

IDENTIFICATION OF THE CONDITIONS (POTENTIAL) FOR THE DEVELOPMENT OF POTENTIAL CLUSTERS IN THE CONDITIONS OF REGIONS OF THE SLOVAK REPUBLIC

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Abstract: The core of forming clusters resides in the creation of supplier and vendor network, information flow, technologies and innovations, which form comparative advantages in a given sector for the region with the aim to achieve the highest profit with the lowest costs. In this connection, it is necessary to pay attention to conditions, which form suitable environment for the clusters forming. The objective of this paper is to examine placement of the sector employment in the regions of the Slovak Republic with regard to identification of the possibilities of the cluster forming cooperation by means of the coefficient of localization and coefficient of variation. We realized analysis based upon data, which were available in the database of the Statistical Office of the Slovak Republic for observed period 1995-2014 and database DATA cube.

Keywords: cluster, region, regional development, Slovak Republic, sector structure

1 Introduction

In the present, forming and development of clusters represents huge potential not only for the region, but also for the whole country performance increase. Clusters represent tool for restructuring of the regional economy, the increase of the economic performance of the region and improvement of its competitiveness. Potomová and Letková (2011) state that it is due to created network of suppliers and vendors, information flow, technologies and innovations, which form comparative advantages for the region in a given sector, respectively the group of sectors in comparison with other regions. In many countries including EU countries, clusters become primary tools of the regional economic development policies. (Kirankabeş and Arik, 2013) By means of clusters and other involved parties in the region, the socioeconomic differences can be narrowed in the regions. (Ivanová and Kordoš, 2017) In this connection, well-known work of Porter (1990) generated a great deal of interest. In his work, he states that the concentration of industry corporations and their support industry sectors brings competitive advantages. In the present, the most of the cluster studies use Porter's work as a starting point for cluster analysis (Bergman and Feser, 1999). In fact, according to a study examining cluster initiatives across Europe, the majority of cluster programmes were not preceded by an in-depth regional analysis comparable with Porter's cluster mapping process. In most regions, the cluster approach is declared as one of the basic conditions for effective public policies, and clusters play the role of tools for increasing the competitiveness of regional economies, ensuring the formation of centres of attraction of investment and innovative activity. (Kovaleva and Baleevskih, 2014) Due to the lack of red tape in a cluster this form of organization is more flexible and agile than other forms of business (Evseenko, 2010). We can consider flexibility and mobility as the key advantages in terms of the modern economy. Despite the fact that current science and professional literature about clusters is unusually extensive and also simultaneously unusually heterogeneous, there is no so much discussion about the term itself and practical consequences of its inclusion into industry and regions development strategies in the Slovak Republic according to Székely (2008). The objective of this paper is to examine the placement of the sector employment in the Slovak Republic regions with regard to identification of the cluster forming cooperation possibilities by means of the coefficient of localization and the coefficient of variation.

2 Methodology

The paper begins with a brief review of the scientific literature on the subject with references to domestic as well as foreign sources.

We used the method of time series analysis, comparison and synthesis in this article. The method of comparison was used for comparing the employment localization in the particular sectors in the regions of the Slovak Republic. The method of synthesis was used to draw conclusions resulting from the analysis. Applied method of comparison and analysis is realized through localization coefficient and coefficient of variation.

The coefficient of localization (LQ) represents the ratio of the share of employment in the sector in the region to the share of employment in the sector in the total employment in the country. We use it to evaluate differences in the localization of sectors in the Slovak Republic regions.

$$LQ = \frac{Eb_R}{E_R} \cdot \frac{E}{Eb}$$

where:

LQ = localization coefficient,

EbR = employment in the selected sector in the region,

ER = employment in the region,

Eb = employment in the selected sector in the SR,

E = employment in the SR.

A localization quotient more than one, indicates the regional specialization. It means that the region is specialized in given industry. A localization quotient less than one means that the given region is not specialized in the given industry.

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Coefficient of variation (CV) we used to measure the degree of regional inequality. It is the proportion of standard deviation to mean of value of the set that we express as a percentage based upon following formula:

$$V_x = \frac{\sigma}{\bar{x}}$$

To calculate the coefficients, we took data in the time series between 1995 and 2014. The statistical data from the Statistical Office of the Slovak Republic, database DATAcube was used.

