

## **TOURISM: ANALYSIS OF ECONOMIC PERFORMANCE OF DISTRICTS OF THE SLOVAK REPUBLIC**

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### **Abstract**

*Tourism is one of the key sectors of the global economy. Slovakia has a great natural, cultural and historical potential. It is interesting not only for mountain lovers, but also offers plenty of opportunities for health and spa tourism. Based on data published by the Statistical Office of the Slovak Republic, we compare the tourism efficiency of the districts of Slovak Republic for the year 2014. Efficiency of the tourism sector is traditionally measured by ratios such as the number of visitors per bed-place. In our study we extend this view by the use of multiple indicators of the tourism sector: in outcomes (the number of visitors and the number of nights spent in districts) and also in inputs (the number of employees, the number of self-employed persons in the tourism industry, the number of bed-places and attractiveness of districts). For this purpose we use Data Envelopment Analysis (DEA) and finally we compare DEA results with traditional ratios.*

**Key words:** *tourism, data envelopment analysis, districts of the Slovak Republic.*

### **1. Introduction**

Tourism affects the balance of payments of the state, its gross domestic product and also creates jobs. It is one of the key sectors of the global economy. Overall performance in tourism is affected by the participation of locals as well as by inbound tourism. Participation of citizens in their own country tourism is considered as the main indicator of the quality of regional supply in tourism. The most attractive regions for domestic visitors are Bratislava and its close surroundings, High Tatras, Liptov, Upper Považie and Horehronie (Slovak Tourist Board, 2013). Inbound tourism is a source of foreign exchange earnings, and represents a significant share of exports of services. In terms of inbound tourism, particularly attractive regions are Bratislava and its close surroundings, High Tatras, Liptov and Považie.

Slovakia has a great natural, cultural and historical potential, it is interesting not only for mountain lovers, but also offers plenty of opportunities for health and spa tourism. Although spa accommodation facilities make up only 2.7% of all accommodation establishments (Slovak Tourist Board, 2013), the total number of overnight stays is up to 22%. Also facilities providing services at a higher level of quality have recently succeeded to progress.

The Slovak Tourist Board (2013) informed that there is a lot of tourism businesses in some destinations, although the interest is low. The theory of market mechanism assumes that the market will manage this offer by itself. In practice, however, we see that the reality and theory differ significantly. This is confirmed in the next section of this paper by ratios that are the most frequently used tools of comparing the tourist destinations.

However, the ratios provide only a one-sided view of the overall situation, since they reflect only two of the plurality of indicators. In our work, we analyze the situation through more complex method that allows us to use more indicators at the same time.

Our goal is to identify districts that shows a disproportion between the number of tourism businesses and the number of tourists visiting these districts. The second goal is to find out if there exists a common factor of the districts that we consider efficient. Efficient in our case means that the proportion on the output from tourism and the investments made to attract tourists is adequate. It is difficult to define what is adequate, therefore we use a normalized results, where the number 1 is referred to efficient district.

For this two purposes we have chosen a Data Envelopment Analysis (DEA) method that enables comparisons of decision making units based on multiple inputs and outputs. The choice of these inputs and outputs significantly influence the results obtained. As the inputs we have to select indicators that characterize the cost of the process and as the output we have to select indicators that are desired outcomes of the process. The efficiency of each destination is evaluated in comparison with the performance of other destinations. DEA measures efficiency as the distance to a production frontier. The concept of the generalized production function of tourism output was mentioned already in 1998 by Marcouiller (see Marcouiller, 1998). Our analysis aims at assessing the tourism efficiency following the production process:

$$\text{Tourist output} = f(\text{capital, labour, natural and cultural resources}), \quad (1)$$

Most of the researchers who use DEA aim to analyze the performance of hotels and travel agencies or compare the performance in the tourism sector of countries. Wu et al. (2010) provide recent and comprehensive survey of studies that applied DEA to the hotel industry between 1989 and 2009. Only few researchers aim at assessing the regions. Cracolici et al. (2008) analysed the efficiency of the tourism industry on the regional level in Italy. The analysis of the efficiency of the tourism industry in various countries using cross-national comparison that distinguishes between developing and developed countries is discussed in Hadad et al. (2012). We have not yet met with any work comparing the performance of different tourism regions in the Slovak Republic using DEA. Therefore, we have decided to evaluate the performance of the tourism industry in Slovakia, where we focus on individual districts.

