

PERSPECTIVE CLUSTERS IN SLOVAKIA: THE CASE OF BANSKÁ BYSTRICA REGION

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Abstract. The paper focuses on the identification of perspective clusters in Banská Bystrica region. It uses national and regional data about the employment and analyses the regional and industrial share of businesses on the total employment (both in Slovakia and in the industry as a whole). It utilizes the static location quotient to identify the most concentrated employment in Banská Bystrica region in 2013 and 2014 and static shift-share analysis in order to quantify changes in the period from 2009 to 2014. The perspective clusters are identified through the share of industry's employment that is extraordinary in comparison to the national employment, or through the most dynamic regional contribution towards the change in employment.

Key words: clusters, employment, industry, location quotient, shift-share analysis.

Introduction

The association of enterprises is a common stage in the development of entrepreneurship. There are many motives for such processes and historically there were many forms, through which the companies were joining their forces. Since the early beginning the companies were thus trying to overcome trade barriers, to grow, to get financial benefits or to build other competitive advantages. Cluster initiatives, as one of such associating trends (regardless to a form of cluster or its geographical area), indicate some very similar features, among which the concentration in the same area, the availability of raw materials, educated labour force and know how, prevail the most (UNIDO 2015).

Based on the above stated basic outcomes for the identification of potential cluster candidates, it is recommended (by European Commission or USAid) to keep the following criteria during the analysis:

- same industry – the same or similar industry means that companies are facing to a common threats and challenges,
- critical amount – the number of members is relevant, as it leads to common cooperation and ensures the sustainability in the long term perspective,
- cover the value chain – the more intensive is the coverage of value chain, the better is the cooperation and the complexity of relations (inner and outer),
- geographical concentration – the longer are the distances between the cluster members, the lower is the interaction between them,
- cross-regional demand – products and services should be placed even on the non-local markets as the potential export increases the cluster's sustainability and further development of cooperation.

According to the Committee of the Regions (INNO 2010) among the above stated criteria we should add even the life cycle and the dynamics of the relations between members (even though it was partially involved in third paragraph).

In our opinion, not every criteria is critical in case of identification of potential clusters. The absence of some criteria is not absolutely excluding the possibility that any cluster may occur (at most it limits such possibility), thus every missing factor may be overcome. For example, nowadays many progressive industries are built upon the interdisciplinary approach. Automotive industry is not oriented on single industry, but it is rather cross-sectional type that integrates many other branches. And just the length and diversity of its value chain points out at the fact that such a product involves the cooperation of heterogeneous, but interconnected subjects. On the other hand, virtual interactivity enables to companies to cooperate even on longer distances, therefore also the local concentration may be sometimes considered to be a significant limit in case of potential clusters identification (it limits the identification if it is kept to strictly).

Basically, the choice of appropriate method for the identification of perspective clusters is coming out from the effort to respect above mentioned criteria. There exist a lot of methods for the identification of potential clusters, either quantitative or qualitative, both with certain limitations and disadvantages. The most of the methods identifies the cluster opportunities only according to the geographical concentration (location quotient) or according to the intensity of industrial activities as to the spatial concentration (INNO, 2010) and ignores the relations between companies on which the cluster is conceptually based (Malmberg, Maskell 1997). On the other hand, there exist methods identify-

ing the linkages between industries and the intensity of supply chain relations (input-output analysis, network analysis), methods quantifying dynamical development of employment (shift-share analysis) or distances between potential members of a cluster (Ripley's K-method). All methods are considerably dependable on available data, as the extent and details of dataset influence the punctuality of research. Of course, each method respects only several from the criteria mentioned above and thus they do not lead to the same or similar results. An industry may be intensively concentrated within the region, but rather stable, or it may evolve very dynamically from initially lower employment concentration.

Other authors (e.g. McRae 2004) stressed the necessity to identify clusters according to the combination of quantitative and qualitative characteristics, which means in case of qualitative research to use the expert methods and to process data that is not gathered as pure numbers. Many clusters in Slovakia came into existence as a top-down initiative of self-government regions, in harmony with regions' strategies and not through some quantitative analysis.

The following article focuses on the identification of potential clusters in Banská Bystrica region through the quantitative methods based on available public data about the employment in mentioned region.

1. The methodology of potential clusters identification

For the identification of potential clusters in Banská Bystrica region the method of location quotient and shift-share analysis were chosen. Those methods take into consideration specifics of each industry (as they are considered separately), critical amount of active businesses and regional concentration. Main advantages of these methods lay upon the simplicity of the computation, availability of data, and easiness of interpretation. On the other hand, as mentioned above, pure orientation just on numerical identification ignores the quality of relations between businesses and other stakeholders and sometimes may appear to others as an effort to group businesses forcibly and artificially.

