OECONOMIA
COPERNICANA

2017 VOLUME 8 ISSUE 4, DECEMBER

p-ISSN 2083-1277, e-ISSN 2353-1827
www.oeconomia.pl

ORIGINAL PAPER

Citation: Koľveková, G., & Palaščáková, D. (2017). Analysis of Bratislava and Žilina as urban areas in Western Slovakia in the context of associations among employment and industries. *Oeconomia Copernicana*, *8*(4), 537–552. doi: 10.24136/oc.v8i4.33

Contact to corresponding author: gabriela.kolvekova@tuke.sk, Technical University of Košice, Faculty of Economics, B. Nemcovej 32, 040 01 Košice, Slovak Republic
Received: 12 April 2017; Revised: 4 September 2017; Accepted: 5 November 2017

Gabriela Koľveková
Technical University of Košice, Slovakia

Daniela Palaščáková
Technical University of Košice, Slovakia

Analysis of Bratislava and Žilina as urban areas in Western Slovakia in the context of associations among employment and industries

JEL Classification: *J21; Q01;R12*

Keywords: *employment; value chains; industry*

Abstract

Research background: This paper observes especially the position of cities, urban areas in the context of global value chains — GVCs. Global value chains reflect specialization and labour division of companies, mostly multinational enterprises – MNEs. MNEs can be considered flagships of some industries. Such flagships influence suppliers and purchasers. MNEs are a part of networks or have got access to such networks that combine dispersion of the value chain, the boundaries of the firm and across national borders.

Purpose of the article: The impetus for this work was to look at the position of Slovak cities (Bratislava, Žilina) in order to look for sectors that can help to develop the city and its adjacent regions, particularly cross-border regions. The paper discussed how the attribute of the cross-border regions gives the cities more advantageous position in GVCs.

Methodology: Applying the method of location quotient allowed to shed a light on the GVCs, which cities participate in. Some cities were in a position to take advantage of participation in GVCs.

Findings & Value added: Examined cities are located in the western part of the Slovak Republic. Discussion about the attribute of the cross-border regions can stimulate new ideas for finding causalities in city sprawl or in specialization patterns in the industrial structure of

the city. Discussion further fosters the comparison of two cities strengths and weaknesses of each of them that were summarized in terms of employment and industrial exploitation of GVCs. This is the first finding and value added of the paper. The second one is that the method of location quotient is simple but provides clear evidence of the regional development or decline in particular industries and at the time of observation.

Introduction

Cities' position in the global world can either be embedded in a region or get disconnected from its own region. There are particular sectors of the urban economy, such as services, which saw rapid changes in a last few decades. For instance, in London the service reorganization was due to globalization. The growth of these global cities is fed by location of transnational corporations, which does not have to apply to cities on the smaller scale. Nonetheless, what applies is that "cities are key sites for the production of services for firms."(Sassen, 2002, pp. 13–30). The overview of the dispersion in terms of various jobs in production in two Slovak cities by sectors was the motivation for writing this paper. Similarly, motivation could be found in observing the strengths and weakness of two cities with a significant position in Slovak economy. At the same time, these cities are specific for their location both as a parts of bordering regions and the western part of Slovakia. They are Bratislava, bordering with the Czech Republic and Austria in the South, and Žilina, bordering with the Czech Republic and Poland in the North.

The paper is organized into two parts. The first part focuses on the current situation and consists of an explanation of objectives and relevant theories, followed by notes on the methods applied. The second part is the analysis itself, i.e. examination of location quotient throughout industries in the urban area of two major cities located in border regions. Analysis took into consideration the skewness of the location quotient that resulted in an additional point of view. The method of location quotient was applied with dataset of employment in these two cities for one year. The analysis emphasizes employment, the particularities of companies, and the peculiarities of the regions in question. Following the description of entrepreneurial activities, specific recommendations could be derived. The discussion provides limitations of this paper, as well as plausible or problematic parts of the research. Nonetheless conclusions are both general and particular for the cities observed. In this paper, the focus of research was to identify one possible way of measurement of the outputs and inputs in all industries in two city-regions of Slovakia: Bratislava and Žilina city.

