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# COMPARATIVE EFFICIENCY ANALYSIS OF TOURIST DESTINATIONS IN SELECTED COUNTRIES OF SOUTHERN AND SOUTH EAST EUROPE

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**Abstract.** Our aim was to measure the efficiency of tourist destinations of selected countries from Southern and Southeast Europe. In order to assess the impact of the Covid pandemic on the efficiency of separate destinations we evaluated two year-long timeframes - 2019 and 2021. However, we remained quite cautious in our final assessment, due to the specifics of the tourism sector's recovery. The study object included 19 countries in Southern and Southeast Europe. In order to complete the set tasks, we went through two stages: first, we formed two separate groups of countries with relatively homogenous indicators (K-cluster), and then we evaluated their relative efficiency, by using the tourism revenue (DEA) as an outcome variable.

*Keywords:* tourism destination; efficiency; clustering; DEA (data envelopment analysis); Southern; Southeastern Europe

**JEL: D61; O47**

## 1. Introduction

Tourism is among the fastest and constantly developing economic sectors in a large number of European countries. Due to the Covid pandemic, it faced many challenges, however, it is now slowly recovering. In a highly competitive environment, the attractiveness of this industry depends to a great extent on the efficiency of touristic destinations. Certain authors have focused on tourist destination efficiency as a prerequisite for economic growth, a chance for growing investment activity and a factor for increasing employment. There are numerous reasons for destinations to develop their primary touristic products, whose diversification could be a sustainable source of revenue, however, this might create many disadvantages during their incorrect repositioning (Farmaki 2012, Weaver & Lawton 2006).

The aim of this study is to complement existent research with examination of tourist destination efficiency in selected European countries. All countries which strive to attract new tourists, and increase their profit from tourism need a very serious analysis of their competitiveness as tourist destinations. The respective managers require appropriate competitive tourism strategies capable of dealing efficiently and effectively with the changing and dynamic environment that surrounds the tourism industry (Rodríguez et al. 2023). We have attempted to show how clustering and the efficiency of the destination may be used in the design of touristic strategies in order to obtain competitive advantage, even for countries which are approaching their limit of growth potential.

## 2. Literature review

Because the aim of the present study is to evaluate efficiency at a macrolevel in the paragraph below we have reviewed previous research that applies the DEA method and focuses on European countries in the last 10 years (*Table 1*). Sometimes DEA methodology is used to assess various regional differences in separate countries, or at a micro level to evaluate separate touristic subsectors, which rest outside the scope of the present article.

**Table 1.** Research applying DEA analysis to tourism

| Author/s | Application | Time frame | Country | Used variables | Results |
|---|---|---|---|---|---|
| Cvetkoska, V., & Barisic, P. 2017 | Analyzing the efficiency of travel and tourism in the European Union | 2017 | 28 EU states | Two inputs: internal travel and tourism consumption and capital investment. Two outputs: travel and tourism's total contribution to GDP and employment. | 13 out of 28 EU countries were relatively efficient in 2017, and 15 were not. The average efficiency of the whole sample is 0.944, with maximum efficiency of 1 and a minimum of 0.741. |
| Cvetkoska and Barisic (2014) | Measuring the tourism efficiency | 2004 – 2013 | 15 EU states | Two Input factors: visitor exports and domestic travel and tourism spending; Output factors travel and tourism's total contribution to GDP, and travel and tourism's total contribution to employment | Based on the obtained results, it was found that there is no country that is efficient in every year in every window; 10 of the 15 countries show efficiency results (overall efficiency by years) over 95%: Italy (99.67%), Cyprus (99.64%), France (98.99%), Spain (98.99%), etc., while Montenegro showed the lowest overall efficiency (by years) (71.53%). |
| Abad A, Kongmanwatana P (2015) | Measuring the performance of European countries and endeavours to explain the dispersion of the efficiency ranking scores in the European Union (EU). | 2009 – 2011 | All EU member states however, Malta is excluded from the dataset | Two output factors: Bed-nights in hotels and similar establishments and nights spent in campsites Input factors: Human resources, Hotels and similar establishments Campsites, Tourism attractions | The general conclusion is that 14 EU member states show room for improvement if they are to achieve best practice procedures identified by efficient peers specified in our benchmarking analysis. More precisely, according to the BCC-O DEA model, there were 12 efficient DMUs among the 26 countries. |

