EFFICIENCY OF TOURISM DEVELOPMENT: APPLICATION OF DEA AND TOBIT MODEL

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Abstract: *The main goal of this chapter is to evaluate the relative efficiency of tourism development in 33 European countries using a Two-stage DEA model for the seven-year time period. The output-oriented DEA model with a variable return to scale has been applied, with one input variable (government expenditure for travel and tourism (T&T)) and four output variables (average receipts per arrival, number of international tourist arrivals, T&T share of GDP and T&T share of employment). Results of the first stage showed that the lowest average efficiency scores were achieved in countries that recently joined the European Union, while a significant increase of efficiency is observed in the results of Western Balkan countries. The highest average efficiency score achieved countries in the EU15 group. Results of the second stage indicate the statistically significant relationships of the tourism efficiency scores with average international tourism receipt per arrival, tourism industry share of GDP and share of employment, government prioritization of tourism industry, visa requirements, number of rooms, rate of use and number of natural sites.*

Keywords: *DEA, Tobit Model, Tourism efficiency.*

1. INTRODUCTION

It is well known fact that the tourism industry has been one of the largest and the fastest-growing industries all around the world. But, current issues on global pandemics have significant negative influence on further tourism development. With international travel bans affecting over 90% of the world population and wide-spread restrictions on public gatherings and community mobility, tourism largely ceased in March 2020 (Gossling et al., 2020). Unexpected travel global restrictions and stay-at-home orders seriously affect all activities of this sector, and crucial changes are necessary in order to somehow maintain the achieved level of tourism development. Measuring and comparing efficiency on different levels of tourism sector has been gaining increasing importance in the current situation in order to manage scarce resources in the best possible way. The main goal of this chapter is to evaluate and compare efficiency of tourism development before pandemic in 33 European countries and furthermore to define factors that significantly address the achieved efficiency levels. Additionally, possible improvements in input and output levels would be suggested to inefficient countries. Hopefully, better allocation of resources that leads to higher efficiency level should be a good prerequisite for dealing with new challenges concerning tourism sector during current pandemics.

The chapter consists of four sections. After the introduction, which presents the main research questions and the objective, the second section presents the methodology and literature review addressing the Two-stage DEA method. The first part of the third section deals with an explanation of the results of DEA model and is followed by the second stage analysis and the results from the Tobit model. The final section presents the main conclusions and a discussion of how this study will contribute to the literature and future trends.

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2. METHODOLOGY AND DATA

In this chapter, the Two-stage DEA method has been applied in order to compare the efficiency of tourism development in 33 European countries and determine significant factors that influence efficiency score. DEA is commonly used non parametric approach in tourism efficiency evaluation on both micro and macro level. Table 1 contains a literature review of papers in which the DEA was applied to tourism industry, which motivated the research presented in this study. The selection of papers in the literature review was primarily conducted according to similarities to our research in terms of the methodology and the regions.

Data envelopment analysis (DEA) is a method of mathematical programming developed for efficiency evaluation. DEA has become a very popular non-parametric method of efficiency analysis and can be successfully applied in different areas and at different levels. This method is designed to accept a large number of input and output variables in order to determine the effectiveness of different decision units whose efficiency is required. DEA is an approach for calculating efficiency, which does not require a specific functional form, unlike most statistical approaches. They reduced multiple inputs to a single „virtual" input and reduced multiple outputs to a single „virtual" output using weight coefficients. They solved the problem of assigning weights by allowing each unit to determine its own weights in order to maximize its efficiency (the ratio of the weight sum of its outputs and inputs), with the restriction that these weights must be positive values and that the quotient of virtual output and virtual input of each units cannot be greater than 1. This problem has been defined as a linear programming task. The decision unit is inefficient if it is possible to reduce any input without increasing any other input, and achieve the same output. The efficiency limit in economic terms represents the empirically obtained maximum of output variables that each decision unit can achieve with a given input variable and acts as a wrapper for inefficient units. The efficiency scores of DEA model represent relative efficiency measures, as they highly depend on the number of entities involved in analysis, as well as the number and structure of selected inputs and outputs.