3 Clusters and their importance for regional development

In the 19th Century, proposals for cooperation of industry sectors, which were concentrated in one place with the effort to achieve savings and increase revenues, although, they were not named clusters yet, they were emerging in the works of important economists (for example Marshall). At the end the 20th Century, an important American economist Michael Porter elaborated the issue of cluster cooperation in detail, and many other authors gradually started to deal with the area of clusters research. There are many definitions of clusters, which are connected with the purpose, area or a context of origination of this term.

Porter (1998) defined cluster as a geographical proximate group of interconnected corporations and associated institutions in a particular field, linked by commonalities and externalities. As stated Havierníková (2013), in general clusters can be defined as a group of firms, related economic actors, and institutions that are located near each other. Clusters are defined by relationships and geography with the aspect of concentration of one or more sectors, within a given region as well as the emphasis on networking and cooperation between corporations and institutions. Skokan (2007) understands cluster as a group of

dependent corporations and other affiliated institutions in the particular sector (for example: information technology, machinery, biotechnologies, financial services) that are interconnected with common technologies, research, traditions and workforce. He also emphasizes the importance of clusters in order to achieve competitiveness national or regional economies.

Potomková and Letková (2011) state that clusters represent tool to restructure regional economy, increase the region economic performance and improve its competitiveness. It is due to created network of suppliers and vendors, information flow, technologies and innovations forming comparative advantages for the region in a given sector, respectively the group of sectors in comparison with other regions. Clusters play an important role when it comes to small and medium enterprises access to innovation and research, or joint development at international markets. (Kordoš, Krajňáková and Korbach, 2016)

The chaining and clustering bring many positive externalities, for example: (a) attracting and development of related industrial branches which provide the special outputs and services; (b) making the supply of specialized labour forces with all knowledge, skills and know-how what are needed for selected industrial branch; (c) ideas, knowledge and technological development spreading between firms and entrepreneurs in selected industrial branch; (d) the industrial atmosphere making with amount of formal and informal labour methods, habits, traditions, social values and specialized institutions which allow the effective existence of selected industrial branch. (Stejskal, 2009) Grouping corporations into clusters can have a positive influence on the development of the region where the corporations are situated and on the growth of competitiveness of the region.

For the reason that not only individual regions, but also the goals and ideas of individual clusters are different, the process of cluster forming, as well as their effective management, is subjective. (Sošová, 2014)

According to Jemala (2009), the key success factors in cluster forming are adequate capital structure; well-prepared long-term business plan, financial plan and budget observing to reality; qualitative infrastructure, nearness of markets and adequate demand in the area; support of the government, the region and the local population; adequate and stable legislation; intensive entrepreneurial and innovation basis and the existence of a knowledge supporting basis on a high-level (including universities and vocational schools); a high-class partnerships and their relationships, and finally a good management and controlling of a cluster.

3.1 Identification of potential clusters

In the professional literature, it is possible to identify two basic approaches to determine cluster mapping either (‘top-down’) or (‘bottom-up’).

As stated Potomová and Letková (2011), the first approach helps to identify key sectors, respectively branches that have real possibly potential competitive advantage usually based upon quantitative data particularly at the national and regional level. There is a huge amount of quantitative methods, however their usage to a certain extent, depends on the database availability. The most often applied quantitative methods are such as: the coefficient of localization, shift-share analysis, Gini’s coefficient of localization, input-output analysis, factor analysis, cluster analysis and others.

Top-down approach is based on the usage of qualitative methods independently of available public data and it is realized entirely at the local, respectively regional level. In contrast with quantitative methods, qualitative methods are dealing with the existence of inside processes and relations between particular corporations of the cluster in a given region. Apart from relations between inputs and outputs, they also explain other factors such as sectors cooperation and above-mentioned information flow

(Doeringer and Terkla, 1995). Qualitative methods are such as: interview with experts, representatives of the particular corporations, expert statement, case studies, surveys and other. As stated Zaušková (2010), the coefficient of localization is the most used quantitative method for cluster identification. It is simple method, which is suitable for statistical searching of the local and regional clusters. It is very often used because data needed for calculation are easily available. Its disadvantage is the fact that it does not provide deeper view of the mutual dependence between particular corporations within the sector. In order to do that, it is necessary to apply other methods for example: shift-share method. The value of the coefficient of employment localization expresses how many times the sector share of employment in the region is higher than the country average. The value of the localization coefficient of the particular sector higher than 1.5 proves regional specialization (Andersen, Bjerre and Hansson, 2006). Other authors state value 1.2, respectively 1.25 (Bergman and Feser, 1999).