| | | | | | |
|---|---|---|---|---|---|
| Soysal-Kurt, H. (2017) | Measuring relative efficiency of 29 European countries with the data of the year 2013 using input-oriented and constant returns to scale Data Envelopment Analysis | 2013 | 29 EU states | Three input and three output variables are used to assess relative performances of the countries. In this study, tourism expenses, number of employees and number of beds are used as input variables; tourism receipts, tourist arrivals and number of nights spent are used as output variables | According to the findings, 16 countries are found efficient; 13 countries are found inefficient. Efficient countries whose efficiency scores are equal to 1 are Cyprus, Croatia, Greece, Hungary, , Malta, Poland, Portugal, Spain and others. Inefficient countries whose efficiency scores are found less than 1 are Bulgaria, Romania, Slovak Republic, Slovenia and others. |
| Radovanov, B., Dudic, B., Gregus, M., Marcikic Horvat, A., & Karovic, V. (2020) | | 2011 – 2017 | 27 EU countries and five Western Balkan countries | T&T Input factor – Government Expenditure, Output factors - T&T Industry Share of Employment, Average Receipt per Arrival Sustainability of T&T Industry Development | The results show relative tourism efficiency per country and year. Countries with the highest tourism efficiency obtained by the mentioned DEA model are Finland, Luxemburg, Croatia, Serbia, Austria, Sweden, Malta and Germany. During the observed period of time the lowest efficiency scores (below the average score of 80%) were achieved in Romania, Italy, Lithuania, Bulgaria, Hungary, Poland and Slovakia. |

| | | | | | |
|---|---|---|---|---|---|
| Ilic, I., & Petrevska, I. (2018) | DEA method used to measure tourism efficiency of Serbia and the surrounding countries. | 2016 | 15 EU states | Tourist costs and the number of beds were used as input factors the number of arrivals, number of nights spent and tourism revenue were used as the output factors | Based on the results in six countries are relatively efficient, while nine countries are relatively inefficient. Efficient countries that have a coefficient of efficiency 1 are: Montenegro, Bosnia and Herzegovina, Croatia, Greece, Austria and Albania. Inefficient countries have a coefficient of efficiency less than 1 (Serbia, FYR Macedonia, Slovenia, Romania, Bulgaria, Italy, Hungary, Slovakia and the Czech Republic). |

In their study, Cvetkoska V, Barisic P (2014) have observed a total of 15 European countries over a period of 10 years (2004-2013). According to the obtained results, neither of the 15 states were active during the entire studied period. Also, 10 out of 15 countries showed over 95% of efficiency. Montenegro was determined the least efficient country, whilst other four states, such as Italy, Cyprus, France and Spain were the most efficient. Three years later, the same authors conducted a new study with a total of 11 states from the Balkans: Albania, Bosna and Herzegovina, Bulgaria, Croatia, Greece, North Macedonia, Montenegro, Romania, Serbia, Slovenia and Turkey. For the timeframe 2010-2015 they used the same four variables from their previous study. They attributed the costs of the local and foreign tourists to the input factors, and as output factors they assessed the impact of the tourist industry on GDP and employment. The same authors discovered that for the studied period the most efficient state was Albania, followed by Croatia, Romania and Turkey, while the least efficient countries were Montenegro, Serbia and Bosna and Herzegovina Cvetkoska V, Barisic P (2017).

Abad A, Kongmanwatana P (2015) conducted a study for the period of 2009 – 2011 on a total of 26 EU states, except for Malta, by applying DEA analysis. Afterwards, they rated the countries according to their efficiency. Among the states with the highest rank were France, Italy, Greece, Slovenia, Spain, Portugal, etc. – a total of 12. The remaining 14 EU member states were shown to have potential to improve some of their characteristics, determined by the most efficient states indicated in the analysis. In this ranking Bulgaria occupied the $14^{th}$ position, Hungary was 20, Poland was 24, and Romania was rated 26th.