Table 1. Summary of relevant DEA empirical research on tourism sector

Author (year)	Period of analysis	Country/region	Input and output variables	Results
Hadad et al. (2012)	2009	105 countries	Inputs: Labour, Rooms, Natural resources, Cultural sites.Outputs: Number of tourists and Expenditure per tourist	Developed countries attract more tourists and generate more income per tourist than developing countries. Developed countries use more rooms in the tourist industry while developing countries use more labour.
Kosmaczewska, J. (2014)	2007-2009	EU Countries	Arrivals in tourist accommodation establishments, Collective tourist accommodation establishments, Gross domestic product at market prices	Significant similarity in the efficiency of the transformation of the inputs into outputs was observed in the group of richer countries or in the group of poorer countries. Richer countries achieved higher pure technical efficiency, while poorer countries achieved higher scale efficiency.

Martin et al. (2015)	2011	129 countries	5 inputs, 13 outputs	The new methodology, virtual DEA-TTCI model has been developed to improve ranking and efficiency position of counties.
Marcikić Horvat, Radovanov (2016)	2013-2015	South Eastern Europe	12 inputs, 4 outputs	Croatia, Montenegro and Bosnia and Herzegovina obtain maximal efficiency, while other observed countries have relatively low efficiency score.
Soysal-Kurt (2017)	2013	29 European countries	Inputs: Number of employees in tourism sector, tourism expenses, number of beds. Outputs: Tourist arrivals, tourism receipts, number of nights spent	Results showed that 16 countries are found relatively efficient and 13 countries are found relatively inefficient.
Chen et al. (2018)	2015	Taiwan	Inputs: Average expenditure per person per day, Average accommodation cost, Average length of stay. Output: Overall satisfaction with travel services	The empirical results of the estimation of technical efficiency revealed that the domestic tourism market is competitive, but still needs enhancements for tourism service.
Škrinjarić (2018)	2011-2015	21 Croatian counties	8 inputs, 4 outputs	Results in this study indicate that it is possible to obtain satisfactory economic and environmental results simultaneously.
Tomić, Marcikić Horvat (2018)	2013-2017	South Eastern Europe	Inputs: Government expenditure, Prioritization of tourism. Outputs: International tourist arrivals, International tourism inbound receipts, Tourism industry GDP.	Croatia and Montenegro achieve maximal efficiency, compared to the other countries in the observed region.
Radovanov et al. (2020)	2011-2017	European countries	Input: T&T government expenditure. Output: Average receipts per arrival, T&T industry employment, Sustainability of T&T industry development	Results show relatively high-efficiency scores, particularly in the case of EU 15 countries. The second stage reveals positive and significant effects on relative tourism efficiency by the sustainability of tourism development, the share of GDP, tourist arrivals and inbound receipts, as well as visa requirements and rate of use.

In this chapter, the output-oriented DEA model with a variable return to scale has been used to examine the efficiency of tourism development in European countries. The analysis is performed by solving the following model (Banker, Charnes, Cooper, 1984) of linear programming for each country and each period:

$$
\begin{aligned}
&\max \phi \\
&s.t. \sum_{j=1}^{n} x_{ij}\lambda_j \le x_{io} \quad i = 1,2,\dots,m; \\
&\sum_{j=1}^{n} y_{rj}\lambda_j \ge \phi y_{ro} \quad r = 1,2,\dots,s; \\
&\sum_{j=1}^{n} \lambda_j = 1 \\
&\lambda_j \ge 0
\end{aligned} \tag{1}
$$

where n is the number of DMUs (Decision Making Units – countries in our case) and DMUo represents the country under evaluation. Assume that we have s output variables and m input variables. Observed output and input values are y_r and x_i respectively, thus y_{ro} is the amount of output r used by DMUo, while x_{io} is the amount of input i used by DMUo. λ is the DMU's weight and the efficiency score is ϕ.

The DEA analysis continues in the second stage through the application of regression analysis in order to determine the drivers of the technical efficiency results. In output-oriented DEA models, technical efficiency scores take values at the interval {0,1}. Thus, a limited dependent variable type of regression stands out to define potential relationships between the scores and group of relevant factors. The most regularly applied regression model, in this case, is the censored regression, commonly known as Tobit regression model. The application of standard regression model with no constraints on coefficient and/or variable level is unsuitable and could lead to misleading results, since the condition of the least-squares is not met (Grmanova, Strunz, 2017). Oppositely, the primary concept of a Tobit model is to censor the dependent variable by determining the threshold of the latent dependent variable. The general formulation of the model is given as follows (Greene, 2003):

$$
\begin{aligned}
&y_{it}^* = x_{it}'\beta + \varepsilon_{it}, \\
&y_{it} = 0 \text{ if } y_{it}^* \le 0 \\
&y_{it} = y_i^* \text{ if } y_{it}^* \ge 0
\end{aligned} \tag{2}
$$

where y_{it} is the dependent variable measured by y_{it}^* as the latent dependent variable of the technical efficiency result for positive values and neglected otherwise, related to the i^{th} country and t^{th} year, x_{it}' is the vector of explanatory (independent) variables, β is a vector of estimated coefficients and ε_{it} is a normally and independently distributed error term. The presented model formulation is a general dynamic or panel data Tobit model that applies temporal and spatial scales data simultaneously.