Finally we compare DEA results with traditional ratios used in tourism and propose one which can be the explanatory variable for the efficiency of the tourism sector.

## 2. Basic Comparison of Districts

Tables 1 – 3 provide information on traditional ratios used in tourism for districts of Slovakia that represent the situation in 2014: the number of visitors per employee in tourism sector, the number of visitors per self-employed in tourism sector, the number of visitors per bed-place, the average length of stay, and the bed-place occupancy rate. We derive these ratios from raw data of the tourism sector published by the Statistical Office of the Slovak Republic, STATdat database<sup>1</sup>.

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<sup>1</sup> Available at <https://slovak.statistics.sk> (accessed April 20, 2016).

Table 1: Ratios showing the performance of the tourism sector in 2014 – Western Slovakia

Destination	Number of visitors per employee	Number of visitors per self-employed	Number of visitors per bed-place	Average length of stay	Bed-place occupancy rate
Slovakia	193.2	285.3	19.6	2.9	15.7%
Western Slovakia	146.5	263.9	23.5	2.8	18.0%
Bratislava Region	140.0	507.4	35.5	2.1	20.6%
Bratislava I	188.8	3249.6	69.6	1.6	30.5%
Bratislava II	153.7	883.4	39.6	2.3	24.6%
Bratislava III	100.8	442.2	36.7	3.0	30.1%
Bratislava IV	62.9	143.1	23.3	5.6	35.9%
Bratislava V	43.2	78.9	32.5	1.8	15.7%
Malacky	56.4	80.5	19.7	2.4	13.2%
Pezinok	109.3	197.7	21.6	1.7	10.1%
Senec	682.1	208.5	7.6	2.3	4.9%
Nitra Region	196.4	167.9	14.0	2.8	10.6%
Komárno	*	101.2	16.6	2.1	9.5%
Levice	*	164.6	12.9	3.8	13.5%
Nitra	77.7	266.8	21.5	2.4	13.9%
Nové Zámky	359.4	247.2	15.1	3.1	13.0%
Šaľa	*	13.5	3.0	2.4	2.0%
Topoľčany	*	60.5	4.1	1.8	2.0%
Zlaté Moravce	*	159.5	15.5	2.3	9.6%
Trenčín Region	112.9	179.9	18.4	4.0	20.3%
Bánovce nad Bebravou	*	39.5	16.3	1.8	8.1%
Ilava	26.0	30.7	6.4	2.3	4.0%
Myjava	*	124.0	10.1	1.9	5.2%
Nové Mesto nad Váhom	76.9	153.2	15.4	2.0	8.3%
Partizánske	*	34.1	13.0	1.8	6.3%
Považská Bystrica	45.0	187.1	25.0	1.7	11.9%
Prievidza	233.2	184.4	14.0	5.0	19.1%
Púchov	69.8	290.9	26.8	4.7	34.6%
Trenčín	164.7	313.6	25.5	4.6	32.3%
Trnava Region	185.3	148.3	17.4	4.1	19.8%
Dunajská Streda	217.3	136.4	15.2	2.5	10.3%
Galanta	*	44.0	10.6	2.3	6.7%
Hlohovec	*	19.7	19.9	1.7	9.1%
Piešťany	407.6	454.2	21.9	5.9	35.4%
Senica	*	107.2	9.1	5.7	14.2%
Skalica	31.9	80.2	20.8	1.9	10.6%
Trnava	96.7	137.2	22.4	3.0	18.1%

Note: \* refers to that it is not possible to publish the figure because of its confidential character.

Source: the authors based on data from Statistical Office of the Slovak Republic.

The average number of visitors per employee for the entire Slovakia in 2014 was 193.2. When comparing the different parts of Slovakia we can see that all the regions of Western Slovakia (Bratislava, Trnava, Trenčín and Nitra) have this indicator lower than the average, while the values in the regions of Central Slovakia (Banská Bystrica and Žilina) are much higher, up to 308.3 visitor per employee. There are substantial differences even in the regions of Western Slovakia. The lowest values of this indicator are in the districts of Trenčín region and the highest values are in the districts of Nitra region. We observe significant differences also between the regions of Eastern Slovakia. The weighted average value in the districts of Prešov region is much higher than the weighted average value of Košice region.