Soysal-Kurt, H. (2017) aimed to assess the relative efficiency of 29 European countries in 2013. He used "the physical and human resources of each touristic destination as input factors of each virtual tourist process". As a result of his analysis, 16 of all 29 states showed an efficient value from the DEA analysis, whereas 13 states were relatively inefficient. In other way we are agree with Idriz and Geshkov that "tourism is a business most dependable on human resources". (Idriz & Geshkov 2023, p.135 )

Ilić, I., & Petrevska, I. (2018) have focused on the Balkan countries. They applied DEA through three input and three output variables. Out of a total of 15 Balkan states, they discovered 5 with an efficiency level 1: Montenegro, Bosna and Herzegovina, Greece, Albania and Austria, and also a very high value – 0,978 for Slovenia. The other 9 countries, including Serbia, Romania, and Bulgaria were not sufficiently efficient.

The authors Radovanov, B. et al. (2020) evaluated tourism efficiency at a macrolevel in a total of 27 EU countries and five West Balkan states over the period 2011 – 2017. The results from their study show that the average efficiency level of the sample was high (above 80%); therefore, they concluded that the tourism sector operated with high efficiency.

Another large-scale study by Gomez-Vega, M., Herrero-Prieto, L. C., & López, M. V. (2022) on a total of 140 states and data from the World Economic Forum (WEF) for 2019 adopted two statistical techniques: a) cluster analysis to group countries and b) assessment of their efficiency as tourist destinations, through DEA analysis, which was later used as a result to build regression analysis that included significant external factors, determining efficiency. The variables used in the cluster analysis were Human Development Index – as a measure of human resource quality in tourism, GDP share and tourism competitiveness index from WEF's database, that recapitulates the main tourism characteristics of individual countries.

## 3. Data and methodology

This study aims to present a model for measuring the tourist destination efficiency in selected countries in Europe and the Balkan Peninsula. As for the homogeneity of the data used in the analysis, we could outline several problematic points. We used characteristics of touristic destinations which were different in size and structure. In this case they could face a number of limitations, to which many analyses have been very sensitive. Our hypothesis for data homogeneity is based on their nature, and the fact that they compete for the same markets and they are all related to the same stakeholders. Nevertheless, non-discretionary factors may turn these observations into non-homogenous. On the other hand, we do not intend to provide the final data to the central authorities responsible for the studied problems, but rather to examine and direct the attention towards the comparative analysis of selected tourist destinations in Europe before and after their recovery from the Covid pandemic. In order to reach homogeneity of the groups, we used non-hierarchical k-means method based on the centroid approach. It operates by iteratively assigning data points to the nearest cluster centroid and recalculating the centroids until convergence (see eq.1).

$$S_k = \{p | \text{if } x_p \text{ belongs to the } k_{th} \text{ clusters}\} \quad (1)$$
$$k = 1 \ldots, K$$

$S_k$ the index set of points $x_p$ currently assigned to the $k_{th}$ cluster.

$$c_k = \sum_{p \in S_k} X_p$$

We used part of Gomez's methodology (Gomez 2021) to highlight the contribution of tourism to the economic development of separate countries. After the clustering over the two studied periods for the separate clusters we applied the DEA method in order to discern the effective DMUs. The use of DEA is justified since it is recognized as applicable in scenarios where the goal is to provide a ranking of comparable units whose components cannot be strictly interpreted as inputs or outputs (Seiford 1996). On the basis of the theoretical grounds for the productive function and linear programming, DEA as a mathematical programming technique has widely been used in scientific literature as an easy non-parameter approach for determining the relative effectiveness of DMUs with specific input and output data (Charnes et al.1978). In order to evaluate efficiency, the DEA method provides a benchmark (frontier) against which competitors can identify areas of "best practices" associated with high measures of performance (Nurmatov 2021). Depending on the aims the author has set, the basic DEA models could be: the Charnes-Cooper-Rhodes (CCR) model that assumes constant returns to scale (CRS) and the Banker-Charnes-Cooper (BCC) model assuming variable returns to scale (VRS). The approach we have adopted in the present study is oriented to maximizing the output (see eq. 2). In DEA, there are two main available options: the constant returns to scale (CRS) and the variable returns to scale (VRS). In order to project each DMU on the efficiency limit, we formulated a mathematical programming model (LP), and added the primary DEA model underneath (eq.2).

$$Maximize \frac{\sum_{r=1}^{s} u_r y_{rk}}{\sum_{i=1}^{m} v_i x_{ik}}$$

where, the technical efficiency of country *k* using *m* inputs, *s* outputs.