Two potential forms of the panel data model are widely used in terms of omitted effects correlated with the independent variables. The principal idea behind these potential model forms is that effects of omitted variables have the same influence on independent variables through time or not. In order to check those effects, the analysis applies a modified Hausman test with the null hypothesis that random effects are independent of the explanatory variables and the alternative hypothesis that fixed effects are correlated with the explanatory variables. In other words, the null hypothesis proposes the random effects estimator to run an analysis, while the alternative one recommends the fixed effects estimator.

Based on the data published in Travel and Tourism (T&T) Competitiveness Reports, tourism efficiency development in Europe has been evaluated over seven years. The data were retrieved from the Reports published in 2013, 2015, 2017 and 2019. The only input variable used in DEA model is T&T government expenditure, presented as a percentage of total government budget. This indicator includes expenditures (transfers or subsidies) made by government agencies to provide T&T services such as cultural, recreational, clearance and so on. In performed DEA analysis four output variables were selected:

1. Average receipts per arrival in US $. International tourism receipts are expenditures by international inbound visitors, including payments to national carriers for international transport. These receipts include any other prepayment made for goods or services received in the destination country.
2. Number of international tourist arrivals.
3. T&T share of gross domestic product (GDP), as a percentage of total GDP.
4. T&T share of employment, as a percentage of total employment.

Table 2. Descriptive statistics of input and output variables

		Average receipts per arrival	International arrivals	Share of GDP	Share of employment	Government expenditure
Western Balkan						
Report 2019	Max	898.74	4642600.00	10.40	8.00	4.00
	Min	415.52	630600.00	2.00	1.80	0.50
	St. dev.	225.48	1600837.32	3.99	2.84	1.41
	Average	656.65	1914000.00	5.28	4.38	1.92
Report 2013	Max	1602.19	2865000.00	8.60	7.60	3.90
	Min	585.97	327500.00	1.30	1.20	0.80
	St. dev.	451.62	1041138.28	3.28	2.87	1.29
	Average	972.80	1109940.00	3.98	3.56	1.94
EU15						
Report 2019	Max	4352.33	86917700.00	8.50	12.70	8.10
	Min	543.33	1045900.00	1.70	2.00	2.20
	St. dev.	961.13	27186396.68	2.24	2.92	1.77
	Average	1191.99	29296726.67	4.14	5.42	3.94
Report 2013	Max	8862.88	81411000.00	6.70	8.90	8.00
	Min	598.58	542600.00	1.60	1.70	2.10
	St. dev.	2033.13	22834037.82	1.66	2.33	1.78
	Average	1589.71	22533353.33	3.11	4.06	3.77
New member states						
Report 2019	Max	915.58	18258000.00	10.90	11.40	11.60
	Min	383.65	1949500.00	1.50	1.90	1.40
	St. dev.	177.69	6009721.53	2.60	2.96	3.16
	Average	613.86	7610507.69	3.88	4.65	4.68
Report 2013	Max	16629.69	13350000.00	13.80	14.90	11.30
	Min	468.67	1411700.00	1.50	1.50	1.40
	St. dev.	4394.71	4268615.40	3.82	4.16	3.09
	Average	2024.00	4875284.62	4.47	5.06	4.56

Source: authors' calculations

Descriptive statistics for selected inputs and outputs, for the first and the last observed period, are presented in Table 2. Furthermore, the abovementioned Two-stage DEA analysis has been performed on the sample of 33 European countries. Those countries can be divided into three groups to obtain separate comparative analysis of achieved efficiency scores. Group of Western

Balkan Countries includes Serbia, Montenegro, North Macedonia, and Albania. Group EU15 are the oldest members of the European Union (EU) together with United Kingdom (UK), since the UK has been the part of the EU in the observed years. The group New member states includes countries that joined the EU later than countries in the EU15 group.

From the data presented in Table 2, it can be noticed that the number of international tourist arrivals has been increasing in all three groups of countries, which also accentuates the significant position of the tourism industry in this region.