Table 2: Ratios showing the performance of the tourism sector in 2014 – Central Slovakia

Destination	Number of visitors per employee	Number of visitors per self-employed	Number of visitors per bed-place	Average length of stay	Bed-place occupancy rate
Central Slovakia	308.3	305.1	19.0	3.1	16.0%
Banská Bystrica Region	293.7	221.3	18.3	3.4	16.9%
Banská Bystrica	97.6	228.4	16.2	2.8	12.3%
Banská Štiavnica	*	203.0	13.3	2.3	8.2%
Brezno	*	326.0	16.4	2.4	10.7%
Detva	*	108.3	10.7	2.6	7.6%
Krupina	*	748.2	27.5	5.6	41.9%
Lučenec	*	56.9	15.1	2.0	8.4%
Poltár	*	49.9	10.2	3.2	8.9%
Revúca	*	207.1	34.4	2.2	20.4%
Rimavská Sobota	*	118.3	16.1	4.3	18.9%
Veľký Krtíš	*	45.3	5.2	2.6	3.7%
Zvolen	202.7	398.4	27.5	3.9	29.5%
Žarnovica	*	53.0	5.8	2.8	4.4%
Žiar nad Hronom	239.6	343.1	21.3	3.2	18.6%
Žilina Region	316.5	380.5	19.4	2.9	15.5%
Bytča	85.2	20.3	5.6	1.9	2.9%
Čadca	480.6	120.8	10.5	2.1	6.1%
Dolný Kubín	*	297.1	15.4	2.4	10.3%
Kysucké Nové Mesto	15.9	64.8	10.7	2.2	6.5%
Liptovský Mikuláš	309.9	824.4	24.0	2.8	18.5%
Martin	82.6	123.5	10.2	2.4	6.6%
Námestovo	*	67.0	7.8	2.7	5.9%
Ružomberok	406.5	417.2	21.3	3.1	18.0%
Turčianske Teplice	*	876.5	16.0	7.4	32.6%
Tvrdošín	1253.9	160.9	10.3	2.8	7.9%
Žilina	531.9	419.8	23.2	2.6	16.3%

Note: \* refers to that it is not possible to publish the figure because of its confidential character.

Source: the authors based on data from Statistical Office of the Slovak Republic.

As we can see in Table 2, Tvrdošín far exceeds other districts in the number of visitors per employee with a value of 1253.9. This indicator is nearly twice higher as the second in the order, the district Senec with a value of 682.1. In terms of this indicator the last place is Kysucké Nové Mesto with a value of 15.9 visitor per employee.

Tvrdošín offers visitors many sights and the opportunity to visit the nearby Poland. Nevertheless, we think that the data for district Tvrdošín published by the Statistical Office about the number of employees working in the field of hospitality services will be probably erroneous or incomplete, because all comparable districts (in size and geographically) reported a higher number of employees working in this sector.

There are significant differences between the ratio indicators: number of visitors per employee and the number of visitors per self-employed. We observe that the number of visitors per self-employed is about 100 more than the number of visitors per employee in Slovakia. Regions of Eastern and Central Slovakia reach approximately the same values, about 300 visitors per self-employed while the region of Western Slovakia only 263.9.

Table 3: Ratios showing the performance of the tourism sector in 2014 – Eastern Slovakia

Destination	Number of visitors per employee	Number of visitors per self-employed	Number of visitors per bed-place	Average length of stay	Bed-place occupancy rate
Eastern Slovakia	225.3	308.1	15.4	3.0	12.6%
Košice Region	173.5	264.7	10.1	2.0	5.6%
Gelnica	*	39.8	2.9	2.6	2.1%
Košice - okolie	*	166.7	16.2	2.3	10.3%
Košice I	119.9	686.1	32.6	1.8	16.1%
Košice IV	93.9	340.8	51.8	1.8	25.0%
Michalovce	305.5	197.9	2.6	2.4	1.8%
Rožňava	*	103.2	9.0	2.3	5.7%
Sobrance	*	4.1	1.3	2.0	0.7%
Spišská Nová Ves	189.1	294.1	12.4	2.3	7.8%
Trebišov	*	151.9	10.3	1.8	5.0%
Prešov Region	254.1	328.6	19.3	3.3	17.6%
Bardejov	91.8	233.4	16.5	7.5	33.9%
Humenné	*	70.0	21.9	1.7	10.4%
Kežmarok	*	233.7	13.6	2.7	10.1%
Levoča	*	112.3	10.8	1.8	5.3%
Medzilaborce	*	44.0	5.7	2.1	3.3%
Poprad	420.7	803.5	26.5	3.2	23.2%
Prešov	36.7	144.6	15.1	1.9	8.0%
Sabinov	*	129.2	15.9	2.5	10.9%
Snina	*	75.2	4.2	2.6	3.0%
Stará Ľubovňa	*	269.9	12.8	4.7	16.4%
Stropkov	*	43.6	2.8	2.5	1.9%
Svidník	*	27.9	4.2	2.6	2.9%
Vranov nad Topľou	*	100.0	10.5	2.3	6.7%

\* refers to that it is not possible to publish the figure because of its confidential character.

