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### **Analyzing regional economic resilience in the Košice Region**

#### **Abstract**

Resilience of any area in question is linked with its structure, which is being built and rebuilt over the years. For instance, Košice city reinforces for most sector of Information, communication and as well its sector of Art, entertainment and recreation. After implementing strategy of reinforcement the city can be better up to the task to cope with shocks. Similarly other areas, this paper was trying to shed light on this topic by implementing methodology of localization quotient and using data for seven cities in Eastern Slovak Republic. The analysis provides comparison in structure and resilience potential of cities in terms of employment.

**Keywords:** resilience, regional development, shock, economic crisis.

**JEL Classification:** J21, R10, R11, R12

#### **Introduction**

The term „resilience” has been commonly applied to how well, or how badly, individual economies have responded to the shocks to their systems arising from the impact of recession (Breathnach et al. 2014). Foster (2007, p. 14) defined regional resilience as „an ability of a region to anticipate, prepare for, respond to, and recover from a disturbance”. In general, regional economic resilience describes the development in a region after an exogenous shock (Wink 2012). Shocks can be of three kinds: 1) shocks caused by downturns in the national economy; 2) shocks caused by downturns in particular industries that constitute an important component of the region’s export base (industry shocks); 3) other external shocks, e.g. a natural disaster, closure of a military base, movement of an important firm out of the area, etc. (Hill et al. 2011). Frenken et al. (2007; in Holm, Østergaard 2013) argues that while specialization enhances employment growth, it also creates greater vulnerability to external shocks. Regions that have a more diverse industry structure might experience less growth, but they are also more resilient to external shocks. If the industry is specialized, it draws heavily on the same resources, which results in higher wages and other negative congestion effects (Martin 2011).

Some of the most significant contributions to this area of research is the work presented by Martin (2011), Christopherson et al. (2010), Masik and Rzycki (2014, pp. 129-141), Dinh and Pearson (2015) etc. In Czech academic literature, the concept of the regional resilience has been expounded for instance by Svoboda (2013, pp. 252-257), Koutský et al. (2012),

Kučerová (2009), Lungová (2011). In Slovak academic literature, the concept of regional resilience has been presented by Hudec and Šišerová (2014), Buček (2010, pp. 190-208.).

In this paper the main focus of research was to identify industrial structure of regions in Slovakia concerning its employment and changes towards resilience. The research hypotheses was that the bigger employment industry capacity is the more chances there can be for building the resilience among cities and within cities itself. For measuring the employment capacity in industry the location quotient was used, while taking into account its limitation in some randomness underlying location decisions (Guimaraes, Figueiredo, Woodward 2009). The region of East Slovakia was selected in this paper for it has both cities, which were assumed to have sufficient capacity and as well cities, which can be helped out.

## **Methodology**

Many studies have analyzed which factors and industries support the growth of an industry in a specific region. Martin (2011) analyzed the resistance and recovery of UK regions following a recessionary economic shock by investigating how employment in the regions was affected by the national recession and its post-recession growth. The empirical findings presented in his research (Martin 2011) indicate that regional resilience to recession can vary and change over time, not only because of differences in the causes and nature of individual recessionary shocks, but because the factors and mechanisms that shape economic resilience may themselves evolve and change. Resilience is not a static feature of an economy, but a dynamic process, influenced both by the impact of major shocks and by the ongoing restlessness of structural economic change and adaptation. Other researchers (Holm, Østergaard 2013) analyzed the situation in Denmark. According their study's findings, the ICT sector in urban and agglomerated regions was sensitive to the business cycle, while the sector in less urbanized regions was resistant. Thus the growth of a regional ICT sectors seems not to reduce the resilience. The ICT sector in Denmark is agglomerated in the large urban university regions and while these declined after shock, they also grew when the business cycle turned positive. Theirs study has shown that the factors that increased the resistance type of resilience also limited the growth of the ICT sector.

The report of Šišerová (2015) presented the results of resistance of the Slovak municipalities. The resistance was measured by sensitivity index during the greatest impact of the financial crisis of 2008 and the prosperity was measured by the composite index of

municipal prosperity. The results show that Košice region was the most resistant region. Košice region will be the object of interest in the current study.