3. RESULTS AND DISCUSSION

The results obtained from the output-oriented DEA model with a variable return to scale (1) are shown in Figure 1 and Table 3. The highest average efficiency is mainly achieved by the EU15 countries, while the countries that joined EU later showed the lowest average efficiency (values around 0,48) of tourism development in the observed period. This conclusion is consistent with similar previous research (Radovanov et al. 2020). The values of the average efficiency score are very constant for the group of New member states, while Western Balkan countries and EU15 show a significant increase of efficiency score during the observed period. The values of the average efficiency score in Western Balkan countries lie between 0.59 and 0.76, similar to the average efficiency score values for the EU15 (lowest 0.57 and highest 0.75).

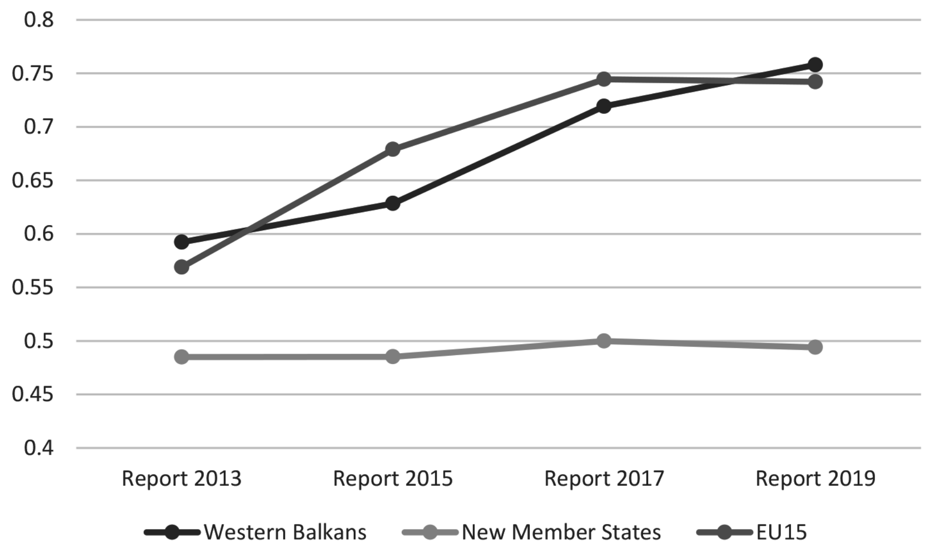

Figure 1. Average efficiency score

Source: authors' calculations

In the group of Western Balkan countries, Serbia has the maximal level of efficiency during the whole 6-year period, while North Macedonia has the lowest efficiency scores (from 0.20 to 0.35 in the last year). In the group of New member states, Croatia and Malta obtained significantly higher efficiency scores than other countries, while Lithuania has the lowest efficiency in the whole period. France, Luxemburg and Spain achieved the highest efficiency score values in our model from the EU15 countries, while Ireland, Finland and Denmark are the most inefficient.

Table 3. Results of DEA model (1)

	Report 2019	Report 2017	Report 2015	Report 2013
Western Balkan Countries				
Albania	0.807339	0.530918	0.414283	0.526219
Bosnia and Herzegovina	0.676323	0.723234	0.627552	0.504398
Montenegro	0.954128	1	0.796235	0.730126
North Macedonia	0.351678	0.342176	0.304077	0.200589
Serbia	1	1	1	1
New Member States				
Bulgaria	0.350857	0.376843	0.385577	0.343594
Croatia	1	1	1	1
Cyprus	0.696046	0.57606	0.662496	0.478429
Czechia	0.453384	0.467942	0.485811	0.43795
Estonia	0.404415	0.347671	0.314945	0.269521
Hungary	0.475061	0.539469	0.495483	0.482528
Latvia	0.376249	0.410991	0.294711	0.27367
Lithuania	0.230755	0.25517	0.252751	0.170814
Malta	0.925561	1	1	1
Poland	0.375968	0.372286	0.369963	0.28701
Romania	0.406324	0.376039	0.335743	0.21794
Slovakia	0.309908	0.306914	0.262619	1
Slovenia	0.416973	0.468602	0.44678	0.342944
EU15				
Austria	0.887572	0.738622	0.631718	0.584036
Belgium	0.453531	0.546062	0.501118	0.280014
Denmark	0.365978	0.428432	0.366478	0.592052
Finland	0.334708	0.379294	0.412548	0.236072
France	1	1	1	1
Germany	0.866959	0.995762	0.778562	0.633884
Greece	1	0.919108	0.791132	0.753331
Ireland	0.286862	0.323993	0.292784	0.240451
Italy	0.947178	0.848881	0.79233	0.682833
Luxembourg	1	1	1	0.624839
Netherlands	0.673687	0.737047	0.662968	0.613225
Portugal	0.80712	0.784833	0.718884	0.57717
Spain	1	1	0.989112	0.911918
Sweden	0.737727	0.576283	0.476969	0.292166
United Kingdom	0.770489	0.888351	0.769389	0.512767