**Table 2.** Production function variables

| Abbreviation | Description |
|---|---|
| Revenue (O) | Tourism industry revenue |
| Employment (I) | Person employment in tourism industry |
| Hotel rooms (I) | Hotel rooms per 100 population |
| Arrivals (I) | Arrivals at tourist accommodation establishments |

## 4. Discussion of the results

This section presents the results from the empirical application at two levels: k-cluster analysis and efficiency evaluation. As an uncontrolled machine learning method, the k-means algorithm chooses the cluster centers randomly and calculates the means of the data points of the cluster in order to generate clusters. Due to the limited range of the sample, we focused on two cluster groups, that we used afterwards to evaluate relative efficiency. When choosing variables, we applied Gomez's methodology (Gomez 2021) which discerns the contribution of tourism to the economic development of the separate states, namely: GDP generated by the tourism industry in each country, HDI which measures the presence of quality personnel, efficiency and productivity on the labour market and the indicator for tourism competitiveness TTCI of WEF (2019), and TTDI (2021), which summarize the main ones under indications, such as regulations, business environment, natural and cultural resources (*Table 3, fig.1*).

**Table 3.** Cluster analysis results

| | Cluster 2019 | | Cluster 2021 | |
|---|---|---|---|---|
| | 1 | 2 | 1 | 2 |
| Tourism Direct GDP | 8.39 | 2.55 | 3.23 | 1.13 |
| Tourism competitiveness (1-7) | 4.32 | 3.96 | 4.43 | 4.01 |
| Human Development Index | 0.87 | 0.83 | 0.86 | 0.83 |
| **Countries** | 9 | 10 | 9 | 10 |

**Source*: Author`s calculations.

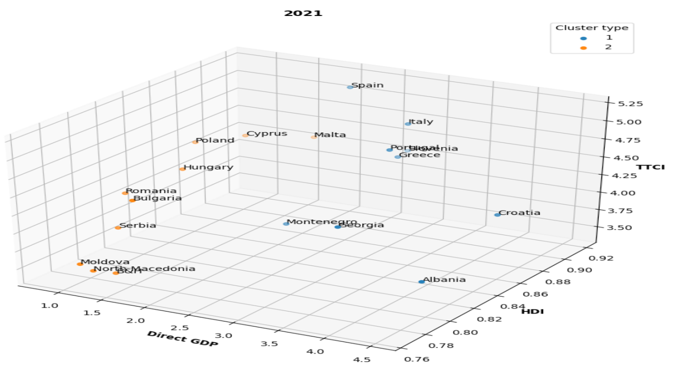


**Figure 1.** Cluster of tourist destinations for 2021 with primary data

The reported results from the clustering in 2019 show that out of 19 countries in the sample there were 9 states with high and above average indicators for evaluation in the model. Among the remaining 10 states with average and lower indicators, the following are notable: North Macedonia, Poland, Moldova, Serbia, Slovenia and Bulgaria. These tourist destinations, despite the higher HDI and TCI values, have lower direct GDP.

The applied descriptive statistics in 2021 manifests a 60% drop in the contribution of the tourist industry to the GDP of the observed countries. Tourist destinations, which mark high and above average indicators during the two years were Portugal, Spain, Albania, Croatia, Georgia, Greece and Montenegro, which at 78% of the sample shows a certain sustainability of the results. Cyprus, Italy, Malta and Slovenia have poor results in 2021, and move to a second cluster due to a decrease in the three studied values.

After the clustering, in order to obtain homogenous groups, we applied DEA directed towards maximizing the output (revenue), for which we reported the relative efficiency of each cluster separately in the two timeframes. The aim was to discern the increase/ decrease of efficiency in the separate groups in 2019 and 2021.

