, waste management	435	-28	1892	2299
G - Wholesale and retail trade	1867	4163	2295	8326
O - Public administration and defence	2661	-2924	850	587
C24 - Manufacture of basic metals	237	105	1752	2094
C31 - Manufacture of furniture	222	-261	780	741
E38 - Waste collection	162	133	2074	2369
F41 - Construction of buildings	102	-19	2150	2233
G47 - Retail trade	1101	2120	1345	4566

Source: elaborated by the authors based on data of the Statistical Office of the Slovak Republic.

Water supply, sewerage and waste management was the second most important section with a regional contribution of +1892 jobs (although, the total effect on employment was +2299 jobs). In Slovakia as a whole, the wholesale and retail trade utilised the positive growth of the sector (+4163) while the water supply, sewerage and waste management section lost some jobs (-28).

The public administration was the third most dynamic section according to the long-term changes in employment, and thanks to regional shifts, it gained 850 working places. Its employment from the point of view of a sector underwent an annual decline, and this trend pulled the regional employment down (-2924). Thus, the total employment did not increase as intensively (+587) as it was in the case of trade activities (+8326). More results of the analysis are presented in Tab. 1.

The industrial production (C) was not a dynamically developed section but had two dynamic divisions — manufacture of basic metals and manufacture of furniture (confirming the interpretation from the location quotient about the increase of its importance). Also, water supply, sewerage and waste management and the wholesale and retail trade activities had one representative within the group of dynamically developed divisions.

Surprisingly, the second highest regional contribution and regional effect in employment were found in the construction of buildings with the total increase of 2150 workplaces and the total effect of 2233 jobs (although, the sector generally decreased in Slovakia). Waste collection regionally reached +2074 new jobs (confirming that this activity alone helped the development of the whole section E) and the manufacture of basic metals had +1752 jobs. Although the region did not help the development of employment in the retail trade as intensively ("just" +1345 jobs), the division took advantage of the positive national development (+ 1001) and the development of the sector (+2120), thus reaching the total employment increase of 4566 jobs between 2009 and 2016.

Consequently, it can be assumed that quantitative methods can be used to reveal trends and identify extraordinary business concentrations. However, if companies are unable to follow the same path, join forces or have the same vision, no clusters would probably occur despite the potentially favourable environment and intensive employment. Even a somewhat stable industry with a huge regional share of employment (or a dynamic industry with a lower share of employment) can be a good cluster candidate when enough stakeholders are engaged.

As already stated in the literature review, quantitative methods were considered a single part of cluster identification. The forcible support of huge concentrations just because "there are so many businesses" could be misleading. The confrontation with current strategies implemented by national, municipal and regional institutions may significantly change the possibilities to create new clusters. While the national strategy for SMART specialisation (RIS 3) is rather general (focused on manufacturing, key enabling technologies, ICT, services, sustainable innovations) and similar to other European countries, it opens more possibilities for towns and regions to specialise and create their own competitive advantages. Banská Bystrica, as the centre of the region has no specific industrial strategy. Its primary industrial park is open for every investor and currently hosts companies primarily from the pharmaceutical, mechanical engineering and construction industry. Although it fully confirms the results of the analysis and demonstrates the fact that significant employment rates observed in

the past are still increasing through the integration of foreign investors, it is rather a coincidence and a result of generic development. Although the forestry or furniture manufacturing is not as intense in Banská Bystrica, it may have more benefits and faster development in smaller settlements (forestry, logging) in eastern districts and the second biggest town of Zvolen and its surroundings.

CONCLUSIONS

Despite the clear effects achieved by operating clusters, their support in Slovakia is insufficient, having no systematic approach. Although many official documents declare the importance of clusters in the economic growth and competitiveness as well as the need to support it, the real implementation of incentives aimed at the creation and development of clusters is lagging. Clusters in the Slovak Republic primarily arose as a result of natural needs, especially the sectoral collaboration, rather than a result of targeted state support of cluster initiatives.

The history of clusters in Slovakia is somewhat short: the first cluster was established only in 2004. In 2008, the First Slovak Engineering Cluster in the Banská Bystrica region was established, which only operated for several years. Although there were some other cluster initiatives, up to now, no clusters were officially created in this region. Using the selected methods of prospective cluster identification, the changing potential of industry sectors was analysed, identifying those that promised the highest potential for the cluster establishment in the Banská Bystrica region.