Source: authors' calculations

Besides information on efficiency score, DEA model also generates valuable information for decision and policy makers on possible ways of efficiency improvement for inefficient countries. All countries that achieved efficiency score below 1 can improve their efficiency by increasing the level of selected outputs, since the performed DEA model was output-oriented. Ways of possible improvements are shown in the following tables 4, 5, 6 and 7. Those tables represent the results of the DEA model (1) for the last observed year in the dataset (data from the Report 2019). Therefore, table 4 presents the peer groups for our inefficient countries and the corresponding values of lambda. Peer groups are the set of efficient countries from which an inefficient unit's inefficiency has been determined. From the results presented in Table 4 we can conclude that Albania, for example, should look up to the Croatian way of efficient allocation of observed outputs and inputs. All other inefficient countries should follow the experiences of efficient ones to improve their relative efficiency position.

Table 4. Peer groups and lambda values for inefficient countries

Country	Benchmark(Lambda)
Albania	Croatia(1.000000)
Austria	Croatia(0.414930); France(0.046352); Greece(0.353608); Luxembourg(0.025705); Spain(0.159405)
Belgium	Croatia(0.103658); France(0.132423); Luxembourg(0.708195); Spain(0.055724)
Bosnia and Herzegovina	Croatia(0.266461); Luxembourg(0.138533); Serbia(0.595006)
Bulgaria	Croatia(0.661756); Luxembourg(0.157038); Spain(0.181206)
Croatia	Croatia(1.000000)
Cyprus	Croatia(0.854873); Luxembourg(0.145127)
Czechia	Croatia(0.426874); France(0.162756); Greece(0.268392); Luxembourg(0.141978)
Denmark	Croatia(0.373581); France(0.298121); Luxembourg(0.314798); Serbia(0.013500)
Estonia	Croatia(0.654437); Greece(0.192301); Luxembourg(0.153262)
Finland	Croatia(0.264900); Luxembourg(0.678142); Spain(0.056958)
France	France(1.000000)
Germany	Croatia(0.266984); France(0.385215); Greece(0.198479); Luxembourg(0.149323)
Greece	Greece(1.000000)
Hungary	Croatia(0.252839); France(0.170731); Greece(0.529380); Luxembourg(0.047050)
Ireland	Croatia(0.273438); France(0.000793); Greece(0.041816); Luxembourg(0.314587); Spain(0.369365)
Italy	Croatia(0.173937); France(0.621865); Greece(0.171162); Luxembourg(0.032428); Spain(0.000609)
Latvia	Croatia(0.746224); Greece(0.089502); Luxembourg(0.164274)
Lithuania	Croatia(0.519832); Greece(0.032217); Luxembourg(0.429582); Spain(0.018370)
Luxembourg	Luxembourg(1.000000)
Malta	Greece(0.943655); Luxembourg(0.056345)
Montenegro	Croatia(1.000000)
Netherlands	Croatia(0.601128); France(0.187254); Greece(0.028129); Luxembourg(0.183490)
North Macedonia	Croatia(0.349356); Luxembourg(0.186761); Serbia(0.463883)
Poland	Croatia(0.154754); France(0.522875); Luxembourg(0.317851); Spain(0.004520)
Portugal	Croatia(0.434228); Greece(0.361836); Luxembourg(0.087109); Spain(0.116826)
Romania	Croatia(0.343429); France(0.007503); Luxembourg(0.412368); Serbia(0.236700)
Serbia	Serbia(1.000000)
Slovakia	Croatia(0.656512); France(0.148872); Greece(0.046191); Luxembourg(0.148424)
Slovenia	Croatia(0.438777); Greece(0.243257); Luxembourg(0.317967)
Spain	Spain(1.000000)
Sweden	Croatia(0.039638); France(0.087806); Luxembourg(0.555696); Serbia(0.316860)
United Kingdom	Croatia(0.166049); France(0.514518); Greece(0.046747); Luxembourg(0.272686)

Source: authors' calculations

Table 5 shows the proportionate movements of input and output variables calculated in the DEA model. Those values actually represent the guidelines to decision makers on how to improve the efficiency of the tourism sector in inefficient countries. Proportionate movements of output variables show necessary increase of the outputs in order to achieve the highest efficiency level. Sometimes, apart from those proportionate movements, it is also important to take into account the values of slack variables, which are presented in table 6.