Theoretical impetus

One of the key decisions in life is the decision of where to live, either in the city or in a rural area. Both have pros and cons, as it is generally known. Science has come up with additional negative side effects of living in a city, namely sprawl. Authors of this term reflect a reality, which is preferred option by employed people. This allows the option to work in the city and at the same time live very close to it, so to say half-way to rural area. To be accurate half-way to rural area means suburb of a city (Brueckner, 2000, pp. 160–171; Johnson, 2001, pp. 717–735; Jun, 2009, pp. 311–327).

The sustainability of the city could be a future envisioned in the life of the regions, particularly the cross-border ones (Nevense *et al.*, 2013, pp. 11–122). The methodology for multi-criterial assessment of city's development from a sustainability perspective was suggested by Yigitcanlar *et al.* (Yigitcanlar *et al.*, 2015, pp. 36–46). For instance they introduce Micro-level Urban-ecosystem Sustainability Index. The Authors continue the analysis for the mezzo level and macro level — providing another option to measure urban sustainability, such as City Prosperity Index.

Urban growth (Baus *et al.*, 2014, pp. 104–111) is distinguished from urban sprawl (Pazúr *et al.*, 2017, pp. 135–146; Verbeek *et al.*, 2014, pp. 48–59). While the urban growth has meaning in population growth and growth of economic activities, the notion of urban sprawl emphasis stretching the borders of city with some regard to economic activities, as well as to population. Urban sprawl is rather uncontrolled (Uhel, 2006), cities that are characterised by "non-sprawl" are also called "edge cities" or polycentric, like probably Manchester or Leeds (Pratt, 2009, pp. S109–S114). The need to travel might decrease due to an increase of jobs for "knowledge workers", it is a picture of a new worker and a new human (Stallings, 2001, pp. 3–14). One can notice the value-chain mechanism forming the ways of education. It is taking advantage of the content and context part of learning. The former is in charge of university, while the latter is not. Therefore, the non-formal and informal learning can take place more frequently.

The more educated people live in the city, the more they spend on local products and create a demand for further goods and services and vivid city life (Marlet & Van Woerkens, 2007, pp. 2605–2626). According to this study, the presence of a creative class in the city fosters urban development in terms of employment. Thus employing creative class distinction is a valuable variable for explaining city growth in terms of employment and availability of jobs.

Companies often have complementarities and therefore also interaction. Based on this assumption, the interregional input-output relationships arise. The exchange of routines or new managerial experience is fostered by labour market mobility, input-output linkages and reverse engineering (Fratesi & Senn, 2008). It is foreign direct investments — FDIs that are noticeable at the regional and the national level as capital flows in the network of companies. Regional economy is often linked with local suppliers, which is less applicable for transnational corporations — TNCs. Such corporations are less free with respect to international relationships in the global economy. The labour market pooling and poaching are factors for agglomeration in cities, where, as mentioned before, educated people gather to find jobs matching their talents. Furthermore, they find better choices to obtain new knowledge either in formal or non-formal learning or collective learning as well. Knowledge spillovers are usually a positive side-effect of these processes.

As Zeleny correctly points out, the outsourcing process (also at labour market) allowed for value added to be searched for more, and thus the Shih's smile curve is broader and deeper (Zeleny, 2007). The explanation was that added value is the measure of human knowledge, which again is searched globally. Global sourcing reaches companies as well as customers.

A slightly different perspective of the same phenomenon comes from the Heckscher-Ohlin factor-proportion theory, later developed into the Heckscher-Ohlin-Vanek model — HOV. This model gives a basis to understanding the impact of globalization on the labour market, where their output can be sold as factor services and thus transforming a local market for factors services into a global market. This theory can apply to cities located near borders (Leamer, 2000, pp. 17–49). For instance, food-processing firms, once they produce in a value chain, they benefit from some kind of spillovers that make productivity a less stringent requirement for export (Giovannetti & Marvasi, 2016, pp. 110–125). This is also why the study provides an insight into export jobs.

Based on this context, the main objective is to find sectors localized in the cities that have a relatively significant position regarding the proportion with Slovak national localization, as it is explained in detail in the methodology section and later illustrated with a brief description. Identifying and confirming these sectors could be considered factors for sprawl, growth and other phenomena presented above.

