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Quantitative Analysis of Environment Potential for Cluster Development in Tourist Regions of Slovak Republic

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Abstract

Clusters and cluster initiatives are the most effective interconnection not only between companies of a particular industry but also in the wider surroundings where cooperation is the most important factor. The analysis of potential clusters provides a clear picture of the regional economy and is one of the backgrounds in formulating the economic development strategies of the regions. The main aim of this article is to propose the appropriate location of the potential tourism cluster. To achieve this, it is necessary to identify the activity of the tourism sector in the selected regions that create the conditions for cluster formation. The identification is done using quantitative cluster mapping methods – the location quotient and shift-share analysis. The main sources of the calculations are statistical data on employment published by the Statistical Office of the Slovak Republic. Comparing tourist regions has helped identify not only growing but also decreasing potential cluster organizations. The application of both methods has found that the region of Upper Považie is, with his positive dynamic development, positive location quotient values and the support of local factors, the most appropriate region for the location of the tourism cluster. The results achieved can be used in further assessments of the environment and his effectiveness for cluster creation already in the specific tourist region. In this process it is necessary to involve institutions that know the environment and can assess the importance of tourism for the region.

Keywords: cluster identification; location quotient; shift-share analysis; tourist regions of Slovakia

Introduction

The phenomenon of clustering is a paradoxical relationship between two or more companies that are in a competitive relationship but also cooperate with each other. The concept of cluster creation is particularly popular in dynamic sectors of the national economy, characterized by a high level of knowledge management and active co-operation of enterprises with scientific institutions. Although this includes the biotechnology sector, the IT sector and high-tech sectors, the same synergy can also be achieved in more traditional sectors, such as tourism (Wierżyński, 2012).

The topic of regional development and the reduction of disparities is increasingly found not only in scientific and professional publications, but also in the pres-

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entation of countries development programs. However, most of these documents are geographically limited and disregarded by mutual relationships and connections. The industrial cluster, as one of the regional development approaches, has become a point of interest for policy makers and economic developers in recent years (Bekele & Jackson, 2006). W. E. Youngdahl and A. P. Loomba (2000) argue that clusters and cluster initiatives whose output, productivity and growth are significantly higher compared than others, represent for an area in which they operate a comparative advantage. Author A. Michálková (2011) assumes that the creation of cluster organizations in tourism is one of the strategies to become a successful and competitive region.

In view of M. E. Porter´s (1996) argument that clusters increase the competitiveness of the regional industry and given the fact that tourism is a powerful tool for regional development, it is justified to support the concept of clustering in tourism area. The cluster creation can be for the sector and region in which the cluster organization operates, a new and prospective development direction (Ferreira & Estevão, 2009).

Current experts who have dealt with the development of various studies concerning to the identification of a potential environment suitable for the emergence of industrial clusters and cluster initiatives are for example M. E. Porter (2019), Ch. Ketels et al. (2009), J. Stejskal (2011) and D. Pavelková et al. (2009).

Methodology

The methodology for identifying and analysing potential clusters in the region is by M. E. Porter (1998) a multistage process that uses quantitative, qualitative and combined methods. The main aim of this article is by applying the methodological procedure to identify potential tourism clusters in selected tourist regions of Slovak Republic. The regions were selected based on the document – *Regionalization of tourism in the Slovak Republic*, which evaluates their future position and their application on the international market (Ministry of Economy of the Slovak Republic, 2005). The input data for the application of the following calculations and analyses is information of revenues and employment in the tourism sector. It is the number of employees by economic activity in the NACE I section in selected regions, sorted according to the *Statistical classification of economic activities – SK NACE Rev. 2* (Statistical Office of the Slovak Republic, 2007). Each tourist region will be analysed using the most widely used quantitative methods of measuring and evaluating clusters – the location quotient (LQ) and shift-share analysis. The calculation of LQ by M. E. Porter (1998) represents the sector's share of employment in the region against the national share. This relationship can be expressed as follows:

$$LQ = \frac{local_i / local}{SR_i / SR}$$

where
- LQ - location quotient of employment in the region
- $local_i$ - regional employment in tourism sector
- $local$- regional employment
- SR_i - national employment in tourism sector
- SR - national employment

The value of LQ equal to 1.0 indicates that the region employs the same share of his workforce in the sector as a whole country. The value of LQ greater than 1.0 means that the region employs a greater part of his workforce in the sector, than the nation has. When LQ exceeds the value of 1.25 the region specializes in a specific industry.