The location quotient and the shift–share analysis are simple instruments used for the identification of prospective clusters within strictly specified geographical areas and selected periods. The undertaken one-time analysis focused on the data of 2012–2016 (with a partial comparison from the point of view of the development in time) was completed with an analysis of dynamics in long-term development. In some sections and divisions, similar results were revealed, while other results significantly varied.

The manufacture of basic metals was a significant industry in terms of regional employment (in all years), and its importance also increased since 2009. Other industries (forestry and logging, manufacture of wood products, manufacture of non-metallic products) were either large employers (in the case of location quotient analysis) or changed dynamically during the time (wholesale and retail, construction,

waste collection in the case of the shift–share analysis results). From the point of view of the regional strategy, the forestry and logging and the manufacture of wood products seemed to have received more support, which may boost underdeveloped regions and help with the effort to support the social economy as well as employ people partially excluded from the labour market.

Results of the analysis are strongly influenced by the extent of business activity, total employment, foreign investor contributions, education structures and other factors. In the case of developed regions, the number of potential clusters is much bigger than in the case of underdeveloped regions. The regional effect is three or four times bigger in the case of Bratislava than in the Banská Bystrica region. The shift–share analysis covered the period from 2009 to 2016, so the results were partially influenced by post-crisis development and the performance of some industries may be over-estimated. As the location quotient was calculated for more years, the analysis was able to exclude one-time effects to employment (post-crisis revitalisation, a sudden change of small initial employment, etc.).

As already mentioned, the continuity in the supply chain was not examined and the relations between supplying companies were not revealed. In some industries, the "flow of values" between companies was rather obvious (such as the integration of production and services, or further processing of basic raw materials), but sometimes, the interaction between companies was not known to a neutral analyst. Therefore, expert methods are necessary (panel discussions, case studies, etc.) for a more detailed analysis while the input-output analysis is efficient for the examination of cross-sectional relations, and in the case of geographical proximity, the Ripley's K method could bring interesting results as it considers distances and ignores regional borders.

Cross-sectional industries are frequently ignored by the location quotient and the shift–share analysis as they are not concentrated within the region but spread in more regions (so their employment results are also spread in those regions). This can also be a good opportunity for future research, as then, another type of a cluster may be identified and supported. On the other hand, it gives more possibilities to combined industries compared to a single industry-oriented cluster (INNO, 2010). It is clear that such relations are possible even in the case of the Banská Bystrica region (metals and machines more intensively in the past or wood processing nowadays).

As only the most attractive candidates (in terms of the regional effect) were summarised, some others are considered as not so dynamically developing within the scope of used methods. Regardless, integration of other players into the analysis and full supply chain coverage would characterise the cluster potential from other perspectives. Another possibility might also be given by the evaluation of inter-regional cooperation when the distances between companies are preferred, and administrative regional borders are ignored.

Slovakia is a small country with significant regional disparities. Political decisions made in the past created artificial regions with administrative borders. Thus, many methods bring strictly geographically defined results as the Statistical Office keeps records according to such borders between regions. In the case of areas with huge industrial activity (mostly abroad), it is a common practice to apply such methods within suburban areas or cities. The identified cluster members are clearly heavy concentrated as the area of a city and the area of a region are mostly incomparable (except for large metropolitan areas). On the other hand, the current trend of virtual or knowledge clusters may overcome whatever distance-related effects encountered by companies.

The presented data about the concentration of employment in analysed industries is only one out of many crucial factors, which are necessary for a factual creation and development of an industrial cluster. It is the willingness of member enterprises to cooperate or the level of mutual trust between potential competitors, which could be even more important for the establishment of clusters than the presented results based on the employment concentration.

Research outcomes bring a more scientific approach to the effort to equally develop the whole Banská Bystrica region and support even those parts that are considered underdeveloped. Results reflect the employment concentration and its dynamic development over the period of eight years and are indirectly linked to the current strategy of the Banská Bystrica self-governing region, as they are helping to develop its priorities.

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