## Method

In general, we can use location quotients to describe the situation of an area. In this paper we concentrate at cities. The basics of using location quotients can be found in the first formula, where  $x_i^r$  and  $x^r$  denote gross output of sector  $i$  in region  $r$ . Total output of all sectors at national level, denotes  $n$ , i.e.  $x_i^n$  and  $x^n$  (Miller, Blair 1985).

$$LQ_i^r = \frac{x_i^r / x^r}{x_i^n / x^n} \quad (1)$$

This formula express 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 with nation.

$$LQ_i^r = \frac{x_i^r / x_i^n}{x^r / x^n} \quad (2)$$

Second formula is a variation of the first one, where already a numerator reflects total national output of commodity  $i$  produced by region  $r$ , in the following analysis it will be a city. The denominator reflects total national output of all commodities produced in city. The interpretation is the similar; it only refers to the most frequent commodities produced in the city instead of the most concentrated industry.

We use the localization quotient as an indirect way of measuring the output and expressing the values for input output tables (Flegg, Tohmo 2013). To be precise we apply here the Cross Industry Location Quotient - CILQ.

$$CILQ_{ij} = \frac{SLQ_i}{SLQ_j} = \frac{RE_i / NE_i}{RE_j / NE_j} \quad (3)$$

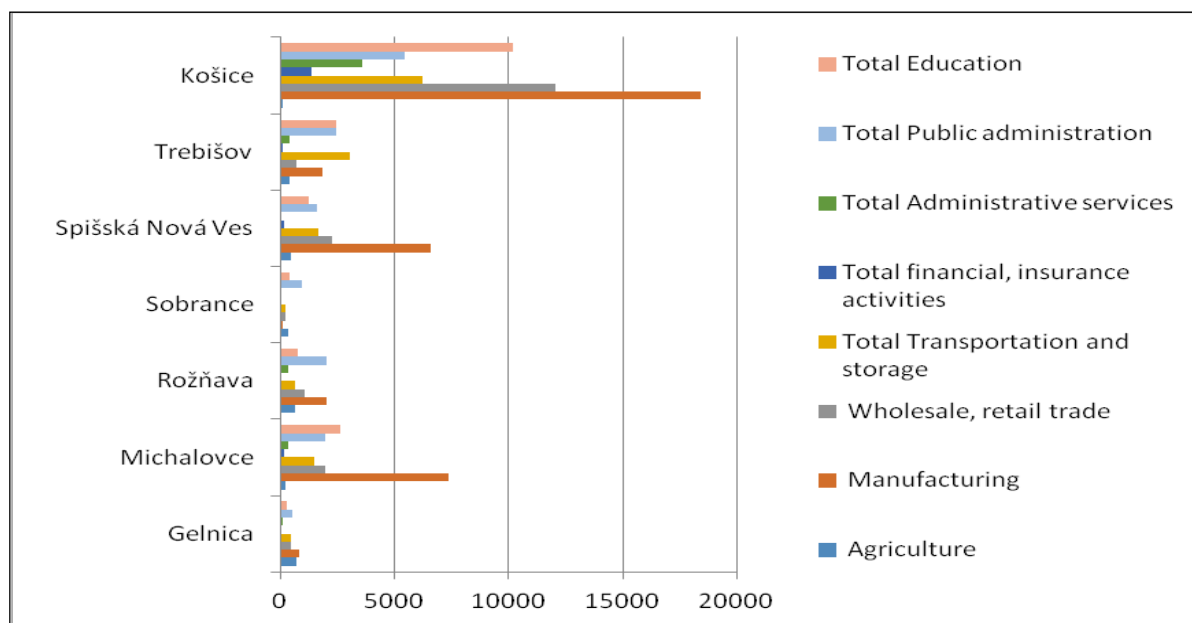
„where RE<sub>i</sub> denotes regional employment (or output) in supplying sector i and NE<sub>i</sub> denotes the corresponding national figure” (Flegg, Tohmo 2013).

Consumption of each sector concentrates on inputs for instance labor (Hujer, Thomsen 2010; Los, Timmer, de Vries 2015; Romero, Tejada 2011), which is the subject of small-scale analysis.