**Table 4**. DEA results by clusters 2019

| | CLUSTER 1 | | | | CLUSTER 2 | | | |
|---|---|---|---|---|---|---|---|---|
| | Min | Max | Mean | Std.dev | Min | Max | Mean | Std.dev |
| Tourism revenue(O) | 450.2 | 68843.9 | 11753.9 | 22078.1 | 60.1 | 76,286.3 | 10616.5 | 22259.7 |
| Tourist arrivals(I) | 2022912 | 3422250 | 1.32 | 1.37 | 174021 | 135226 | 2.75 | 4.60 |
| Industry employment(I) | 21344 | 1601.72 | 330838.2 | 523034.7 | 3400 | 158231 | 260028 | 473732 |
| Hotel rooms(I) | 0.62 | 4.1 | 2.35 | 1.26 | 0.12 | 1.8 | 0.80 | 0.57 |
| | Spain | | | 1 | Italy | | | 1 |
| | Malta | | | 1 | Serbia | | | 0.7539 |
| | Croatia | | | 0.9408 | Slovenia | | | 0.7436 |
| | Portugal | | | 0.8760 | Hungary | | | 0.6463 |
| | Greece | | | 0.8287 | Moldova | | | 0.5947 |
| | Cyprus | | | 0.6258 | Bosna & Herzegovina | | | 0.5762 |
| | Georgia | | | 0.4418 | Poland | | | 0.5464 |
| | Monte Negro | | | 0.3162 | Bulgaria | | | 0.3401 |
| | Albania | | | 0.2676 | Romania | | | 0.3007 |
| | | | | | North Macedonia | | | 0.2509 |

**Source*: Author`s calculations.

The results presented in *Table 4* show optimal (result maximization) in Spain and Malta. The last three countries from Cluster 1 have an efficiency of under 50%, which we suppose is due to the lower levels of tourist arrivals. In cluster 2, two-thirds of the observed tourist destinations have an efficiency of over 50%. Low efficiency is evident in Bulgaria, Romania and North Macedonia.

**Table 5**. DEA results by clusters 2021

| | CLUSTER 1 | | | | CLUSTER 2 | | | |
|---|---|---|---|---|---|---|---|---|
| | Min | Max | Mean | Std.dev | Min | Max | Mean | Std.dev |
| Tourism revenue(O) | 0.902 | 34.5 | 11.08 | 11.92 | 0.387 | 9.1 | 2.58 | 2.79 |
| Tourist arrivals(I) | 656000 | 808000 | 2.37 | 3.24 | 178196 | 222536 | 5058920 | 6755158 |
| Industry Employment(I) | 18000 | 144151 | 455857.7 | 588493.4 | 3000 | 318438 | 99526.2 | 97548.5 |
| Hotel rooms(I) | 0.615 | 4.05 | 1.94 | 1.03 | 0.13 | 3.93 | 1.31 | 1.38 |
| | Spain | | | 1 | Malta | | | 1 |
| | Portugal | | | 1 | Hungary | | | 1 |
| | Croatia | | | 1 | Moldova | | | 1 |
| | Albania | | | 1 | Poland | | | 1 |
| | Italy | | | 0.7867 | Serbia | | | 0.6203 |
| | Greece | | | 0.7253 | Bosna & Herzegovina | | | 0.3616 |
| | Georgia | | | 0.7085 | Romania | | | 0.3336 |
| | Montenegro | | | 0.6052 | North Macedonia | | | 0.2543 |
| | Slovenia | | | 0.3778 | Bulgaria | | | 0.1980 |
| | | | | | Cyprus | | | 0.1215 |

**Source*: Author`s calculations.

The results for relative efficiency, presented in *Table 5*, strongly impress with the improved efficiency against the previous period of primarily Albania and Montenegro. These tourist destinations have recovered fast after the Covid pandemic. Only Slovenia has retained an efficiency under 50%. In the cluster 2 group for 2021 it may be affirmed that countries which could not recover successfully and lost efficiency are Bulgaria and Cyprus. It is necessary to mention the average efficiency of cluster 1 in 2021, which was 82%, while in cluster 2 it was 58%. These average values for 2019 reached 55 – 65%, which may hint a certain homogeneity of the entire sample.

## 5. Conclusion

The present study aimed to compare and assess the relative efficiency of tourist destinations in selected countries from Southern and Southeast Europe over two separate timeframes before and after the Covid pandemic. By using the non-parameter DEA analysis oriented towards maximizing the result and in view of tackling the heterogeneity of the sample, we applied k-means clustering, which facilitated the equalization of the data in the separate groups. The extracted two clusters over the two timeframes showed a certain sustainability of the results at 47% of all.

The contribution of the tourism industry to the GDP in 2021 was notably reduced by 60% for the selected destinations. We also observed sustainable efficiency results over the two timeframes for Spain, Portugal, Croatia and Greece, which validated previous research. On the other hand, tourist destinations with poor profitability indicators were Cyprus, Bulgaria and North Macedonia, which allows us to conclude that the aforementioned have slowly been restoring their tourism industry after Covid.

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