Research methodology

The reason to use location quotient is that it reflects changes in economies of smaller areas, regions. Input-output (I-O) tables can serve the same purpose for larger areas. However, I-O tables will not provide information on changes in one region and its cities, this being an impetus of paper. The impetus of this work was to look at the position of Slovak cities (Bratislava, Žilina), in order to look for sectors that can help to develop the city and its adjacent regions, particularly cross-border regions.

Location Quotient (LQ or SLQ) are the starting point of this research. There exist several options how to calculate location quotient as referred in book by Miller and Blair (Miller & Blair, 1985). In general, one can use location quotients to describe the situation of an area with respect to national total. Sometimes it is reflected as a periphery and a core area. Nonetheless, in this paper the emphasis was on cities that cannot be referred to as periphery. We are also aware of some disadvantages to using location quotients that were described by Leigh (Leigh, 1970).

The basics of using location quotients can be found in the first formula, where we denote the gross output of sector *i* in region *r* (x_i^r and x^r). The total output of all sectors at the national level, denoted by *n*, (i.e. x_i^n andx^n).(Miller & Blair, 1985, p. 349).

$$LQ_i^r = \frac{x_i^r / x^r}{x_i^n / x^n} \tag{1}$$

This formula (1) is an index that allows a comparison between phenomena. In this case, it expresses how much each of the sectors contributes to the regional output in its numerator and to the national output in its denominator. As a consequence: the more the LQ exceeds 1, the more is the sector concentrated in the region compared the with nation. However, more is not always seen as the best option. Some industries can be at their peak points, and some can be just emerging and having great potential. Thus the interpretation of quantitative data needs to be reinforced by a qualitative description and research of the situation.

$$LQ_i^c = \frac{x_i^c / x_i^n}{x^c / x^n} \tag{2}$$

The second formula is a variation of the first one, where a numerator already reflects the total national output of commodity *i* produced by city *c*. The denominator reflects the total national output of all commodities pro-

duced in the city. The interpretation is similar; it only refers to the most frequent commodities produced in the city instead of the most concentrated industry. The interpretation of the results is around number one, which is understood as a variable concentration of the share in a city in accordance with its share in total. The result of 1.25 is often regarded as the threshold for growth industries, industries suitable for export (later discussed as export jobs producing commodities to supply other areas). Even low results can be seen as positive, meaning potential to emerging industries. It would be appropriatte to support the implementation of this *LQ* with the Wald test, as suggested in explanation using dartboard test. This test provides valuable information on the substance of decision making to localization, i.e. independency and randomness (Capone & Boix, 2008, pp. 209–224; Guimaraes *et al.*, 2009, pp. 360–364). To make it straightforward by using statistics:

$$w_{ri} = \frac{J[log(L_{ri})]^2}{(J-2)w_{ri}^{-1} + \overline{\overline{w_i^{-1}}}} \tag{3}$$

The understanding of this statistic was explained by the aforementioned authors. For the purpose of this paper it was not possible to implement this formula, where (L_{ri}) location quotient is denoted with *i*, *r* aligned to Miller and Blair denotations or as a likelihood function with one new variable of attractiveness (this was not available at the time of writing the paper). Weights — (w_{ri}) is a vector containing the regional shares of the variable used — employment. This test was mentioned here to provide a limitation of the study that can be an impetus for new and deeper research. Other tests were recommended, such as the Kolmogorov-Smirnov (K-S) test for normality (O'Donoghue & Gleave, 2004, pp. 419–427). This is because *LQ* values shall approximate normality, otherwise the logarithmic transformation is recommended. This was done with respect to the fact that aggregation error is continuously of importance in regional input — output models. (Lahr & Stevens, 2002, pp. 477–507) Two other methods of measuring the errors were taken into consideration, i.e. Means Absolute Percentage Error — MAPE and Thiel's U. One of Lahr's recommendation was that "…aggregation error plateaus, and perhaps even declines, when the number of sectors in an I-O matrix depicting a highly diversified economy gets sufficiently small." (Lahr & Stevens, 2002, pp. 477–507). Later on, we use these quotients for broader analysis (Hsieh & Kung, 2013).