Source: the authors based on data from Statistical Office of the Slovak Republic.

Almost all the data comparing the number of visitors per bed-place in the regions of Slovakia reach the value  $\pm 10$  from Slovakia's average (19.6). Only the Bratislava region

boasts a value 35.5 visitors per bed-place. Also the largest value, almost 70, is observed in the district Bratislava I. The second one is Košice IV, which recorded 51.8 visitors per bed-place. The following positions are occupied by other districts of the capital Bratislava and the second largest town of Slovakia - Košice, they recorded 30-40 visitors per bed-place. The lowest values, in the range of 1-5 visitors per bed-place, are in the districts of Eastern Slovakia, such as Snina, Svidník, Gelnica, Stropkov, Sobrance and Michalovce, along with Topoľčany and Šaľa which are located in the Nitra region.

On the contrary, we see that the average number of overnight stays in Bratislava region reaches value only 2.1, while the Slovak average is 2.9. In Tables 1-3 we can see, that the highest values are in the districts with a health spa resort, such as Bardejov (7.5 nights) Turčianske Teplice (7.4 nights) and Piešťany (5.9 nights). Above-average values are in 25 districts from 77, in 8 of them we can find a spa resort. That confirms the effect of spa tourism on the overall tourism in Slovakia. The lowest average number of overnight stays reached Bratislava I district with a value of 1.6. Although Bratislava is a favorite destination with lots of attractions, on the basis of these data we think that this district is rather a weekend destination or a place for business trips.

The minimal average value of the bed-place occupancy rate is reached in Košice region (5.6%). The other regions achieved average bed-place occupancy around the national average of 15.7%. The highest values are observed in districts Krupina (41.9%), Bratislava IV, Piešťany and Púchov (about 35%). They are followed by the districts with spa towns like Bardejov, Trenčín and Turčianske Teplice with values of occupancy rate 32-34%. The lowest occupancy rate, less than 2% is recorded in the districts of Košice region, such as Stropkov, Michalovce and Sobrance.

Based on these indicators, we observe huge differences between the districts. However, we can say that the greatest number of visitors came to the big towns such as Bratislava, Košice and Žilina and of course to the spa towns. The least interest was recorded in some districts of the Nitra region and especially in the northern part of Košice region. However, this provide just a one-sided view on the situation, because it monitors the ratio of only two indicator.

### **3 Methodology**

Following on the introduction of the paper we measure the efficiency of the tourism sector of the districts of Slovakia using DEA methodology. It would be natural to represent the labor in formula (1) by the number of employees in the tourism sector. Unfortunately 41 districts of Slovakia consider this figure as confidential, so there is a need to replace it by another figure – namely by the number of self-employed persons. Therefore we divide our research onto two parts. In the first part we do the analysis with two models for 38 districts, we use the number of employees or the number of self-employed persons as the figure for the labour, and compare the DEA scores. We show that this change in input indicators does not significantly affect the DEA score. The content of the second part of our research leads in computing the DEA score for all districts of Slovak Republic (except for Košice II and Košice III, for which none of the data were available) using the number of self-employed as the indicator of labor in tourism sector.

#### **3.1 DEA model**

Our analysis aims at assessing the tourism efficiency of 77 districts of Slovakia in 2014. We use data for two outputs and three inputs (see the next subsections), in order to estimate how well districts in Slovakia utilize their tourist resources.

We want to identify districts that operate at the most effective returns to scale, these are constant returns to scale, and refer to inefficient districts with too many employees (or self-employed) and beds for a given number of tourists and the given number of nights spent. We include the number of attractive places into the model because they characterize the districts. There is no need to reduce them therefore we consider them as a non-controllable indicator.

For this purpose, we apply an input-oriented constant returns-to-scale DEA model with non-controllable indicator (for more detail about this model see Cooper et al. 2007).