As the criteria for potential clusters identification the industry homogeneity (sections and divisions of SK NACE rev. 2), geographical area (Banská Bystrica region) and the quantity (absolute and relative data on employment) were utilized. From methodological aspect the location quotient based on total employment was applied (with annual quantification), followed by the shift-share analysis (in longer time scope).

Location quotient represents region's specialization in appropriate industry and its size indicates potentially more intensive activities. It expresses the uniqueness of such industry in comparison to its position in national economy or national average employment. In most cases it is expressed as the relative importance of employment in the region in comparison to its national importance.

Location quotient of 1 emphasizes the fact that the region is not specialized in such industry and its employment share is comparable with its share on national level (rather equal distribution of employment in regions). Index bigger than 1 represents the higher importance of industry's employment and identifies potential cluster of similar companies on the regional level. It is assumed then that regional cluster cumulates 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) actually more than 3. Articles' outcomes rely on the recommendations of European Cluster Observatory, according to which the location quotient should exceed the value of 2. Such statement was confirmed even by Ketels et al. (2008). Thus the potential clusters in Banska Bystrica region are identified through the number of employees and the changes from the point of view of time development in last 3 years.

$$LQ = \frac{\left(\frac{\text{regional employment in the industry}}{\text{total regional employment}} \right)}{\left(\frac{\text{national employment in the industry}}{\text{total national employment}} \right)} \quad (1)$$

Shift share analysis reveals that part of employment in the industry or cluster itself (through the number of employees), which was caused by national, regional or sectoral trends (or competitive advantages). It helps to consider overall regional performance in comparison to other regions and identify cross-regional problems that should be taken into consideration by all policy makers on regional or national levels (Potomová, Letková 2011). Shift-share analysis quantifies total change in employment and splits it into national, industrial and regional effect (Karlsson, 1999). It was developed to help with great masses of data (Brown, 1969), so the analyst might identify more effectively the forces behind.

Limited validity in time is considered to be the main disadvantage of such method (Yasin et al. 2004), as well as its almost no predicting ability. It may have just theoretical contribution, when it is applied without taking regional situation into consideration. The identification of all three mentioned effects is coming out from following relations:

$$NS_{ir}^t = E_{ir}^{t-1} \times \left(\frac{E_{SK}^t}{E_{SK}^{t-1}} - 1 \right) \quad (2)$$

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

$$RS_{ir}^t = E_{ir}^{t-1} \times \left[\left(\frac{E_{ir}^t}{E_{ir}^{t-1}} \right) - \left(\frac{E_{iSK}^t}{E_{iSK}^{t-1}} \right) \right] \quad (4)$$

where:

NS = national share,

IM = industrial share,

RS = regional share,

t = time period

i = industry

r = region

E_{SK} = total employment in Slovakia

E_{iSK} = total employment in industry

E_{ir} = total employment in region

Although some authors prefer dynamic shift-share analysis as the more proper research method splitting longer time period into shorter seasons (Barff, Knight 1988), its static form was used during the analysis.

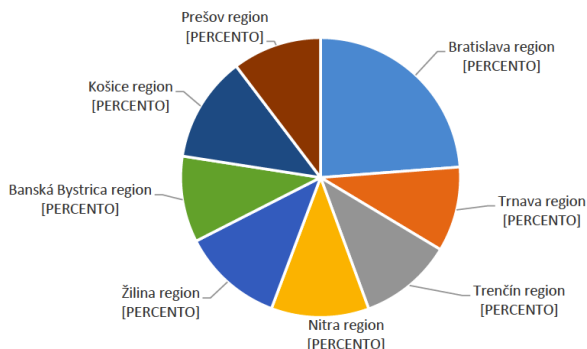
2. The analysis of potential clusters in Banska Bystrica region according to employment concentration (location quotient) in 2014

The analysis was based on the data gained from the Statistical office of the Slovak republic. The data covered the development of employment in Banska Bystrica region during the years 2012, 2013 and 2014, so the analysis was focused on time changes as well. Employment data covers all types of companies and other organizations regardless to the company size and according to their prevailing activity. Data does not cover employees of self-employed persons (Statistical office of the Slovak republic 2014).

Total employment in Slovakia fell down by 5,2 % in 2014 compared to 2013 (the fall in 2013 was just 0,009 %). In both years Bratislava region had the biggest share on total employment in all periods with just small changes. The biggest share was found in 2014 with 23,8 % (23,7 % in 2013, resp. 22,7 % in 2012), the lowest share on total employment was in Trnava region with 9,79 % (9,68 % in 2013, resp. 9,99 % in 2012).

Banska Bystrica region had the second lowest regional employment share on total employment in each of above mentioned periods.