The second step is to determine the annual growth rate, which represents the average growth rate on an annual basis. In this article annual growth rates change over time in the size LQ (which varies depending on growth of employees working in the tourism sector or the decline – the labor force from the tourism sector) and show whether the potential cluster in his degree of specialization in relation to the country increases or decreases. The following mathematical relationship applies to calculation of annual growth rates (Rist & Pizzica, 2015):

$$CAGR = \left(\frac{EV}{BV}\right)^{\left(\frac{1}{n}\right)} - 1$$

where
- $CAGR$ - compound annual growth rate
- EV - ending value
- BV - beginning value
- n - number of periods (years)

The calculation of the LQ in the first step of the methodology shall determine the concentration of the tourism sector by the selected parameters in each region. The next stage of the methodology focuses on investigating factors that help or hinder the clusters creation. Using shift-share analysis according to P. Sambidi (2008) identifies the performance of the regions, their interregional problems and the com-

petitive advantage of the region. Shift-share analysis quantifies the change in employment which divides into three components – the national share, industrial mix and regional shift components.

The national share measures the change in employment that has occurred in the selected tourist region during the period considered. It assesses the rate of employment growth in the sector at regional and national level. The industrial mix expresses a proportional shift depending on different growth or decline in the tourism sector between regional and national levels. Positive values of the industrial mix reflect the faster growth of the tourism sector in the region compared to the nation and vice versa. The regional component, as the most important component, points to the progress or stagnation of the industry in the region. The positive values of the regional shift component are presented as a comparative advantage of the region to the national level and vice versa. All the above components can be calculated using the following relations (Sambidi, 2008):

$$NS = local_i^{t-1} \cdot \left(\frac{SR^t}{SR^{t-1}} \right) - 1$$

$$IM = local_i^{t-1} \cdot \left[\left(\frac{SR_i^t}{SR_i^{t-1}} \right) - \left(\frac{SR^t}{SR^{t-1}} \right) \right]$$

$$RS = local_i^{t-1} \cdot \left[\left(\frac{local_i^t}{local_i^{t-1}} \right) - \left(\frac{SR_i^t}{SR_i^{t-1}} \right) \right]$$

where

- *NS* - national share component
- *IM* - industrial mix component
- *RS* - regional shift component
- $local_i^{t-1}$ - regional employment in tourism sector at the beginning of a period
- $local_i^t$ - regional employment in tourism sector at the end of the period
- SR^{t-1} - national employment at the beginning of a period
- SR^t - national employment at the end of the period
- SR_i^{t-1} - national employment in tourism sector at the beginning of a period
- SR_i^t - national employment in tourism sector at the end of the period

Following the calculation of the values of all three components, the total employment change in the region is calculated as follows:

$$TEC = NS + IM + RS$$

Subsequent to the shift-share analysis and calculation of the *LQ* of each region, together with changes in the quotient from the base year, potential clusters are ranked according to the method developed by the Boston Consulting Group (BCG). The BCG matrix will clear which regions are specialized and whether their degree of specialization increases or decreases. According to this method of data sorting, clusters in the studied regions can be classified into four categories – stars / winners, emerging / mixed losers, mature / *mixed winners and transformers* / losers.

Results and Discussion

Identifying potential tourism clusters and the results of this study, which are divided into two parts, deal with economic development tools – location quotient and shift-share analysis to identify the tourist region with a comparative advantage in the tourism sector. The third part of this study evaluates tourism in selected tourist regions through the development of revenues from provided tourism services.