The DEA efficiency measure maximizes efficiency in terms of the ratio of total weighted output to total weighted input, subject to the condition that, for every district, this efficiency measure is smaller or equal to 1. If the efficiency coefficient of an input-oriented model is smaller than 1, it is possible to reduce the inputs keeping the outputs constant. The efficient districts reach the score that equals to 1.

### 3.2 Inputs

We use three inputs in our analysis. According to the production function (1), we define the capital as the number of bed-places available in the accommodation establishments of the tourism industry. They include hotels, boatels, motels, guest houses, tourist hostels, cottage camps, camping sites, other collective accommodations and accommodation in private (Statistical Office of the Slovak Republic, 2015). Number of bed-places shows how many tourists can visit the region at the same time. Larger and more attractive districts have more beds available than smaller or less attractive ones.

We define the labour as the number of employees (Model 1) or the number of self-employed persons (Model 2) in the tourism industry.

Natural and cultural resources include a number of attractive natural places such as the number of UNESCO natural and cultural World heritage sites, the protected areas of national and international importance, the number of theatres, museums, galleries, observatories, castles and caves open to public, and the number of health spas.

The underlying assumption is that natural and cultural resources give the district a genuine comparative advantage. Therefore, all things being equal, a district with more cultural and natural resources will be more attractive to tourist (see Priskin, 2001; Silberberg, 1995). This is the non-controllable input of the DEA model.

### 3.3 Outputs

The output indicators should characterize the factors that are considered as a desirable outcome of the researched process, therefore we define two outputs for the tourism industry: the number of visitors that visit the district in a year and the number of nights spent in the district (we consider this indicator as a non-financial measure of income from tourists). A more efficient district is expected to attract more tourists and generate a higher number of overnight stays.

### 3.4 Sources of Data

Data in input and output of the DEA analysis has been obtained from Statistical Office of the Slovak Republic, STATdat database<sup>1</sup>, except the data on natural and cultural resources and represent the situation in 2014. They were obtained from different sources: the number of protected areas of national and international importance from the Ministry of Environment<sup>2</sup>; the number of UNESCO natural and cultural World heritage sites, number of theatres,

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<sup>2</sup> Available at <http://www.minzp.sk/o-nas/mzp-sr/> (accessed April 20, 2016).

museums, galleries from the Ministry of Culture<sup>3</sup>; the number of observatories, castles from the website muzeum.sk<sup>4</sup>; the number of caves open to public from the State Nature Conservancy of the Slovak Republic Slovak Caves Administration<sup>5</sup>; the number of health spas from the website kupele.sk<sup>6</sup>.

## 4 Results

According to the methodology we introduce our results.

### 4.1 First part – Comparison of Model 1 and Model 2

In this part we compare 38 districts of the Slovak Republic. As we can see in the Table 4, there are substantial differences among the districts in individual inputs and outputs. On the one hand, there are significant differences between the minimum and maximum values, but also, the standard deviations compared to measured values is high. This is confirmed by the difference between the arithmetic mean and median, and also between the maximum values and the medians of individual variables. For example, the maximum value of the number of nights is more than nine times higher than the median of this indicator.

Table 4: Basic Descriptive Statistics on the input – output variables of 38 districts of Slovakia

	Number of bed-places	Number of employees	Number of self-employed	Natural and cultural resources	Number of visitors	Number of nights
Maximum	16107	2237	531	37	426636	1364319
Minimum	153	10	42	2	852	1596
Average	3767	506	228	13	82527	235662
SD	3673	467	113	10	105170	282414
Median	2807	347	213	11	45460	150304

Source: the authors.

First, Pearson correlation test is utilized to measure the relationship between input and output variables. The results indicated in Table 5 show that the correlation of outputs and inputs are all positive and the correlation coefficients are all above 0.48, so we can see that the relationships between inputs and outputs are moderate or strong.

As we can see from Table 6, 6 efficient districts are observed in Model 1, but just 3 in Model 2. It appears from Tables 1-3 that the nationwide trend in the proportion of self-employed persons and employees in this sector is that there is more employees than self-employed persons. Districts in which this trend is not respected recorded the reduction of the efficiency score in Model 2. District Tvrdošín is assessed efficient by Model 1, but we think this is due to incorrect data for number of employees.

<sup>3</sup> Available at <http://www.culture.gov.sk/vdoc/424/vysledky-kult-2014-27b.html> (accessed April 20, 2016).