Figure 1. The structure of employment according to regions in 2014



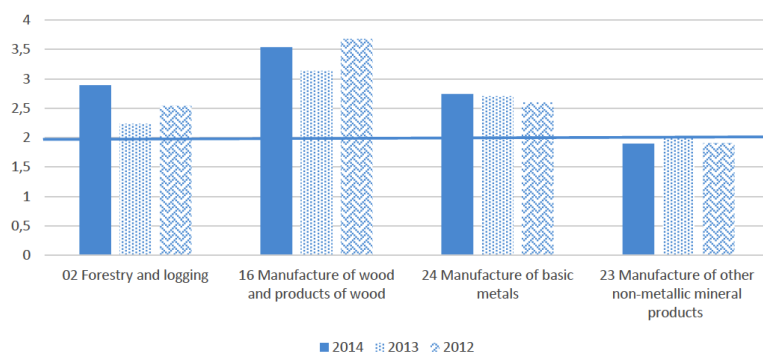
Source: own processing of data from Statistical office of the Slovak republic (2015).

In 2014 all regions lost certain job places. In 2013 an increase in employment was found only in Bratislava region (+4,3 %), as well as in Žilina region (+2,77 %). In other regions employment was going down, the biggest downfall was observed in Košice region (-4,09 %).

Employment in Banská Bystrica region indicated the same trend as in other regions, namely the gradual descent of employment in industrial production. The shares of particular industries on total industrial production were quite low and that points out to a lower regional industrial specialization and rather general distribution of employment within the region's industrial branches. The manufacture of basic metals (as a division) had the biggest share (4,24 %) on the employment (both in 2014 and 2013), while total industrial production (as a section) had 24,15 % (24 % in 2013). Wholesale and retail trade was the second biggest (SK NACE section) employer in the region with 13,69 % share and public administration with 11,94 % share was the third one (it lost almost 0,5 % in 2014).

As was already mentioned in the methodological part, firstly the location quotient was used for the identification of potential clusters. According to the processed data there were 4 potential clusters in 2013 and three cluster candidates in 2012 and 2014. The highest location quotient (but decreased when compared to 2012) was found in the manufacture of wood and of products of wood and cork (quotient 3,54) and in the forestry and logging (2,89). The minimal recommended quotient's value was exceeded also in the manufacture of basic metals (2,74). These industries' quotients varied in analysed periods, although manufacture of wood prevailed every year. The manufacture of other non-metallic mineral products was the fourth perspective industry in 2013, but in 2014 its quotient fell below 2. Other industries with lower quotients are not presented as we focused only on potential clusters and the gap in quotient's values of remaining industries made them less perspective.

Figure 2. The highest location quotients in Banska Bystrica region



Source: own processing of data from Statistical office of the Slovak republic (2015, 2014, 2013).

As it is visible in the chart, forestry and logging activities recorded the biggest growth in the quotient's value (not total employment, but regional importance of employment after it was compared with national employment). It went up by 0,656. The same trend was noticed even within wood processing (+0,405). On the other hand, the quotient of manufacture of non-metallic mineral products was going down by 0,123. In spite of described changes and dynamic development, selected industries are still considered as quite perspective, as even the region's geographical specifications (total area, forestation) support such orientation. Basically, wood processing and metal processing industries are identified through the static employment's concentration as region's most attractive from the point of view of potential clusters.

3. The identification of potential clusters in Banska Bystrica region according to shift-share analysis

While previous chapter identified potential clusters according to the regional employment in particular industries in 2014 (with simple comparison to previous years), shift-share analysis took longer period into consideration and its outcomes were quantified preferably due to the dynamics of regional employment between 2009 and 2014.

This method is once again based on the employment data, because as Isaksen stated (1998), clusters are more probably to be found in 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 is not limited only on industrial sections (even though their dominance was confirmed in previous chapter), as they can be effectively supplemented by various commercial or public services as well.

Wholesale and retail trade sections were the most dynamically developed activities in Banska Bystrica region during the period between 2009 and 2014, with regional contribution of +1367 working places (total employment grew by 7183 employees). Such trade activities, except of the sale of household goods, cover even the maintenance of motor vehicles and supplementary trade activities (goods classification, deliveries assembling, packaging or holding in storage).

Public administration was the second most important section with regional contribution of +622 jobs (even though the national effect was even higher). It confirmed that in spite of declared public administration reform and effort to save public expenditures the regional employment may fluctuate. On the other hand, as the sectoral effect was negative, the growth in public administration was not the case of all regions.