### Cities industrial structure in the perspective of employment

The objects of examination were cities of East Slovakia: Gelnica, Košice, Michalovce, Sobrance, Spišská Nová Ves, Rožňava and Trebišov. The employment overview and brief comparison of seven cities is to be found in the graph 1. There the industry under NACE rev. 2 was used, thus C – manufacturing industry – seems to be prevailing in Košice, Michalovce and Spišská Nová Ves. C industry is linked with G – wholesale and retail, which gets the second largest portion of employment in the three cities mentioned afore. Then the employment is concentrated in P industry, which is education. Obviously manufacturers need educated staff. But within the afore mentioned three cities, the two – Košice and Michalovce were obtaining such result and Trebišov outmatched Spišská Nová Ves.

**Graph 1. Employees in Industries in the cities of Košice region - data of 2014**



Source: Compiled by authors based on data from the Slovak Statistical Office (absolute value).

Looking at the data for evaluation, we may tend to come to the different conclusions compared to the conclusions derived by further analysis. In analysis we use the already mentioned Location Quotient (table1).

In the following we have applied the simple Location Quotient (LQ or SLQ) for employment in seven cities through all industries. Aware of its disadvantages we tried to describe the seven towns in year 2014.

**Table 1. Location quotient derived of employment in individual industries of the cities of east Slovakia (as of 2014)**

| Of which: by economic activities of NACE Rev.2 |                      | Košice | Gelnica | Michalovce | Rožňava | Sobrance | Spíšská Nová Ves | Trebišov |
|--|----------------------|--------|---------|------------|---------|----------|------------------|----------|
| Agriculture                                    | A                    | 0,03   | 0,18    | 0,01       | 0,07    | 0,13     | 0,02             | 0,03     |
| Industry in total*                             | B,C,D,E              | 0,87   | 0,15    | 3,37       | 0,34    | 0,05     | 1,59             | 0,60     |
| *Of which:                                     | Mining and quarrying | B      | 0,17    |            |         |          | 2,34             |          |
|  | Manufacturing        | C      | 0,84    | 0,85       | 1,47    | 0,88     | 1,46             | 0,50     |
|  | Electricity supply   | D      | 1,51    |            | 2,08    |          | 0,64             | 0,62     |
|  | Water supply, waste  | E      | 0,62    |            |         | 0,90     | 0,99             |          |
| Construction                                   | F                    | 0,95   |         | 0,91       | 0,24    |          | 1,24             | 0,81     |
| Wholesale, retail trade                        | G                    | 0,96   | 0,90    | 0,68       | 0,83    | 0,58     | 0,89             | 0,34     |
| Transportation and storage                     | H                    | 1,00   | 1,79    | 1,05       | 1,00    | 1,24     | 1,28             | 2,88     |
| Accommodation, food services                   | I                    | 1,04   |         | 0,35       |         |          | 0,67             |          |
| Information, communication                     | J                    | 2,44   |         | 0,06       | 0,06    |          | 0,17             | 0,02     |
| Financial, insurance activities                | K                    | 0,72   | 0,22    | 0,36       | 0,31    | 0,21     | 0,38             | 0,35     |
| Real estate activities                         | L                    | 1,30   |         | 0,57       | 1,42    |          | 1,09             |          |
| Profession., scient., techn. activit.          | M                    | 0,86   |         | 0,41       | 0,01    |          | 0,11             | 0,38     |
| Administrative services                        | N                    | 1,16   | 0,59    | 0,45       | 0,99    | 0,03     | 0,11             | 0,74     |
| Public administration                          | O                    | 0,72   | 1,50    | 1,12       | 2,51    | 4,04     | 1,03             | 1,92     |
| Education                                      | P                    | 1,22   | 0,86    | 1,36       | 0,86    | 1,53     | 0,74             | 1,71     |
| Health   | Q                    | 1,40   | 0,44    | 0,76       | 1,08    |          | 0,95             | 1,72     |
| Arts, entertainment, recreation                | R                    | 0,93   | 0,17    | 0,30       | 0,88    |          | 1,16             | 0,09     |
| Other service activities                       | S                    | 1,64   |         | 0,85       | 2,30    |          | 0,97             | 0,85     |

Source: own elaboration.

As for an illustration of the C industry and some uniqueness of the city we provide concrete company's names and its branch, in brackets there are codes in line with NACE rev.2:

- Michalovce, the LQ was the highest (1.47, as shown in Figure 1) among the cities, the companies representing C industry can be: SYRÁREŇ BEL SLOVENSKO a.s. –

Operation of dairies and cheese making (10.51), Moneta S, s.r.o. – Manufacture of plastic packing goods (22.22).