<sup>4</sup> Available at <http://www.muzeum.sk/?obj=hrad&ix=1zoznam> (accessed April 20, 2016).

<sup>5</sup> Available at <http://www.ssj.sk/sk> (accessed April 20, 2016).

<sup>6</sup> Available at <http://www.kupele.sk> (accessed April 20, 2016).



Table 5: Correlation matrix of the input – output variables for 38 districts of Slovakia

	Number of bed-places	Number of employees	Number of self-employed	Natural and cultural resources	Number of visitors	Number of nights
Number of bed-places	1	0.338	0.601	0.602	0.741	0.785
Number of employees		1	0.276	0.546	0.757	0.560
Number of self-employed			1	0.531	0.482	0.586
Natural and cultural resources				1	0.683	0.588
Number of visitors					1	0.916
Number of nights						1

Source: the authors.

The average values of the DEA scores are 0.631 and 0.503 for Model 1 and Model 2, respectively. The Pearson correlation coefficient is equal to 0.783 that shows very strong relationship between the two scores. The value of the Spearman test, 0.745 (significant at the 1% level), shows that there are only minor differences in the ranking of the districts. We conclude that it is possible to use the number of self-employed instead of the number of employees as a figure for the labour in the production function (1).

Table 6: Efficiency scores of DEA Models 1 and 2 for 38 districts of Slovakia

District	Model 1	Model 2	District	Model 1	Model 2
Bratislava I	1	1	Prievidza	0.592	0.543
Bratislava IV	1	1	Košice I	0.583	0.516
Piešťany	1	1	Dunajská Streda	0.554	0.313
Poprad	1	0.711	Trnava	0.541	0.537
Tvrdošín	1	0.236	Bratislava V	0.505	0.505
Žilina	1	0.494	Pezinok	0.475	0.327
Púchov	0.975	0.984	Spišská Nová Ves	0.462	0.241
Bardejov	0.953	0.955	Nitra	0.426	0.424
Trenčín	0.923	0.921	Banská Bystrica	0.407	0.369
Bratislava III	0.890	0.893	Malacky	0.401	0.401
Ružomberok	0.870	0.534	Považská Bystrica	0.383	0.383
Zvolen	0.857	0.854	Skalica	0.337	0.337
Liptovský Mikuláš	0.842	0.579	Nové Mesto nad Váhom	0.336	0.261
Košice IV	0.803	0.803	Martin	0.291	0.203
Bratislava II	0.762	0.761	Michalovce	0.252	0.092
Žiar nad Hronom	0.720	0.551	Prešov	0.252	0.252
Nové Zámky	0.693	0.384	Bytča	0.208	0.091
Čadca	0.687	0.189	Kysucké Nové Mesto	0.201	0.201
Senec	0.666	0.149	Ilava	0.125	0.122

Source: the authors.

#### 4.2 Second Part – Results for 77 District of Slovakia by Model 2

In this part we compare 77 districts of the Slovak Republic. Comparing Tables 4 and 7 we see that the new districts added have lower attendance, facilities and fewer natural and

cultural resources. This is confirmed by the differences between medians of models with 38 and 77 districts. For example, the median of the number of nights for 38 districts is more than three times higher than the median for 77 districts.

The correlation coefficients for 77 districts, see Table 8, show stronger relationship between input and output variables, except for the correlation of natural and cultural resources with the outputs.

Table 7: Basic Descriptive Statistics on the input – output variables of 77 districts of Slovakia

	Number of bed-places	Number of self-employed	Natural and cultural resources	Number of visitors	Number of nights
Max.	16107	531	41	426636	1364319
Min.	93	24	1	124	247
Average	2456	169	11	48208	141054
SD	2961	109	9	81930	224291
Median	1441	139	9	23467	48628

Source: the authors.

Table 8: Correlation matrix of the input – output variables for 77 districts of Slovakia

	Number of bed-places	Number of self-employed	Natural and cultural resources	Number of visitors	Number of nights
Number of bed-places	1	0.667	0.555	0.787	0.819
Number of self-employed		1	0.529	0.557	0.615
Natural and cultural resources			1	0.597	0.523
Number of visitors				1	0.926
Number of nights					1

Source: the authors.

From the DEA results of the model with 77 districts, stated in Table 9, it appears that only 3 districts are efficient and only 16 districts achieved a score higher than 0.5. The average DEA score is 0.359. In contrary the median of the scores is very low, just 0.293, we see that more than the half of the compared districts shows alarmingly low values of efficiency score.