Apart from mentioned authors, the coefficient of localization and the shift-share analysis potential clusters identification are also used by Havierníková and Strunz (2014), Stejskal (2011), Litvintseva and Shits (2015), Kovaleva and Baleevskih (2014) and others.

3.2 Application of the coefficient of localization for potential cluster identification in the regions of the SR

In order to assess possibilities to establish cluster cooperation in the regions of the Slovak Republic, we examine the localization of employment in the particular sectors in the following part by means of the coefficient of localization.

Statistical Office of the Slovak Republic divides sectors in terms of SK Nace Rev. 2 classification into sections A-U, as stated in Table 1.

Table 1: Sector classification in the SR

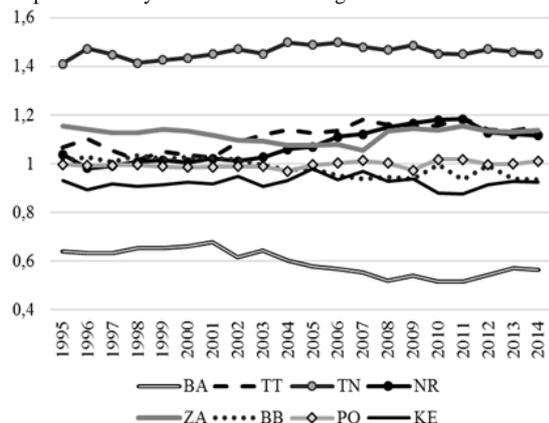
Section	Title
A	Agriculture, forestry and fishing
B	Mining and quarrying
C	Manufacturing
D	Electricity, gas, steam and air conditioning supply
E	Water supply; sewerage, waste management and remediation activities
F	Construction
G	Wholesale and retail trade; repair of motor vehicles and motorcycles
H	Transportation and storage
I	Accommodation and food service activities
J	Information and communication
K	Financial and insurance activities
L	Real estate activities
M	Professional, scientific and technical activities
N	Administrative and support service activities
O	Public administration and defence; compulsory social security
P	Education
Q	Human health and social work activities
R	Arts, entertainment and recreation
S	Other service activities
T	Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use
U	Activities of extraterritorial organisations and bodies

Source: Statistical Office of the Slovak Republic

Industry sector (B-E) takes the biggest share in GNP creation in the SR. It follows from the results of our analysis that industry sector is the most represented in the Trenčín Region (TN) as the coefficient of localization ranges from 1.41 (1995) to 1.5 (2006). Other regions follow by a relatively large margin. The Bratislava Region (BA) is the last one where the coefficient of localization reaches only 0.52 at the end of 2010. The development of the

industry coefficient of localization in the regions of the Slovak Republic is depicted on Graph 1.

Graph 1: Industry localization in the regions of the SR



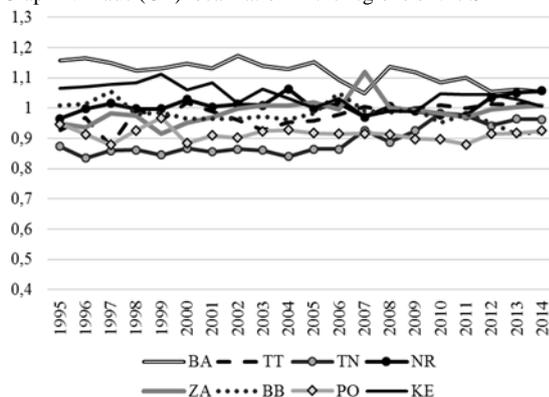
Resource: own calculations based on Statistical Office of the Slovak Republic

Agriculture, forestry and fishing (A) sector in the SR gradually decreases its share of employment and GDP creation. With regard to its localization coefficient in the Slovak Republic regions, above-average share of employment is shown in Nitra Region (NR), Banská Bystrica Region (BB), and Prešov Region (PO). The significant decrease of the localization coefficient was recorded in the Trnava Region (TT) in connection with the development of automobile industry. The lowest value of the localization coefficient is in the Bratislava Region (BA) only 0.24 in 2001 and it increased slightly to 0.35 until 2014.