The data used for analysis were found in the Statistical Office of the SR and the World city report (Habitat, 2016). The overall usefulness of using LQs can be underpinned by regional input coefficient that can be estimated (Flegg & Tohmo, 2013, pp. 703–721; Flegg & Webber, 1997, pp. 795–805):

$$\widehat{r_{ij}} = LQ_{ij} \times a_{ij}{}_{i}^{r} \tag{4}$$

where LQ_{ij} is any form of location quotient preferred in analysis such as cross-industry location quotient, r_{ij} is regional input coefficient and a_{ij} is the national input coefficient.

Companies of border regions in Slovak Republic: Bratislava and Žilina

The following description should illustrate the situation from the qualitative point of view as an additional information to location quotient and employment data analysis that will follow.

The economic growth and improvement of competitiveness of the national economy can be directly influenced either by small and medium enterprises (SMEs) in Slovakia which were observed in the cities of Bratislava and Žilina and their regions, or by an integration to a network of companies and especially by integration to global value chains — GVCs. These chains are coordinated by transnational corporations. The importance of this form of international labour division has risen significantly, especially in the course of last two decades. This, again, is influencing the economic position of the national economy, as well as competitiveness. In this context and upon the foreign experiences, this paper took advantage of knowledge of the Slovak enterprises and large companies that were part of the GVCs and global supply networks, particularly in the automobile industry. The automobile industry is an economic activity that has been using observably the international labour division since 90s of 20th century (Sturgeon & Van Biesebroeck, 2011). There were serious changes in intensity and architecture of such chains in reaction to the global recession. At the same time, the automobile industry is a flagship of the economic growth in the Slovak Republic. This is proved by the presence of three large automobile companies in the country, two of which are situated in the regions in question, namely: Volskwagen SK, a.s. in Bratislava and Kia Motors Slovakia, Ltd.. in Teplička nad Váhom in Žilina region. It is self-evident that the automobile industry in Slovakia is not only the three large companies (Kia Motors Slovakia, PSA Peugeot Citroën Slovakia, Volkswagen SK),

but also a broad network of high quality suppliers that are both vertically included into global value chains (often chains of several buyers, customers) and included in horizontal clusters (of higher or lower intensity).

According to data of the Automotive Industry Association of the Slovak Republic (hereinafter „ZAP SR"), in 2016 there were 343 companies supplying to the automobile industry. Out of this number, 279 are located in the western part of Slovakia, especially along the D1 highway from Bratislava (the capital) to Žilina and along the R1 road from Trnava to Banská Bystrica, and 64 suppliers are located in the eastern part of Slovakia. Among these are also large companies under foreign control. Such companies are suppliers of the first haul (e.g. Continental, Johnson Controls, INA, Mobis, Magneti Marelli, Getrag Ford, Valeo, ZF, Arv-inMeritor, Visteon, Faurecia, Lear, etc.) and suppliers of the second haul (e.g. HBPO, Brose).

This illustration provides some insight into one industry which is vigorous in western Slovakia and a part of Global value chains, with its suppliers along the production of such an innovative commodity as cars definitely are.

Cities of border regions in Slovak Republic: Bratislava and Žilina

Cities drive human progress in their harnessing employment and location. In general, it is expected that the world population will be aging. This is also true in Slovakia. In connection with Table 1 the level of urbanization is slightly decreasing, negative 0.17 points between 1995 and 2005 then between years 2005–2015 it was negative 0.36 points. The rate of change in percentage of urbanization in 20 years, i.e. between 1995 and 2015, was negative 0.27 points.

Both Bratislava and Žilina are cities on the river streams, the former on the Danube river, and the latter on the Váh river. Comparing the urban area: Žilina covers 8 003 hectares and Bratislava 36 763 hectares. Despite this fact, Žilina is the fourth largest city in the Slovak Republic, and was selected for the study due to its geographic location.

A further description of border regions gives more details on region of the city of Bratislava, which is located about 55 kilometers from Vienna, Austria, which is noticeably hosting almost one third of total labour force in its quarters, while in Bratislava, it is around half of this proportion, as seen in Table 2. The Czech city of Brno, as another city from across the border, is situated 122 kilometers away from Bratislava. Again, Brno has about half of the labour force population compared with Bratislava, but in terms of unemployment, the two cities are somewhat similar.