Slack variables provide vital information pertaining to the areas which an inefficient country needs to improve upon in its drive towards attaining the status of the efficient one (Kumar&Gulati, 2008). Coelli et al. (2005) stated that is important to report that both the scores of technical efficiency and any non-zero input and output slacks provide an accurate indication of technical efficiency of a unit in a DEA analysis. Therefore, the slack values should be interpreted and presented together with the efficiency values. Slacks represent the potential improvements in input and output variables for the inefficient units in the data set when compared with their peer efficient targets. Thus, slacks are only the "leftover portions of inefficiencies", after proportional reductions in inputs or outputs. If a decision making unit (DMU) cannot reach the efficient frontier, slacks are needed to push the DMU to the frontier (Ozcan, 2008). The presence of non-zero slacks for a DMU implies that the DMU under scrutiny can improve beyond the level implied by the estimate of technical efficiency (Jacobs et al., 2006).

Therefore, if we want to make suggestion to Albania to improve its efficiency, we should take into account both proportionate movements i.e. increase of all four output variables as well as slack movements i.e. reduction of government expenditure by 2.6%, together with the further slack increase of three output variables. This way we generate the projected input and output variable values needed to achieve the maximal level of efficiency. Those projections are presented in table 7.

Table 5. Proportionate Movement of input and output variables

Country	Proportionate Movement (Government expenditure)	Proportionate Movement (Average receipt per arrival)	Proportionate Movement (International tourist arrivals)	Proportionate Movement (Share of GDP)	Proportionate Movement (Share of Employment)
Albania	0	99.1585	1107893.18	2.10	1.91
Austria	0	87.97	3731722.04	0.98	1.10
Belgium	0	1799.92	10070861.43	2.65	2.89
Bosnia and Herzegovina	0	428.67	441445.56	1.34	1.53
Bulgaria	0	842.50	16435002.79	5.74	5.37
Croatia	0	0.00	0.00	0.00	0.00
Cyprus	0	374.03	1594824.29	3.01	2.75
Czechia	0	652.52	15441775.96	3.26	5.06
Denmark	0	1174.27	20343653.12	4.16	4.16
Estonia	0	739.96	4778793.46	5.60	5.89
Finland	0	2118.60	6322223.21	3.98	4.37
France	0	0.00	0.00	0.00	0.00
Germany	0	163.18	5747203.16	0.54	1.04
Greece	0	0.00	0.00	0.00	0.00
Hungary	0	431.95	17442325.92	2.87	5.41
Ireland	0	1350.70	25700213.25	4.72	4.97
Italy	0	42.35	3248636.32	0.31	0.37
Latvia	0	805.99	3231909.79	5.97	5.97
Lithuania	0	1745.21	8411687.62	6.00	6.33
Luxembourg	0	0.00	0.00	0.00	0.00
Malta	0	60.95	182872.00	0.45	0.92
Montenegro	0	26.67	90250.00	0.50	0.33
Netherlands	0	446.26	8681836.60	0.82	2.71
North Macedonia	0	955.96	1162517.85	3.69	3.32
Poland	0	1161.08	30304693.28	3.15	3.32
Portugal	0	192.97	5066223.14	1.70	1.94
Romania	0	1337.75	4032763.27	2.19	3.80
Serbia	0	0.00	0.00	0.00	0.00
Slovakia	0	854.29	16967950.78	5.79	6.01
Slovenia	0	1072.27	5014083.06	4.75	5.45
Spain	0	0.00	0.00	0.00	0.00
Sweden	0	732.37	2440605.42	0.85	1.24
United Kingdom	0	388.05	11215339.73	1.10	1.43