With regard to construction (F), in year 1995, this sector was above-average localized especially in the Bratislava Region (LQ: 1.30). Since year 1996, the Žilina Region was at the first place (LQ: 1.36 in 2005). Since year 2010, the Prešov Region (LQ: 1.49 in 2014) was at the first place. In the observed period, the differences in the localization in the construction sector in the Slovak Republic regions were increasing.

Other important sectors of the Slovak Republic economy are such as: wholesale and retail trade, repair of motor vehicles and motorcycles, transportation and storage and accommodation and food service activities (G-I) that represent the biggest employers in the SR. In these areas, the differences between regions in employment are small (LQ is between 0.8-1.2) and during the observed period are decreasing (graph 2). In the most years, the Bratislava Region takes the first place. The lowest LQ was in the Trenčín Region (TN) and since 2007 in the Prešov Region (PO).

Graph 2: Trade (G-I) localization in the regions of the SR



Resource: own calculations based on Statistical Office of the Slovak Republic

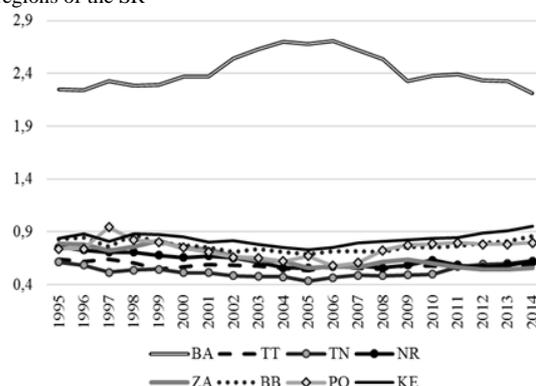
Public administration and defense; compulsory social security, education, human health and social work activities (O-Q) sectors

show small relative differences in employment, however these are slightly increasing. Until 2005, the highest LQ was in the Prešov Region (PO), later in the Košice Region (KE) and the Banská Bystrica Region (BB). The lowest localization coefficient was in the Trenčín Region (TN) amounted to 0.74 in 1997.

Information and communication sector (J) is very perspective sector where we can observe significant difference between the Bratislava Region and other regions when in 2011 LQ reached value of 1.65. The Košice Region is at the second place (LQ up to 1.23). In other regions, LQ values are almost at the same level. Although since 2010, the differences had been increased. The Prešov (LQ: 0.64 in 2010) and the Trenčín Region are at the last place.

Financial and insurance activities (K) sector is above-average localized in the Bratislava Region (graph 3), which as the only region is placed over the average of the Slovak Republic and in 2004 and 2006 reached LQ value up to 2.7. The Trenčín Region (LQ: 0.43 in 2005) was at the last place until 2010, since then it was the Žilina Region.

Graph 3: Financial and insurance activities localization in the regions of the SR



Resource: own calculations based on Statistical Office of the Slovak Republic

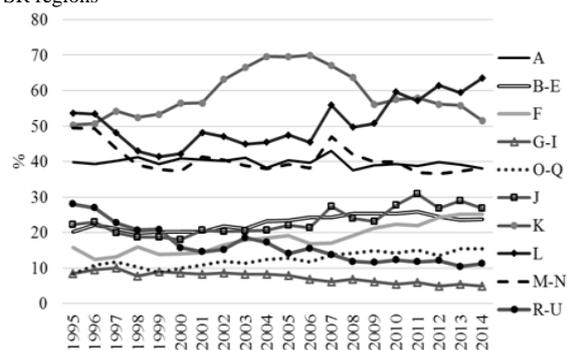
We can observe significant margin of the Bratislava Region over other regions in the SR (LQ: 2.51 in 2014) also in real estate activities (L). The Košice Region, that is the second one, reached the level over the SR average only in some years. Other regions do not reach the average level at all. The Prešov Region was the last one (LQ: 0.39 in 2011) and the Žilina Region is the last one within the last two years.

Sectors Professional, scientific and technical activities and administrative and support service activities (M-N) is characterized by a significant employment localization in the Bratislava Region, although its significant margin over other regions is slightly decreasing (LQ: 2.22 in 1995, in 2014: 1.91). The lowest localization coefficient value of 0.57 in this sector was in the Prešov Region in 1996.

In sectors such as arts, entertainment and recreation, other service activities (R-U), the Bratislava Region margin over other regions was at the beginning quite significant, however, in the following years, the differences were reduced. The Banská Bystrica Region, the Trenčín Region, the Nitra Region and the Žilina Region alternate at last places.