The next comparison is related to the city of Žilina (unemployment share of national value: 8.4 in 2010, 9.4 in 2013, and 8.5 in 2014), which can be reached from Polish cities: Katowice (177 km), Kraków (127 km) and the Czech city Ostrava (the nearest 76 km). Out of all the cities, Kraków has the lowest unemployment, in the region of 3%. Considering that Žilina has labour force share of national value 2.7-2.8 in the period of 2010-2014. In observing the data, it is understandable that the Polish or Czech labour force national value (in absolute numbers) is substantially greater than the one in Slovakia.

In the following section, we have applied the simple location quotient (LQ) for employment in two towns throughout all industries (see table 3, where NA stands for „not applicable"). Previously mentioned knowledge workers and their jobs are noticeable in economic activities (J — Information and communication), Bratislava 2,87 whereas in Žilina less 1.53. This location points out that the region of Bratislava provides output from Information and communication services from 13 811 job positions, similarly Žilina from 760 job positions. A service providing financial, insurance activities (K) is favorable for Bratislava, where 6 108 people work to provide for local demand and 12 015 provide for other regions. It is possible that these workers provide services for demand in Žilina, because the location quotient for this economic activity there is 0.67. The opposite is true for the construction industry (F), where Bratislava's location quotient is 0.87 and Zilina's is 2.04. In Žilina, there are 2 424 export jobs. The most favorable activities in Bratislava can be summarized as: wholesale, retail trade; transportation and storage; accommodation, food services, information, communication; financial, insurance activities; real estate activities; administrative services; arts, entertainment, recreation and other services. In Žilina, the most favorable economic activities would be: electricity supply; water supply, waste, construction; wholesale, retail trade; transportation and storage; information, communication; education and arts, entertainment, recreation.

As seen in Figure 1, the skewness of location quotient is positive (1.7) and the K-S test of normality proved that distribution is not normal ($D(39)=2.14$, $p>0.05$). Thus the Standardized Localization Quotient (SLQ) was obtained from logarithmic transformation (Figure 2) using Box-Cox transformation (Freeman & Modarres, 2006, pp. 764–772), skewness of SLQ (-0.24). This way the outliers, statistically significant residuals, could be identified. Statistically significant values of LQ were found in z-values (over 1.65) of the following activities, and this is only in Bratislava for sectors: J (1.85), K (1.93), M (1.82). No such sectors were identified in Žilina.

Conclusions

Activities with higher value added could be fostered by government policy that would be aimed especially at education, research and development and cooperation of universities (research institutions) with the business sector. Such a policy in fostering cooperation shall bring about conditions that would motivate foreign investors to have an increased interest in establishing their economic activities with higher value added in the regions of the Slovak Republic rather than in the neighboring regions. This applies generally to enrollment or joining of local enterprises to official or unofficial Global Value Chains — GVCs. In praxis, it is mostly SMEs, eventually also large companies that still are not included or did not access GVCs. SMEs need more attention in terms of information assistance (in order to provide awareness or knowledge about SMEs to foreign investors and vice versa in order to provide SMEs with information on opportunities of joining GVC available to them, as well as information on quality standards and other norms that such inclusion requires). Of key importance is also a financial support for SMEs.

There are main recommendations for government policies towards SMEs in GVC in the following theses:

- to provide information on market opportunities for subcontractors and potential foreign partners;
- to support the expansion of domestic SMEs abroad;
- to support to spread information among various chain parts of GVC with suitable tools, eventually motivate foreign investors to inform local companies about their intentions (while it is allowed or even required by their own global strategy)
- to support the formation of networks or clusters of companies in the local economy;
- to support the formation of various clusters of local businesses eventually forming consortiums to accomplish some activities;
- to provide SMEs with workshops on the correct ways to select their future cooperating partners; and so forth.

The recommendations provided can contribute towards an improvement in attractiveness (even taking into account by dartboard test) of the local sector of SMEs to foreign investors. This can also apply to a certain extent towards local business that would achieve a better position in the value chain. Still, the question remains how to secure financing such claims that are brought about with the inclusion of SMEs into GVCs. Perhaps euro funds could be used here.