Identification of the region for tourism cluster – LQ method

In the first step of analysing potential clusters, it is necessary to collect and analyse the employment data of the tourism sector in two different time periods in selected regions. In this research we used data from the database by Statistical Office of the Slovak Republic for the regions with the starting year 2007 and the comparison year 2017, in order to clarify what is happening in the tourism sector and regions over time. The base year 2007 was chosen due to the first mention the clusters and cluster initiatives support in the territory of the Slovak Republic in the political document – *National Strategic Reference Framework*.

Table 1 calculates the values of *LQ* selected tourist regions for the years 2007 and 2017 as well as a composite annual growth rate of employment in the research period. These results serve as the basis for determining the potential tourism cluster.

Six of eight regions have a positive compound annual growth rate, which shows that these regions have increased in their degree of specialization in the tourism sector in relation to the country. Region of Upper Považie has the largest compound annual growth rate of 4,77 %, but his *LQ* value for the years 2007 and 2017 achieves a value less than 1.0, indicating that although the region is increasingly specialized, the tourism sec-

Table 1. Change LQ values in selected tourist regions per 2007 – 2017

Tourist region	Location Quotient		Compound Annual Growth Rate (%)
	2007	2017	
Region of Bratislava	1.36	1.48	0,94 %
Region of Upper Považie	0.63	0.95	4,77 %
Region of Turiec	1.41	1.51	0,75 %
Region of Orava	1.07	1.10	0,34 %
Region of Liptov	2.13	2.53	1,93 %
Region of Horehronie	1.21	1.25	0,33 %
Region of Tatras	2.22	1.10	-7,50 %
Region of Spiš	1.95	1.51	-2,83 %

Source: processed by the authors according to data by Statistical Office of the Slovak Republic, 2018

tor is still not sufficiently represented as a national level. The largest decrease in *LQ* values was recorded in the region of Tatras, which was identified in 2007 with a value of 2.22 as a suitable territory for the emergence of a potential tourism cluster, but in year 2017 the value of *LQ* was 1.10.

The decrease in the quotient during the research period is also seen in the case region of Spiš, from a value 1.95 to a value of 1.51. In this case the region continues to be highly specialized in the tourism sector. From the table we can see that the other tourist regions – Liptov, Turiec, Bratislava, Horehronie and Orava reached the value of the quotient over 1.0 during the research period.

The change in the resulting *LQ* values in the research period is an effective measure of economic activity in the regions. The results provide information on whether the importance of the potential cluster in the region increases or decreases. With input and output data, clusters can be divided into four categories:

- *star* clusters that are relatively specialized ($LQ > 1.0$) compared to the national economy and are becoming more specialized over time in the field of study,
- *emerging* clusters that are relatively non-specialized ($LQ < 1.0$) compared to the national economy but are becoming specialized over time in the field of study,
- *mature* clusters that are relatively specialized ($LQ > 1.0$) compared to the national economy but are becoming less specialized over time in the field of study,
- *transforming* clusters that are relatively non-specialized ($LQ < 1.0$) compared to the national economy and are becoming more less specialized over time in the field of study.

The Figure 1 below provides information on the growth of LQ values in the regions during the research period.

The size of each bubble shows the number of persons employed in the tourism sector.