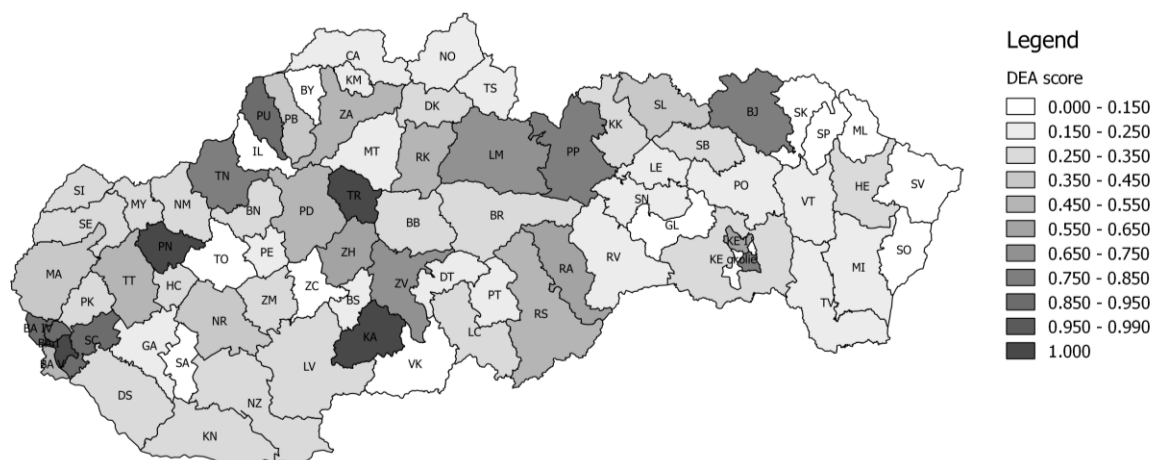
If we compare this model with the previous two ones, we see that only Bratislava I remain efficient even when compared to all 77 districts, but the district Bratislava IV already achieves efficiency score only 0,858. There are new efficient districts (they have not been included into models 1 and 2): Turčianske Teplice and Krupina. In both districts there are spa towns, confirming that the overall tourism in Slovakia is highly influenced by the spa tourism. There are differences with regard to districts Senec, Žilina and Poprad, they were efficient in Model 1, inefficient in Model 2 and even more inefficient in model regarding 77 districts. Very low levels of DEA score achieved mainly eastern districts of Košice region (Gelnica, Sobrance), Prešov region (Snina, Svidník, Stropkov), and some districts of Nitra region (Topoľčany, Šaľa). These differences are presented in Figure 1.

Table 9: Efficiency scores of DEA Model 2 for 77 districts of Slovakia

District	Score	District	Score	District	Score
Krupina	1	Malacky	0.375	Partizánske	0.198
Bratislava I	1	Nové Zámky	0.346	Vranov nad Topľou	0.194
Turčianske Teplice	1	Levice	0.345	Galanta	0.194
Bratislava IV	0.858	Senica	0.339	Kysucké Nové Mesto	0.191
Púchov	0.848	Banská Bystrica	0.339	Martin	0.191
Piešťany	0.846	Humenné	0.331	Čadca	0.181
Bratislava III	0.812	Skalica	0.329	Levoča	0.166
Bardejov	0.811	Pezinok	0.323	Rožňava	0.165
Trenčín	0.795	Sabinov	0.309	Námestovo	0.162
Košice IV	0.791	Brezno	0.307	Myjava	0.161
Zvolen	0.748	Košice - okolie	0.299	Trebišov	0.157
Bratislava II	0.717	Hlohovec	0.293	Senec	0.140
Poprad	0.616	Dolný Kubín	0.293	Žarnovica	0.121
Revúca	0.602	Dunajská Streda	0.292	Ilava	0.115
Liptovský Mikuláš	0.509	Komárno	0.283	Veľký Krtíš	0.104
Košice I	0.506	Zlaté Moravce	0.280	Medzilaborce	0.098
Bratislava V	0.497	Kežmarok	0.279	Bytča	0.088
Žiar nad Hronom	0.495	Bánovce nad Bebravou	0.254	Michalovce	0.084
Trnava	0.491	Lučenec	0.252	Snina	0.083
Ružomberok	0.481	Nové Mesto nad Váhom	0.252	Svidník	0.082
Rimavská Sobota	0.471	Prešov	0.245	Topoľčany	0.062
Prievidza	0.464	Banská Štiavnica	0.240	Gelnica	0.058
Žilina	0.457	Poltár	0.236	Šaľa	0.056
Stará Ľubovňa	0.404	Spišská Nová Ves	0.227	Stropkov	0.054
Nitra	0.399	Tvrdošín	0.216	Sobrance	0.022
Považská Bystrica	0.378	Detva	0.214		

Source: the authors.