One can rephrase the result of tests to say that in Bratislava, there are the following outstanding sectors: Information, communication (J), Financial, insurance activities (K), Professional, scientific, technical activities (M). For Žilina, the sector of Construction (F) can be mentioned. These sectors were influencing the growth and sprawl in their regions, as described in illustration along the highways and freeways connecting the border regions and cities scattered around the two cities in question. These industries and their forming companies can be encouraged to do various forms of cooperation, preferably cooperation in GVCs.

The dartboard test suggested by Portuguese authors can contribute to better understanding of the randomness of the localization process, and at same time shed a light on urban sprawl. This test was mentioned in methodology for awareness of some limitation of the study and to encourage broader and deeper research with the use of two more variables, i.e. profit and attractiveness. Nonetheless, some evidence of attractiveness was provided by discussing the FDIs that large companies in automotive industry had brought about.

References

Baus, P., Kováč, U., Pauditšová, E., Kohutková, I., & Komorník, J. (2014). Identification of interconnections between landscape pattern and urban dynamics — case study Bratislava, Slovakia. *Ecological Indicators, 42*. doi: 10.1016/j.ecolind.2013.12.011.

Brueckner, J. K. (2000). Urban sprawl: diagnosis and remedies. *International Regional Science Review, 23*(2).

Capone, F., & Boix, R. (2008). Sources of growth and competitiveness of local tourist production systems: an application to Italy (1991–2001). *Annals of Regional Science, 42*(1).

Flegg, A. T., & Tohmo, T. (2013). Regional input-output tables and the FLQ formula: a case study of Finland. *Regional Studies, 47*(5). doi: 10.1080/00343404.2011.592138.

Flegg, A. T., & Webber, C. D. (1997). On the appropriate use of location quotients in generating regional input-output tables: reply. *Regional Studies, 31*(8). doi:10.1080/713693401.

Fratesi, U., & Senn, L. (2008). *Growth and innovation of competitive regions: the role of internal and external connections*: Springer Science & Business Media.

Freeman, J., & Modarres, R. (2006). Inverse Box–Cox: the power-normal distribution. *Statistics & Probability Letters, 76*(8). doi: 10.1016/j.spl.2005.10.036.

Giovannetti, G., & Marvasi, E. (2016). Food exporters in global value chains: Evidence from Italy. *Food Policy, 59*. doi: 10.1016/j.foodpol.2015.10.001.

Guimaraes, P., Figueiredo, O., & Woodward, D. (2009). Dartboard tests for the location quotient. *Regional Science and Urban Economics, 39*(3). doi: 10.1016/j.regsciurbeco.2008.12.003

Habitat, U. (2016). World cities report 2016. *UN Habitat: Nairobi, Kenya*.

Hsieh, H.-J., & Kung, S.-F. (2013). The linkage analysis of environmental impact of tourism industry. *Procedia Environmental Sciences, 17*.

Johnson, M. P. (2001). Environmental impacts of urban sprawl: a survey of the literature and proposed research agenda. *Environment and Planning A, 33*(4).

Jun, M. J. (2009). Economic impacts of Seoul's job decentralization: a metropolitan input-output analysis. *Journal of Regional Science, 49*(2). doi: 10.1111/j.1467-9787.2008.00585.x.

Lahr, M. L., & Stevens, B. H. (2002). A study of the role of regionalization in the generation of aggregation error in regional input–output models. *Journal of Regional Science, 42*(3).

Leamer, E. E. (2000). What's the use of factor contents? *Journal of International Economics, 50*(1). doi: 10.1016/S0022-1996(99)00004-5.

Leigh, R. (1970). The use of location quotients in urban economic base studies. *Land Economics, 46*(2).

Marlet, G., & Van Woerkens, C. (2007). The Dutch creative class and how it fosters urban employment growth. *Urban Studies, 44*(13).

Miller, R. E., & Blair, P. D. (1985). *Input-output analysis: foundations and extensions*: Prentice-Hall.

Nevens, F., Frantzeskaki, N., Gorissen, L., & Loorbach, D. (2013). Urban transition labs: co-creating transformative action for sustainable cities. *Journal of Cleaner Production, 50*. doi: 10.1016/j.jclepro.2012.12.001.