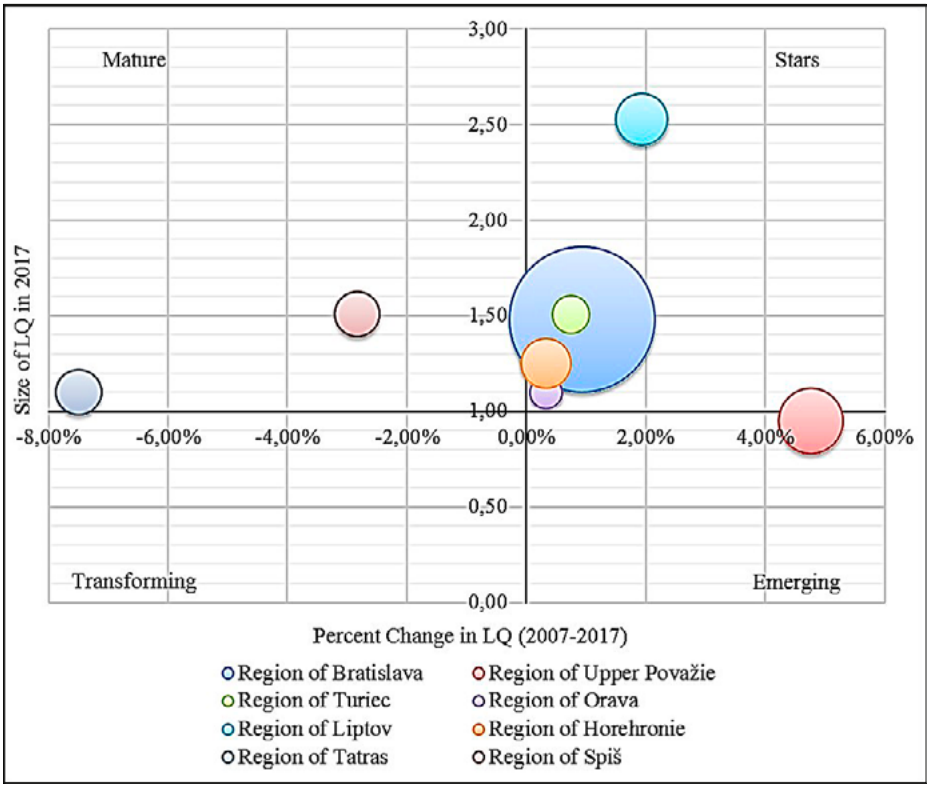

Figure 1. BCG matrix of specialization and LQ values changes of selected tourist regions per 2007 – 2017
Source: processed by the authors using MS Excel software according to data by Statistical Office of the Slovak Republic, 2018

The vertical axis represents the concentration of the sector in the regions in the year 2017. Regions located above the horizontal axis have a *LQ* value greater than 1.0 indicating that the sector is more concentrated in the region than in the country, while under the horizontal axis there are regions that use a smaller part of their workforce. The horizontal axis of the graph shows the compound annual growth rate of each region from 2007 to 2017. The bubbles located to the right of the vertical axis illustrate regions with increasing local employment compared to the country, while those on the left side of the vertical axis have decreased their employment over the research period. Regions with *LQ* value higher than 1.0 or his growing share are found in the quadrant *stars* and *emerging*. These BCG matrix´s quadrants represent successful regions with high specialization.

As can be seen – the region of Liptov had *LQ* value 2.53 in the year 2017 and recorded a 1,93 % increase in his value since 2007. Other tourist regions with the position in a quadrant stars are Turiec, Bratislava, Horehronie and Orava. Region of Upper Považie currently located in the *emerging* quadrant can become a specialized region in the future. Region of Spiš and Tatras falls into the *mature* quadrant. These are important tourist regions that require some attention as they become less specialized. This can be caused by the departure of employees for example abroad or going to another sector. The main cause of these changes is the search for better wage evaluation.

While decreasing *LQ* values are always a negative indicator, increasing values are not only a positive indicator. This situation can also happen if the national share of employment in the industry has decreased faster than the regional share.

Identification of the region for tourism cluster – shift-share analyse

The *LQ* values compare the regional concentration of the industry sector to the national level. Shift-share analysis considers changes over time to determine which of the three components has significantly affected the economic growth of a particular tourist region. The calculation of all three components of the analysis allows you to determine which regions in the tourism sector achieve good or bad results based on which it is possible to detect regions with a competitive advantage and the potential for the establishment of a tourism cluster. Table 2 shows the results of three shift-share analysis components – national share component, industrial mix component and regional shift component.

According to the above table, the most tourism activities between years 2007 and 2017 were recorded in the region of Bratislava with a regional contribution of 2 260 jobs (a total increase of 4 489 employees). Region of Upper Považie was the second region with a share plus 734 jobs (total employment increased by 1 123). According to the recorded long-term changes in employment, the region of Liptov was the third dynamic region with a total increase plus 555 jobs.