- Spišská Nová Ves, the LQ was almost the highest (1,46, as shown in Figure 1) among the cities, the companies representing C industry can be NOVES okná, a.s. – Manufacture of builders' ware of plastic (22.23).
- Gelnica as well as the rest of the cities were achieving the LQ lower than 1, uttering some companies to reflect reality: ELEKTROCONNECT, s.r.o. Manufacture of other electronic and electric wires and cables (27.32) STROJKOV ENGINEERING, s.r.o. Manufacture of electric lighting equipment (27.40)

What comes as obvious is that Košice is specialized in the economic activities such as: Information, communication – J value 2.44, Electricity supply – D value 1.51 and Health – Q value 1.4. The values exceeding Košice was found in Michalovce in the following industries: Electricity supply – D value 2.08, Manufacturing – C value is 1.47 and Education – P value 1.36. We shall compare also the Spišská Nová Ves, which has got its potential in Mining and quarrying – B value 2.34 and Manufacturing – C value 1.46, Transportation and storage – H value 1.28 and similarly Construction – F value 1.24. One more LQ of Spišská Nová Ves is interesting it is the value of R industry, i.e. Arts, entertainment, recreation also exceeding one – 1.16. One can assume that these industries will be further developed and strengthened.

Coming back to the research hypotheses, which was looking for an answer of the correlation between the employment capacity in an industry and the chances for building the resilience among cities and within cities itself. Three cities provide signes of resilience in values of LQ over 1, the cities are Košice, Spišská Nová Ves and Michalovce are cities ranking the score of the number of industries, where the LQ is above 1 (the numbers are 9,8, and 6 respectively). The interesting fact is that all cities have H industry LQ over 1, it is Transportation and storage industry. Quite big difference there is in industry J – Information and communication, where Košice (2,44) and Trebišov (0,02) and even Gelnica does not have any value at all. This can be an industry, in which cities may find a common ground for cooperation. Even better industry is Arts, entertainment, recreation – R, values are in the table 1.

### **Indirect effects of employment**

Some indirect effects can be found in the education of employees in the industries, which have proven ability to supply for the demands of other regions. When observing the



employment data and concentrating at crucial resources, it is certain that Michalovce city is prime one in terms of electricity supply, followed by Kosice city. Water supply and waste employs most people in Spišská Nová Ves. Agriculture being at the same time crucial sector for resources and rather traditional one for the area of Eastern Slovakia, we consider to be the sector of future potential. It is so, only under the assumption that young generation, keen in new technologies, together with existing farmers would cooperate in creating innovative products based on use of the arable land. There are numerous examples in the world. The recommendation is that creativity has to find place in our lives, so to say, as *modus operandi*. Increasingly popular became in the last few years sector of Art, entertainment and recreation. With Košice city being European Cultural Capital of 2013 together with Nice, the employment data are rather unfavorable (LQ was calculated as 0,93). In comparison Spišská Nová Ves (1,16) exceeds Košice. Finding out reason for this situation can be a good question for another paper.

## **Conclusion**

Regional industry resilience, apart from other factors, depends on the industrial structure that changes when an industry evolves and also on fairly stable factors, such as the region's size and overall industrial diversity (Holm et al. 2013; Suchacek 2015). Economic resilience is measured by variety of indicators such as Gross domestic Product, Gross Value Added, disposable income, sectoral employment, productivity, work-force, employment, number of enterprises / start-ups, business in highly exporting sectors, innovations and qualification levels (Masik, Rzycki 2014, pp. 129-141). In this study, we used sectoral employment and the Location Quotient. The Location Quotient used in the paper was helping to identify sectors that can spin and support resilience of the cities. Of course it is achievable by people and for people, therefore LQ referred to employment data. The paper's limitation is that it did not use further methods of evaluation such as probabilities distribution. Despite this fact, it allowed to create recommendations addressed to the city officials or entrepreneurs.

Increased knowledge of ways to build resilience could also be very significant for governments and development agencies in planning and executing strategies or implementing policies to stimulate regional development (Bristow 2010, pp. 153-167; in Alonso, Bressan 2014).

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