O'Donoghue, D., & Gleave, B. (2004). A note on methods for measuring industrial agglomeration. *Regional Studies, 38*(4).

Pazúr, R., Feranec, J., Štych, P., Kopecká, M., & Holman, L. (2017). Changes of urbanised landscape identified and assessed by the Urban Atlas data: case study of Prague and Bratislava. *Land Use Policy, 61*. doi: 10.1016/j.landusepol.2016.11.022.

Pratt, A. C. (2009). Social and economic drivers of land use change in the British space economy. *Land Use Policy, 26, Supplement, 1*. doi: 10.1016/j.landusepol.2009.09.006.

Sassen, S. (2002). Locating cities on global circuits. *Environment and urbanization, 14*(1).

Stallings, D. (2001). The virtual university: organizing to survive in the 21st Century. *Journal of Academic Librarianship, 27*(1). doi: 10.1016/S0099-1333(00)00208-1.

Sturgeon, T. J., & Van Biesebroeck, J. (2011). Global value chains in the automotive industry: an enhanced role for developing countries? *International Journal of Technological Learning, Innovation and Development, 4*(1-3).

Uhel, R. (2006). Urban sprawl in Europe: the ignored challenge. *EAA Report, 10*(2).

Verbeek, T., Boussauw, K., & Pisman, A. (2014). Presence and trends of linear sprawl: explaining ribbon development in the north of Belgium. *Landscape and Urban Planning, 128*. doi: 10.1016/j.landurbplan.2014.04.022.

Yigitcanlar, T., Dur, F., & Dizdaroglu, D. (2015). Towards prosperous sustainable cities: a multiscalar urban sustainability assessment approach. *Habitat International, 45, Part 1*. doi: 10.1016/j.habitatint.2014.06.033.

Zeleny, M. (2007). The mobile society: effects of global sourcing and network organisation. *International Journal of Mobile Learning and Organisation, 1*(1).

Acknowledgements

This paper was written in connection with scientific project VEGA no. 1/0961/16. Financial support from this Ministry of Education's scheme is also gratefully acknowledged.

Annex

Table 1. Characteristics of urbanization in Slovak Republic

Urban population ('000)				Rate of change of the urban population (%)			Level of urbanization (%)			
1995	**2005**	**2015**	**2025**	**1995-2005**	**2005-2015**	**1995-2015**	**1995**	**2005**	**2015**	**2025**
3 032	2 996	2 925	2 923	-0,1	-0,2	-0,2	56,5	55,6	53,6	53,6

Source: based on data of World Cities Report (2016).

Table 2. Comparing labour market characteristics of cities neighbouring Western Slovakia region

Metropolitan areas	Labour force of the metropolitan area as a share of national value (%)				Employment of the metropolitan area as a share of national value (%)				Unemployment of the metropolitan area as a share of national value (%)			
	2000	**2010**	**2013**	**2014**	**2000**	**2010**	**2013**	**2014**	**2000**	**2010**	**2013**	**2014**
Bratislava	14,7	14,6	14,3	14,2	16,7	15,8	15,5	15,3	6,5	7	7,2	7,4
Brno	6,1	6,1	6,3	...	6,2	6,1	6,3	...	5,8	6,5	6,2	...
Katowice	5,4	6,5	6,8	6,6	5,3	6,6	6,9	6,6	6,2	6,2	6,5	6,3
Kraków	3,6	3,3	3,5	3,4	3,8	3,4	3,5	3,4	2,6	3,2	3,7	3,5
Ostrava	5,5	5,2	5,1	...	5,1	5	5	...	8,9	7,2	7,3	...
Vienna	31,8	32,2	32	...	31,8	31,8	31,4	...	32,4	40,2	42,2	...