Region of Tatras recorded the largest decrease in jobs in the overall scale by minus 531 jobs with a regional decline minus 1 101 employees. The second region, reaching negative values, is the region of Spiš with a total loss of 176 employees and a regional decline minus 616 employees. Despite the decline in the regional component in the region of Horehronie (minus 76 people) and region of Turiec (minus 41 people), the total value of employment represents the plus values.

Following the transition of the calculated values of the structural and regional components to the coordinates of the BCG matrix, the position of the regions shall be determined based on the economic activity of the tourism sector in four quadrants – *winners, mixed winners, mixed losers and losers*. The *winning* regions are the regions that grew at national and local levels during the research period. *Mixed winners* are regions that have not grown at national, but at local level. *Mixed losers*' regions have grown at national level, but they declined at local level over time and *los-*

Table 2. Results of shift-share analysis of selected tourist regions

Tourist Region	National share component	Industrial mix component	Regional shift component	Tourism Quotient
Region of Bratislava	1,01789	1,21087	2,26025	4,489
Region of Upper Považie	0,17750	0,21115	0,73436	1,123
Region of Turiec	0,09906	0,11784	-0,04190	0,175
Region of Orava	0,06268	0,07457	0,06375	0,201
Region of Liptov	0,14437	0,17174	0,23889	0,555
Region of Horehronie	0,16564	0,19705	-0,07669	0,286
Region of Tatras	0,26486	0,31508	-1,11094	-0,531
Region of Spiš	0,20137	0,23955	-0,61691	-0,176

Source: processed by the authors according to data by Statistical Office of the Slovak Republic, 2018

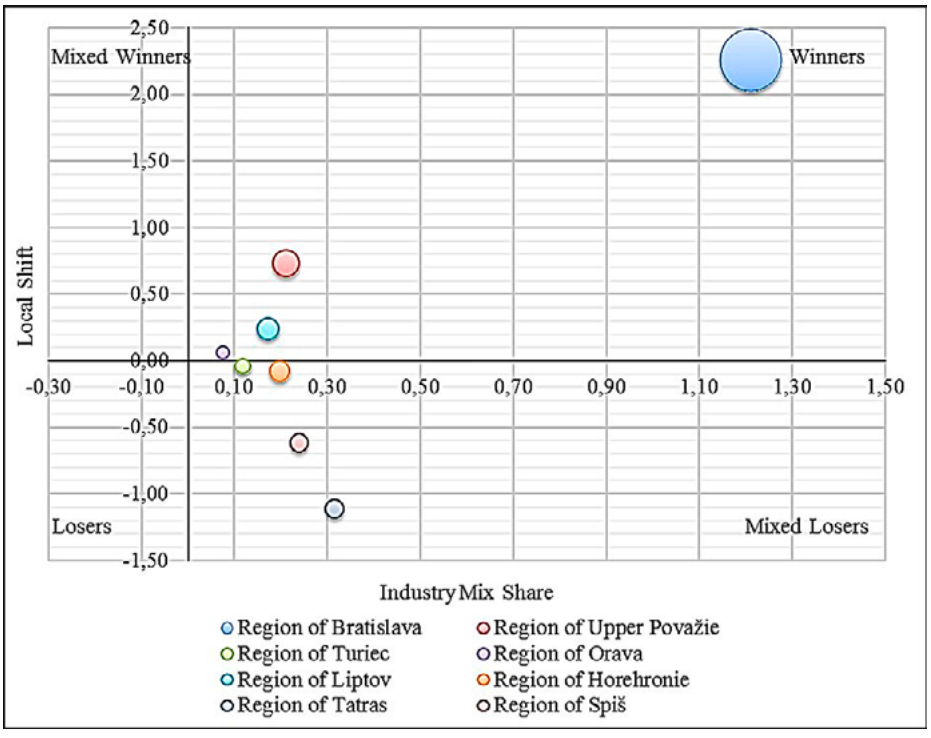

Figure 2. Shift-share analysis of the tourist regions compared to the nation
Source: processed by the authors using MS Excel software according to data by Statistical Office of the Slovak Republic, 2018

ers' regions decreased both at national and local level. The Figure 2 illustrates the results of the shift-share analysis of the tourist regions compared to the nation.