Figure 1: Efficiency scores of DEA Model 2 for 77 districts of Slovakia



Source: the authors.

Finally we compare the traditional ratios used in tourism of district that are DEA efficient (showed in Table 10). We can conclude that all the efficient districts have relatively large

number of visitors per self-employed and bed-place occupancy rate, twice more than the average of Slovakia. The other two ratios show high variability.

Table 10 also reveals that the efficiency of tourism sector is very strongly correlated with bed-place occupancy rate. Although all traditional ratios are important for the tourism sector, based on our analysis we can say that the most important of them is the bed-place occupancy rate followed by the number of visitors per bed-place. Surprisingly, the number of self-employed persons or the average length of stay do not have so much importance.

Table 10: Selected ratios of the DEA efficient districts and Slovakia. The coefficients of correlation of selected ratios with the DEA scores of 77 regions

	Number of visitors per self-employed	Number of visitors per bed-place	Average length of stay	Bed-place occupancy rate
Bratislava I	3249.6	69.6	1.6	30.5%
Turčianske Teplice	876.5	16.0	7.4	32.6%
Krupina	748.2	27.5	5.6	41.9%
Slovakia	285.3	19.6	2.9	15.7%
Correlation of the DEA score	0.594	0.790	0.597	0.984

Source: the authors.

## 5. Conclusion

The aim of any tourism destination is to attract as many tourists as possible and offer them enough attractions and opportunities for leisure to extend the length of their stay. The tools to reach that lie both in an attractive environment with a lot attractions and at the same time in availability of tourist facilities. In our work we investigated how effectively individual districts are able to utilize their natural and cultural potential, as well as accommodation and catering facilities. An efficient district is able to balance its supply of tourism businesses with the demand of visitors. Using traditional ratios as well as using data envelopment analysis we analyzed the efficiency of 77 districts of Slovakia from the point of view of tourism.

Searching the common factors of the efficient districts we can say that there are two types of efficient districts, the first type of districts is able to attract less number of tourists but for longer stays and the second type of district shows large number of tourist but for shorter stays. This is due to the presence of health spas in the district, or the district is a part of big town (such as the districts Bratislava I – IV or Košice IV). The last mentioned districts reach the highest values in almost all ratios except of the ratio Average length of stay.

Among the ratios used in tourism sector, according to the values of coefficients of correlation with the DEA score (Table 10), we choose two: the number of visitors per bed-place and the bed place occupancy rate. Based on these two ratios we conclude that the worst situation is in the eastern Slovakia (particularly Gelnica, Svidník, Stropkov, Snina, Sobrance and Michalovce) and in some parts of central and western Slovakia (Topoľčany, Šaľa a Veľký Krtíš). These districts also obtained the lowest DEA scores.

In addition, the average DEA score is 0.359 and the median of the DEA scores is 0.293. These very low values suggest that we have just a few districts with very good performance and the majority of the districts is not able to attract sufficient amount of visitors. Only 20.8% of all compared districts achieved a score higher than 0.5.

Based on our analysis we can also confirm that the health and spa tourism has really a great and positive impact on tourism in Slovakia. This kind of tourism is very demanding in human resources and the fluctuation of tourists is low. So the ratios Number of visitors per employee and the Number of visitors per bed-place are not so high as we expected. Nevertheless they achieve the highest DEA scores.

The DEA model compared to traditional ratios gives us the opportunity to present the standardized results that allows to compare the districts. While at ratios we must know the value of all districts to assess who is the best.

Since many data have been marked as confidential by the Statistical office of the Slovak Republic, we are planning to get them from other state institutions and supplement the Model 1 for all 77 (79) districts. In addition, we would like to modify this model taking into account the labour in such a sense that we include therein not only the employees but the sum of employees and self-employed persons. Furthermore, it would be better to include directly the income from tourism into the outputs instead of number of nights. Those data were marked as confidential at district level.

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