Source: authors' calculations

Table 6. Slack Movement of input and output variables

Country	Slack Movement (Government expenditure)	Slack Movement (Average receipt per arrival)	Slack Movement (International tourist arrivals)	Slack Movement (Share of GDP)	Slack Movement (Share of Employment)
Albania	-2.60	185.91	9842406.82	0.00	0.09
Austria	0.00	0.00	0.00	0.00	0.00
Belgium	0.00	0.00	0.00	0.00	0.81
Bosnia and Herzegovina	0.00	0.00	3826792.01	0.76	0.00
Bulgaria	-0.71	0.00	0.00	0.00	0.18
Croatia	0.00	0.00	0.00	0.00	0.00
Cyprus	-7.75	0.00	8234820.36	0.00	0.35
Czechia	0.00	0.00	0.00	2.20	0.00
Denmark	0.00	0.00	0.00	0.00	0.44
Estonia	-5.45	0.00	7570636.38	0.00	0.00
Finland	-0.16	0.00	0.00	0.00	0.36
France	0.00	0.00	0.00	0.00	0.00
Germany	0.00	0.00	0.00	2.67	0.00
Greece	0.00	0.00	0.00	0.00	0.00
Hungary	0.00	0.00	0.00	2.64	0.00
Ireland	0.00	0.00	0.00	0.00	0.00
Italy	0.00	0.00	0.00	0.00	0.00
Latvia	-0.92	0.00	9060139.58	0.00	0.00
Lithuania	-0.76	0.00	0.00	0.00	0.00
Luxembourg	0.00	0.00	0.00	0.00	0.00
Malta	-3.78	0.00	23264199.01	2.20	0.00
Montenegro	-1.30	119.21	13625450.00	0.00	2.87
Netherlands	0.00	0.00	0.00	5.75	0.00
North Macedonia	0.00	0.00	4544216.01	0.00	0.45
Poland	0.00	0.00	0.00	0.00	0.53
Portugal	-1.93	0.00	0.00	0.00	0.00
Romania	0.00	0.00	0.00	2.34	0.00
Serbia	0.00	0.00	0.00	0.00	0.00
Slovakia	0.00	0.00	0.00	0.35	0.00
Slovenia	-0.83	0.00	5189450.47	0.00	0.00
Spain	0.00	0.00	0.00	0.00	0.00
Sweden	0.00	0.00	0.00	0.56	0.00
United Kingdom	0.00	0.00	0.00	0.53	0.00

Source: authors' calculations

Table 7. Projection of input and output variables

Country	Projection (Government expenditure)	Projection (Average receipt per arrival)	Projection (International tourist arrivals)	Projection (Share of GDP)	Projection (Share of Employment)
Albania	1.40	700.59	15592900.00	10.90	10.00
Austria	4.70	782.47	33192022.04	8.68	9.80
Belgium	3.10	3293.73	18428961.43	4.85	6.10
Bosnia and Herzegovina	1.10	1324.38	5190637.57	4.90	4.73
Bulgaria	2.59	1297.86	25318002.79	8.84	8.45
Croatia	1.40	700.59	15592900.00	10.90	10.00
Cyprus	1.65	1230.55	13481744.65	9.91	9.40
Czechia	3.70	1193.74	28249775.96	8.15	9.26
Denmark	2.40	1852.09	32086653.12	6.56	6.99
Estonia	2.95	1242.41	15594329.83	9.40	9.89
Finland	2.84	3184.47	9502923.21	5.98	6.93
France	3.00	698.14	86917700.00	3.90	4.60

Germany	3.60	1226.51	43198703.16	6.71	7.84
Greece	8.10	607.77	27194200.00	8.50	12.70
Hungary	5.30	822.85	33227325.92	8.11	10.31
Ireland	4.10	1894.03	36038213.25	6.62	6.97
Italy	3.60	801.68	61501636.32	5.91	6.97
Latvia	2.28	1292.17	14241549.37	9.57	9.57
Lithuania	2.44	2268.73	10934987.62	7.80	8.23
Luxembourg	3.10	4352.33	1045900.00	4.10	5.90
Malta	7.82	818.75	25720871.01	8.25	12.32
Montenegro	1.40	700.59	15592900.00	10.90	10.00
Netherlands	2.20	1367.58	26605836.60	8.27	8.31
North Macedonia	1.30	1474.51	6337333.86	5.69	5.57
Poland	2.80	1860.61	48562693.28	5.05	5.85
Portugal	4.57	1000.45	26266223.14	8.80	10.04
Romania	1.90	2253.33	6792863.27	6.03	6.40
Serbia	0.50	898.74	1497200.00	2.40	2.10
Slovakia	2.20	1237.94	24587950.78	8.74	8.71
Slovenia	3.57	1839.14	13789533.54	8.15	9.35
Spain	6.50	831.99	81868500.00	5.40	5.00
Sweden	2.20	2792.42	9305605.42	3.81	4.74
United Kingdom	3.00	1690.77	48866339.73	5.33	6.23

Source: authors' calculations

Furthermore, we continue with the second stage of analysis. The Tobit model estimated coefficients, using the panel sample from 33 European countries and 4 T&T Competitiveness Reports, presented in Table 8, indicate the statistically significant relationships of the tourism efficiency scores with average international tourism receipt per arrival, tourism industry share of GDP and share of employment, government prioritization of tourism industry, visa requirements, number of rooms, rate of use and number of natural sites. Mentioned variables could be singled out as leading drivers of tourism development. Also, the value of χ^2 statistics confirms the null hypothesis of the usage of random effects estimator instead of fixed effects run of the model.