The Figure 2, which illustrates the effects of potential tourism clusters show that four tourist regions (Bratislava, Upper Považie, Liptov and Orava) have gained more jobs than the national average. Their positive trend in job creation suggests that regions have a comparative advantage in the tourism sector. In tourist regions in a quadrant *mixed losers* (Turiec, Horehronie, Spiš and Tatras) which lost most of their jobs between years 2007 and 2017, the tourism sector has grown faster at national level than in regional conditions. This loss is, given the positive values of the national component, due to local economic conditions that did not follow the national trend.

The overall shifts and results of shift-share analysis are almost the same as in the analysis of location quotient. Based on the data obtained it is possible to identify regions most suitable for the emergence of a tourism cluster.

Analysis of tourism performance in selected tourist regions by tourism revenues

In Table 3, we decided to describe the development of revenues from tourism performance in selected tourist regions for the years 2007 and 2017. Accommodation revenues include revenues from overnight stays including accommodation services, such as parking, laundry cleaning, etc. The values shown include VAT, regardless of the method of payment for these services.

Table 3. Tourism revenues in selected tourist regions per 2007 – 2017

Tourist region	Revenues (EUR thousands)		Δ Revenues (in %)
	2007	2017	
Region of Bratislava	72 592	108 455	49,40 %
Region of Upper Považie	15 792	22 154	40,29 %
Region of Turiec	5 440	12 676	133,01 %
Region of Orava	2 337	6 026	157,85 %
Region of Liptov	21 794	39 981	83,45 %
Region of Horehronie	9 543	12 849	34,64 %
Region of Tatras	31 589	54 971	74,02 %
Region of Spiš	2 947	4 337	47,17 %

Source: processed by the authors according to data by Statistical Office of the Slovak Republic, 2019

It is clear from Table 3 that the revenues for accommodation in all regions increased year on year. The largest increase (more than once the original value) was achieved by the region of Orava with revenues increase by 157,85 % and the region of Turiec, whose annual increase represents 133,01 %. Although these results are very flattering for the mentioned tourist regions, we can see that the resulting figures are still lower in comparison with the region of Horehronie, which recorded the