We evaluated differences in the localization of the particular sectors in the SR by means of variation coefficient. The result values of the variation coefficient are depicted in Graph 4.

Graph 4: Variability of the sector employment localization in the SR regions

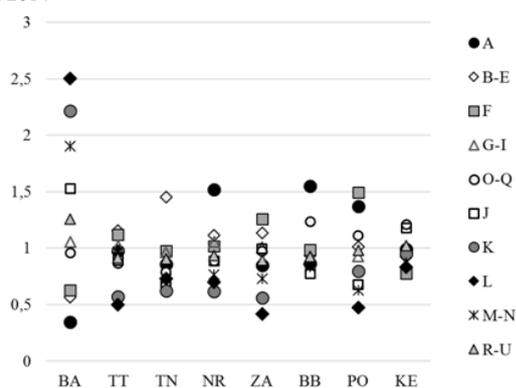


Source: Own processing, own calculations

At it follows from Graph 4, the biggest differences in the employment localization in the SR regions are in financial and insurance activities sector (in 1997-2009 and 2011). In other years, the biggest differences are in real estate activities sector. Both sectors are concentrated in the Bratislava Region. The employment in wholesale and retail trade and public administration sectors is distributed equally and as well as since 2007 in arts, entertainment and recreation sector.

At the end, we evaluate the localization coefficients of the particular regions in the SR in 2014 to find out which sector has over-average representation in the region. This would create prerequisites for cluster cooperation. The results are depicted in Graph 5.

Graph 5: The localization coefficient in sectors in the SR regions in 2014



Source: Own processing, own calculations

As it follows from Graph 5, the biggest differences in the sector employment localization are in the Bratislava Region, on the contrary, the lowest differences are in the Košice Region. In the Trenčín Region there are suitable conditions to form cluster in the industry area as industry is over-average represented in this region. In the Nitra and Banská Bystrica Region, agriculture, forestry and fishing dominate. In the Prešov and Žilina Region, construction is over-average localized.

4 Conclusion

Clusters represent network groups of corporations concentrated in one area, which operate in the particular industry sector. Clusters, which operate correctly by means of competitive benefits, are asset not only to the particular corporations, which are part of the cluster, but also to the region growth. In the article, we examined distribution of the sector employment in the regions of the SR with regard to identification of the cluster forming possibilities.

It followed from the research that the biggest differences in the sector employment localization are in the Bratislava Region (BA), on the contrary, the lowest differences are in the Košice

Region (KE). In the Trenčín Region, there are suitable conditions for cluster forming in industry sector as industry is over-average represented in this region. In the Nitra Region (NR) and in the Banská Bystrica Region, agriculture, forestry and fishing dominate. In the Prešov Region (PO) and in the Žilina Region (ZA), construction is over-average localized.

However, as Szekely (2008) stated, over-average sector employment provides hypothetically assumption about the existence and the possibilities of further cluster development in the region. Whether there is a cluster in a given region or not it can be revealed only by a detail analysis of the corporation's structure and their mutual business and non-business relations, because the existence of high regional employment itself in one sector does not mean cluster existence in that region.

Therefore, based upon our research as well as further researches from which we gained information sources, we can state that the cluster approach in the SR is very ambiguous and their correct identification belongs to the basic questions of the cluster research issue. Therefore, it is necessary to establish central database in the SR, which will monitor forming, activity and effectiveness of clusters, so that the relevant information about clusters activity would be more available for researches. This creates assumption for more accurate identification of the preconditions for forming of the new clusters that will contribute to particular regions development.

Literature:

- Andersen, T., Bjerre, M., Hansson, E. W.: *The Cluster Benchmarking Project*. Oslo, Norway: Nordic Innovation Centre, 2006. 56 p.
- Bergman, E. M., Feser, E. J.: Industrial and Regional Clusters: Concepts and Comparative Applications. In: *The Web Book of Regional Science* [online] eds., Scott Loveridge. Morgantown, WV: Regional Research Institute, West Virginia University.
- Doeringer, P. B., Terkla, D. G.: Business strategy and cross-industry clusters. In: *Economic Development Quarterly*, Vol. 9, Iss. 3, 1995, pp. 225-37.
- Evseenko, S. V.: Klaster i korporacija: sravnitel'nyj analiz organizacii (Cluster and corporation: comparative analysis of the organization), *Vestnik Omskogo universiteta. Serija «Jekonomika»* (Omsk University Review. Economy.) 4, 2010, pp.108-111,
- Haviernikova, K.: Qualitative and quantitative aspects of the clusters in the Slovak Republic. In: *Economics and Management*, Vol.18, No.4. 2013, pp.778-792, ISSN 2029-9338
- Havierniková, K., Strunz, H.: The comparison of selected methods used for identification of cluster potential in the regions of the Slovak Republic. In: *SGEM conference on political sciences law, finance economics & tourism: Conference proceedings, Volume IV. Economic & tourism*. Sofia: STEF92 Technology, 2014. ISBN 978-619-7105-28-5. pp.693-699.
- Ivanová, E., Kordoš, M.: Competitiveness and innovation performance of regions in Slovak Republic, In: *MARKETING AND MANAGEMENT OF INNOVATIONS*. ISSN 2218-4511. No.1(2017), pp.145-158.
- Jemala, M.: Strategické podnikateľské aliancie: Kvalitatívna analýza špecifických faktorov podnikania v klastroch. In: *Acta Oeconomica Pragensia*, vol. 4, pp. 19-33.
- Kirankabeş, M., C. and Arik, M.: Industrial Clustering Approach in Regional Development: The Case of Turkey. In: *Journal of Applied Business and Economics*, vol. 16 (3) 2014, Iss. 3, pp. 135-151.
- Kordoš, M., Krajňáková, E., Karbach, R.: Cluster policies implementation in Slovakia. In: *Actual Problems of Economics*. ISSN 1993-6788. Vol.181, No.7(2016), pp.90-96.
- Kovaleva T.Yu., Baleevskih V. G.: Identification of the Educational Clusters in the Regional Economy: Theory, Methodology and Research Results (in Example of Perm Krai). In: *International Journal of Econometrics and Financial Management*, 2014, Vol. 2, No. 4, pp. 153-162.

12. Litvintseva, G., Shits, E.: Territory Management in View of Cluster Potential. In: *Procedia Economics and Finance*, Vol. 27, 2015, pp.216 – 223.
13. Porter, M.: *On Competition*. Harvard Business Review Books, 1998.
14. Porter, M.: *The Competitive Advantage of Nations*, Free Press, New York, 1990.
15. Potomová, J., Letková, J.: Problémy identifikácie potenciálnych odvetví vhodných pre vznik a rozvoj klastra. In: *ACTA GEOGRAPHICA UNIVERSITATIS COMENIANAE*, Vol. 55, 2011, No. 1, pp. 93-113. Available at: http://m.actageographica.sk/stiahnutie/55_1_05_Potomova_Letkova.pdf
16. Skokan, K.: Klastry v transformaci regionů - pět let poté. In: *Ekonomická revue*, VSB-TU Ostrava, Vol. 10, No 2-3, pp. 149-166.
17. Soósová, V.: Analysis of the region's environment for the formation of clusters possibilities. In: *Proceedings of the 2nd international conference on European integration 2014*. Ostrava: VŠB, 2014, pp.626-633, ISBN 978-80-248-3388-0.
18. Statistical Office of the Slovak Republic: *DATAcube*. 2017, [online]. [cit.: 2017-08-25] Available at: <http://datacube.statistics.sk/>.
19. Stejskal, J.: Competitiveness advantage analysis as one method for cluster identification in regions. *3 rd Central European Conference in Regional Science – CERS*, 2009, pp. 1337-1346
20. Stejskal, J.: Analysis of the applicability of selected methods for industrial clusters identifying. In: *INTERNATIONAL JOURNAL OF SYSTEMS APPLICATIONS, ENGINEERING & DEVELOPMENT*, Vol. 5, Issue 3, 2011, pp. 255-262.
21. Székely, V.: Regionálne priemyselné klastre a problémy (nielen) s ich identifikáciou (Regional Industrial Clusters and Problems (not only) with their Identification). In: *Ekonomický časopis*, Vol. 56, 2008, No. 3, pp. 223 – 238.
22. Zaušková, A.: Klastre – nástroj pre zvyšovanie inováčnej výkonnosti a konkurencieschopnosti regiónov. In: *Communication Today*. ISSN 1338-130X, Trnava: Fakulta masmediálnej komunikácie UCM v Trnave, 2010. pp. 43-64. Available at: https://www.communicationtoday.sk/download/1/2010/CT_2010_1_Zauskova.pdf

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