Table 8. Tobit model results

Variable	Coefficient	z-Statistic
Constant	0.2810570**	2.2573
Average receipt per arrival	0.0000159***	6.4820
Tourism industry Share of GDP	0.0214300**	1.9084
Tourism industry Share of employment	0.0424230***	4.1485
Government prioritization of travel and tourism industry	0.0513130**	2.4437
Visa requirements	0.0106550***	3.6147
Number of rooms	-0.0000003**	-2.4151
Rate of use	0.0006110**	2.3774
Natural sites	0.0369200**	2.1788

Note: *** and ** indicate significance at the levels of 1% and 5%, respectively. χ^2 = 1.4122.

Source: authors' calculations

Average international tourism receipt per arrival shows a significant and positive influence on overall tourism efficiency. The retention of international tourists in one country through the diversity of tourism offer is reflected through the amount of money spent during their stay. The coefficients of tourism industry share in GDP and employment remain significant and positive with overall tourism efficiency results, presenting that observed countries that pay special attention to the tourism industry are more efficient (Radovanov et al., 2020). The growth of the economic level and the technological progress will cause the elevation of tourism efficiency overall

(Liu et al., 2017). The coefficient concerning the relationship of government prioritization of tourism industry with tourism efficiency is positive and statistically significant at the 5% level. Giving importance to the tourism sector by official state institutions significantly increases the chances of tourism efficiency growth according to the observed sample of countries. The estimated coefficient of the relation between visa requirements and overall efficiency score indicates the positive and statistically significant connection at the 1% level. Actually, openness can possibly inspire traveling and increase international competition, which provides lower prices, better quality and product, and service variety for international visitors (Chaabouni, 2019). The number of rooms is normally a prerequisite for a great number of tourist arrivals, but in this sample of the observed countries, it is negatively related to the tourism efficiency. On the other hand, the coefficient concerning relation between the rate of use and tourism efficiency is positive and significant at the level of 5%, showing the meaning of better usage of existing tourist facilities (Radovanov et al., 2020). Finally, the number of natural heritage sites can be an issue of significant increase of tourism efficiency involving and protecting all relevant stakeholders in the tourism development process.

4. CONCLUSION

In this study, the evaluation of relative efficiency of tourism development in 33 European countries has been presented using a Two-stage DEA model, in order to compare and relate efficiency levels in Western Balkan countries, countries that are the oldest EU members and countries that recently joined EU. The analysis was performed for period of six years and the data were retrieved from the Travel and Tourism Competitiveness reports published from 2013 until 2019. The output-oriented DEA model with a variable return to scale has been applied, with one input variable (government expenditure for travel and tourism (T&T)) and four output variables (average receipts per arrival, number of international tourist arrivals, T&T share of GDP and T&T share of employment). Results of the first stage showed that the lowest average efficiency scores achieved countries that recently joined the European Union, while a significant increase in efficiency is observed in the results of Western Balkan countries. The highest average efficiency score achieved countries in the EU15 group. Results of the second stage indicate the statistically significant and positive relationships of the tourism efficiency scores with average international tourism receipt per arrival, tourism industry share of GDP and share of employment, government prioritization of tourism industry, visa requirements, rate of use and number of natural sites. Simultaneously, the number of rooms shows a significant, but negative impact on general tourism efficiency.

The implications of this chapter are reflected in the competent indicators of the position of tourism development in Western Balkan countries in comparison to the EU. These contribute to a better understanding of the situation in the tourism sector in the Western Balkan countries, which could be important during pre-accession negotiations with the EU. More specifically, the results of this chapter can be used by policymakers to identify which factors improve or degrade the efficiency of tourism development. Hopefully, the comprehensive analysis of efficiency levels and its drivers can serve as a valuable basis for dealing with new problems in the tourism sector during pandemics. Further research will be directed to explore those issues in the future.

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