The section of financial and insurance activities was the third most dynamic one according to the long-term changes in employment and thanks to the regional shifts it gained 390 working places. Its employment at national level was positive, but generally, the whole employment of the sector was going down. Total employment did not increase in case of agriculture (-293), even though within the region it gained 388 working places. More analysis' outcomes are presented in the Table 1.

Table 1. Perspective clusters in Banska Bystrica region according to shift-share analysis

Section/Division	National effect	Sectoral effect	Regional effect	Total change
A – Agriculture, forestry and fishing	511,92	-1192,73	387,81	-293
G – Wholesale and retail trade	1095,38	4721,07	1366,55	7183
O – Public administration and defence; social security	1561,01	-2692,71	621,70	-510
K – Financial and insurance activities	161,63	-298,56	389,94	253
A1 – Crop and animal production, hunting	364,26	-853,02	486,76	-2
C24 – Manufacture of basic metals	500,99	-560,08	473,09	414
C25 – Manufacture of fabricated metal products	138,88	-76,68	580,8	643
F41 – Construction of buildings	59,90	18,96	990,13	1069
G45 – Wholesale and retail trade; repair of motor vehicles	72,53	296,99	614,48	984
G46 – Wholesale trade, except of motor vehicles	376,8	1878,33	644,87	2900

Source: own processing.

In case of divisions, the biggest increase was found in construction that reached the highest regional contribution and effect in employment with total increase of 1069 work places (with regional contribution of 990 jobs). Other divisions were not as successful and their regional contribution was signifi-

cantly lower. Moreover, wholesale and retail trade activities were quite limited as they lack crucial support of other logistics services (transport, storing, etc.) The previous static analysis (location quotient) did not helped to reveal any similar support as well. On the other hand, there exist direct linkage between the manufacture of basic metals and manufacture of fabricated metal products, thus their common relations are attractive and establish quite good perspective for potential cluster development. The fact that the cluster with such orientation was already established in Banska Bystrica region in the past confirms the results we have gained from the analysis.

Based on this we can assume that used methods helped to identify certain regional specialization that is quite hidden at first. On the other hand, the association of companies comes out from the common objectives and efforts the companies may share (purposely and voluntarily). Quantitative methods are good for revelation of trends and identification of extraordinary business concentrations, but when the companies are not able to follow the same path and to join forces, to have the same vision, then probably no clusters would occur. Even quite stable industry with huge regional share on employment (or dynamic one with lower share) can be a good cluster candidate when sufficient number of stakeholders is combined.

The analysis did not take into account the cross-sectoral relations which help to reveal the cooperation between suppliers in the chain. This can be also a good opportunity for future research, as then another type of cluster may be identified and supported. On the other hand, it gives more possibilities of industries combinations than it was in case of single industry oriented cluster. From previous text it is clear that such relations are possible even in case of Banska Bystrica region (metals and machines).

As we picked only the most attractive candidates (as to the regional effect) in our article, an integration of other players into analysis and full supply chain coverage would characterize the cluster potential from other perspective. Another possibility is given also by evaluation of inter-regional cooperation, when the distances between companies are preferred and administrative regional borders are ignored.

Conclusions

Location quotient and shift-share analysis are simple instruments used for the identification of perspective clusters within strictly specified geographical areas and selected periods. Our one-time analysis focused on 2014 data (with partial comparison with previous years) was completed with analysis of dynamics in a long-term development. In some areas we revealed similar results (manufacture of metals, forestry), other industries' results were different. It means that manufacture of basic metals was a significant industry as to the regional employment in 2014 and it increased its importance since 2009 as well.

Other industries were either a large employers (in case of location quotient analysis) or they changed dynamically during the time (in case of shift-share analysis).

The only established cluster in Banska Bystrica region (since 2008) was oriented just on engineering and metal production. Thus we can state that region's orientation on similar activities was confirmed through the results of both methods. On the other hand, forestry and manufacture of wood products seem to be quite perspective industries, as it is very intensively concentrated within the region (top section as to the location quotient method with the value of 3,5) and the dynamics in forestry was proved as well (within the regional effect of whole section A). Unfortunately, manufacture of wood products was not identified as a dynamic industry and that points at rather low added value activities than at sophisticated production.

Analysis' results were strongly influenced by the extent of business activity, total employment, foreign investors' contributions, regional education structure and other factors. In case of developed regions the number of potential clusters is much bigger than in case of under-developed regions. Regional effect is three or four times bigger in case of Bratislava than in Banska Bystrica region. Shift-share analysis covered the period from 2009 to 2014, so the results were influenced partially by a post-crisis development and some industries' performance may be over-estimated. Missing data made us to focus on 2014 period, so the analysis should be up-dated later in order to see both static quotient and shift-share changes in other years to come. Thus we will be able to exclude one-time effects (post-crisis revitalization, sudden change of small initial employment, etc.).

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