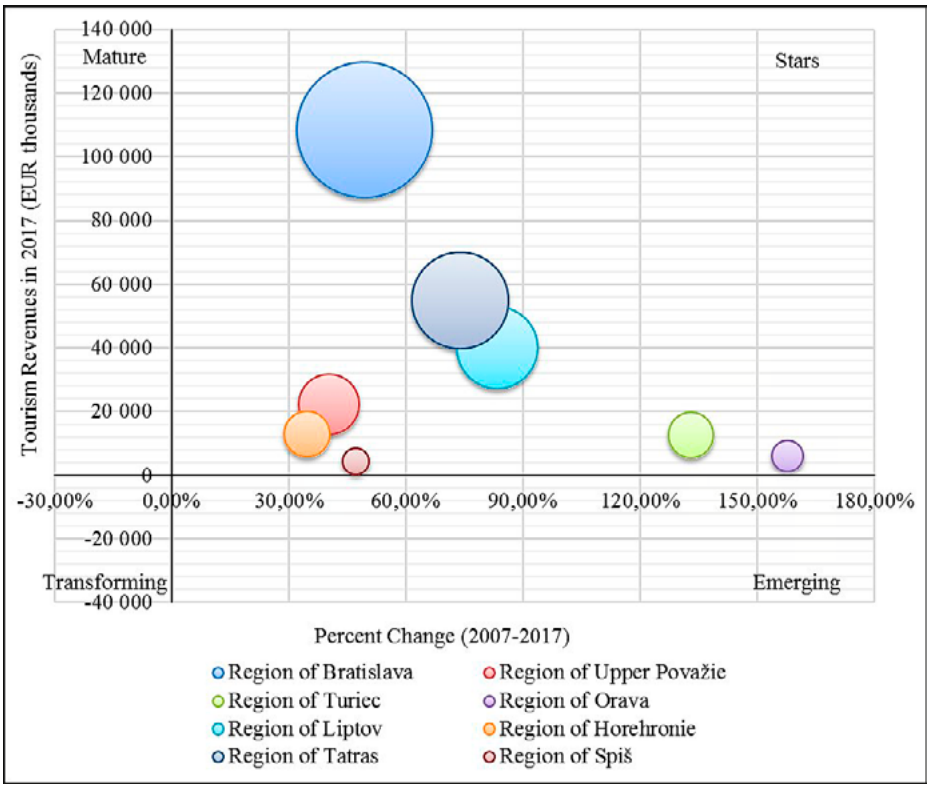

Figure 3. BCG matrix of tourism revenue development of selected tourist regions per 2007 – 2017
Source: processed by the authors using MS Excel software according to data by Statistical Office of the Slovak Republic, 2019

smallest increase in the number of revenues by 34,64 %. In the overall evaluation of selected tourist regions, the region of Bratislava is the best, where the development of the monitored indicator recorded the highest number of tourism revenues. The second is the region of Tatras and the third region of Liptov. These results are also fueled by the fact that these tourist regions are popular and visitors seeking destinations in Slovak Republic.

Similarly, as in the previous parts of this study, the results will be projected into BCG matrix (Figure 3), which will clarify the position of the various tourist regions.

According to the results shown in Figure 3, all tourist regions are in the quadrant stars, with the region of Tatras and region of Liptov situated in the center of the quadrant the best position. Region of Orava and the region of Turiec have achieved the highest increase in tourism revenues over the years, but their absolute value is lower than other tourist regions. Similarly, the region of Bratislava with high tourism revenues, but a low percentage increase in the period under review. From the Figure 3 we can conclude that the region of Upper Považie has achieved a third best position, which could significantly improve over the next years (with the same growth rate). Region of Spiš is significantly lagging the other tourist regions and its results are at the lowest of the area reached.

Conclusions

The establishment of a cluster and cluster initiative is a long-term process, resulting in the creation of relations between enterprises, strengthening of regional employment, facilitating of industrial re-organization and the promoting of the regional economic development (Barkley & Henry, 2001). Cluster mapping provides a clear picture of the regional economy by pointing to regions whose importance in the sectors of the national economy is increasing or decreasing. In the study, the concept the calculation of location quotient quantifies the level of industry concentration in the region in relation to the nation. Shift-share analysis evaluates the comparative advantages of existing or potential clusters. It separates national and industrial contributions from regional and assesses their impact on the clusters and cluster initiatives growth.

By applying the quantitative methods to identifying potential clusters and using the available employment statistics in tourist regions, research has found that in addition to region of Upper Považie, all studied regions surveyed LQ values higher than 1.0. However, when examining the values of LQ over time, the

region of Tatras and Spiš shows a loss of their specialization in the territory. During the research period, the concentration the tourist region of Horehronie and Turiec decreased due to the decline of job at regional level compared to the national trend. Based on the results, it can be assumed that the region of Upper Považie, which currently has a value of LQ in a quadrant *emerging*, will have a significant impact soon on the regional economy. This conclusion is also based on the data from shift-share analysis, where the region of Upper Považie with his contribution to employment is located just behind the tourist region of Bratislava. In the analysis of selected tourist regions by tourism revenues, the region of Upper Považie has occupied the third best position. From the results we can assess that the development of the region of Upper Považie has a growing trend and over the years it can gain a better position. Using the methods used is to locate the potential tourism cluster proposed by the region of Upper Považie because in the region of Bratislava, which achieves better results already the cluster organization operates.

Calculating the values of LQ and performing shift-share analysis is just the first step in the cluster mapping process, which is much more difficult. The results of this study may be used using other tools and techniques to further analyse a specific tourist region, which verifies his effectiveness, links and support from the country.

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