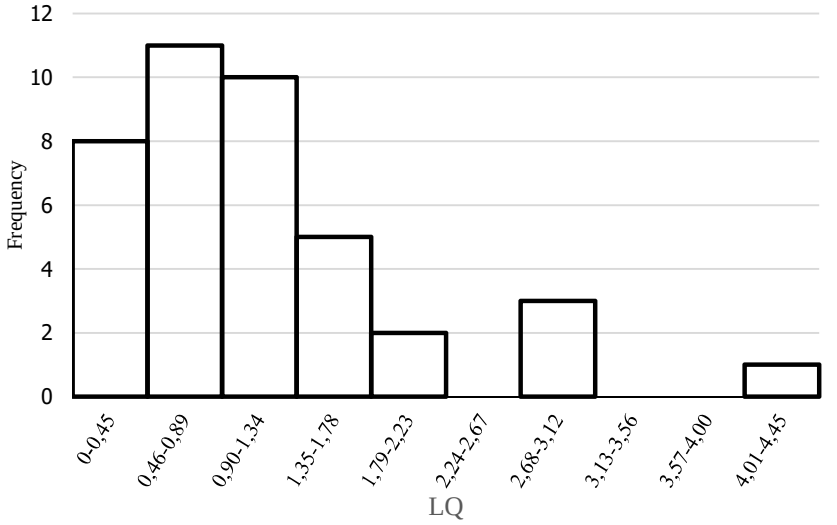
Source: based on data of World Cities Report (2016).

Table 2. Employment in thousands of persons concerning the export jobs and location quotient (as of 2014)

Of which: by economic activities of NACE Rev.2 (codes)			Bratislava		Žilina	
			LQ	Export jobs	LQ	Export jobs
Agriculture		A	0,04	NA	0,21	NA
	Industry in total*	B,C,D,E	0,42	NA	0,91	NA
***Of which:**	Mining and quarrying	B	0,08	NA	1,06	17
	Manufacturing	C	0,41	NA	0,84	NA
	Electricity supply	D	0,29	NA	1,95	701
	Water supply, waste	E	0,36	NA	1,16	144
Construction		F	0,87	NA	2,04	2 424
Wholesale, retail trade		G	1,19	7 832	1,22	1 758
Transportation and storage		H	1,05	995	1,26	1 032
Accommodation, food services		I	1,31	1 433	0,33	NA
Information, communication		J	2,87	13 811	1,53	760
Financial, insurance activities		K	2,97	12 015	0,67	NA
Real estate activities		L	1,49	1 769	0,87	NA
Profession.,scient., techn. activit.		M	2,84	20 042	0,71	NA
Administrative services		N	1,61	6 111	0,84	NA
Public administration		O	0,98	NA	0,74	NA
Education		P	0,72	NA	1,26	1 367
Health		Q	0,83	NA	0,63	NA
Arts, entertaitment, recreation		R	1,52	2 121	1,07	57
Other service activities		S	1,50	1 356	0,75	NA

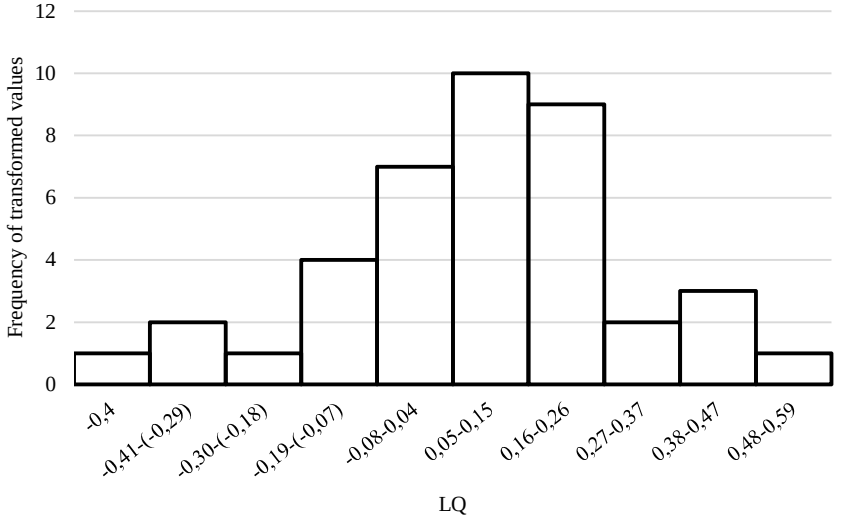
Source: own elaboration, based on data of Statistical Office SR.

Figure 1. Measure of location quotient asymetry of the probability distribution



Source: own elaboration, based on data of Statistical Office SR.

Figure 2. Standardized Location Quotient –after transfomation of data



Source: own elaboration, based on data of Statistical Office SR.