doi: 10.52370/TISC2263AM

INVESTMENTS IN TOURIST DESTINATIONS FOR INCREASING EFFICIENCY IN THE FUTURE SERBIAN TOURISM SECTOR

Aleksandra Marcikić Horvat[1]; Otilija Sedlak[2]

Abstract

The main goal of this paper is to find out a possible increase in efficiency on the basis of data from the previous period - which refers to investments in various elements of tourist destinations. In this studyit would be done by the evaluation of relative technical efficiency of tourism sector in 24 Serbian regions using data envelopment analysis (DEA). The evaluation will enable an analysis of how to influence the increase of tourism efficiency in the future, based on results from the recent past. On the side of output two variables were used in the DEA model: number of tourists and number of overnight stays. Furthermore, four input variables were used: annual average share of employment in accommodation and food service activities, annual average share of employment in arts, entertainment and recreation, investments in accommodation and food service activities and investments in arts, entertainment and recreation. Output oriented DEA model with variable return to scale has been solved and results show that relative efficiency score values are between 10% and 100%. Average efficiency score is 81%, which indicate that majority of Serbian regions obtained high efficiency score values. It will turn out that investments can be crucial for the development of tourism, but there are also barriers, limitations in this type of analysis. The small amount of input and output data in the survey can only yield results that need to be further verified.

Key Words: *efficiency analysis, future tourism, data envelopment analysis, Serbian regions*
JEL classification: *G11, Z32, Z33*

[1] Aleksandra Marcikić Horvat, PhD, Assistant Professor, University of Novi Sad, Faculty of Economics Subotica, Segedinski put 9-11, Subotica, Srbija, +38124628000, aleksandra.marcikic.horvat@ef.uns.ac.rs

[2] Otilija Sedlak, PhD, Full Professor, University of Novi Sad, Faculty of Economics Subotica, Segedinski put 9-11, Subotica, Srbija, +38124628000, otilija.sedlak@ef.uns.ac.rs

Introduction

The topic of this paper is examining the efficiency of tourism as an economic branch in different regions of Serbia using DEA method.

This paper consists of five sections. After introduction, the next chapter provides an overview of previous studies dealing with efficiency analysis of tourism sector using DEA method. Methodology and data is described in the third section, while fourth section presents the results of applied DEA model. The evaluation of relative technical efficiency of tourism sector in 24 Serbian regions using DEA in the fourth section. Final section opens up a discussion and concludes this paper.

The research that is in the paper can justify with its results that increasing efficiency in the future may be a solution for tourism to become a significant economic branch again, as it was before the pandemic.

Literature Review

In recent decades, studies on efficiency analysis have become very popular in various fields. Mainly two approaches have been used for efficiency evaluation: parametric and nonparametric methodology. Parametric methods focus on average tendencies and deviations from it, while nonparametric methodology focuses on the extreme observations (Cvetkoska & Fotova-Čiković, 2021). One of the most popular nonparametric methodology is DEA with various models and modification that can be applied for efficiency assessment in many different fields: from banking (Milenković et al., 2022; Nourani et al. 2021; Bod'a & Zimková, 2015), insurance (Radovanov et al., 2021) agriculture (Kocisova 2015; Marcikić Horvat et al., 2019; Marcikić Horvat et al., 2020), education (Johnes, 2013; Marcikić Horvat & Radovanov, 2017), healthcare (Stefko et al., 2018) to tourism. Furthermore, this section focuses on the papers that apply DEA analysis in tourism sector in Serbia and surrounding countries, which highly motivated us for this research.

Pavković et al. (2021) have developed a DEA model to evaluate tourism efficiency in 23 European countries, which were grouped in the following 5 categories: countries in transition, Scandinavian countries, Eastern European countries, Mediterranean countries and and Central and Western European countries. Authors applied output oriented DEA models with three input (number of hotels and similar accommodation capacities, number of rooms, number of bed places) and three output variables (number of inbound tourists, number of bed-nights and tourism expenditure). Results showed that only three countries (Croatia, Belgium and Denmark) achieved the highest relative efficiency.

Marcikić Horvat and Radovanov (2020) in their research applied a two-stage DEA model to evaluate tourism efficiency of European countries for the period from 2013-2019. Output oriented DEA model had 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 show that the highest average efficiency score was achieved by the EU15 group countries, while Serbia achieved the highest efficiency score in the group of Western Balkan countries.

Radovanov et al. (2020) applied an output oriented DEA methodology to evaluate tourism efficiency for 33 European countries for the period 2011-2017. Furthermore, authors applied a Tobit regression model to examine the statistical significance of particular tourism development factor. DEA showed relatively high efficiency score values and Tobit model results indicate that sustainability of tourism development, the share of GDP, tourist arrivals and inbound receipts, visa requirements and rate of use significantly influence efficiency of tourism.

Prorok et al. (2019) examined the efficiency of tourism in two groups of countries (EU and non-EU countries) in 2017 using DEA model. Serbia has achieved lower coefficient of total technical efficiency, while the coefficient of pure technical efficiency was one. These findings imply that Serbia is ineffective in terms of scale.

Authors Ilić and Petrevska (2018) used DEA for efficiency assessment of tourism in Serbia and surrounding countries. DEA model had two input variables (tourism expenses and number of beds) and three output variables (number of arrivals, the number of nights spent and tourism revenue). The results show that six countries achieved highest efficiency score, while other 9 are relatively inefficient. Countries with efficiency score less than 100% should reduce tourism costs and the number of beds and increase some of the output variables.

Crouch and Ritchie (1999) in their research have the view that the competitiveness of a destination is crucial for the tourism industry and is very important in practice, and for decision makers in tourism. Porter's framework (1990), or its variants (Crocombe et al., 1991; Enright et al., 1996) are used in many studies, whether they are the topic of an individual branch or the economy as a whole.

Sedlak and Ćirić (2018) thought that "factors influencing the competitiveness and attractiveness of the destination and its tourist offer can be used to build a methodology for ranking tourist destinations" (p. 223). Ranking should serve as an incentive to the further development the competitiveness of the destination, to improve the existing criteria, to discover new criteria, or to contribute to the better fullfillment of the criteria (Crouch & Ritchie, 1999; Tovmasyan, 2016). "Cities or tourist places have to have different offers, which require multiple demands and multiple attributes"(Ćirić & Sedlak, 2018, p. 224). The model of the competitiveness of the destinations with four basic components (basic resources and attractiveness, factors and resources for support, destination management and factors contributing to the quality of the destination) and their weights are equally represented in the model.

"Tourism has reached world importance in the economy. The competition in tourism has intensified between destinations, whether the destinations are cities, regions or countries. In this sense, the evaluation of the tourism competitiveness of these destinations may be helpful in planning and prioritizing actions that will benefit the industry" (Ćirić & Sedlak, 2019, p. 672). In the article, Ćirić and Sedlak (2019) discusses the concept of competitiveness by the multidimensional view of performance, efficiency and unit analysis.

All these researches relates to the application of DEA methods for analyzing the efficiency of the tourism sector. The analysis of the tourism sector of Serbia by the authors of this paper, unlike the reviewed literature, could give clear guidelines in the future development of the tourism sector: the great importance of further investment and efficiency.

Methodology and Data

Technical efficiency was first defined by Kopmans (1951), as a condition in which a manufacturer is able to increase one type of output if and only if it reduces another type of output or increases some of the inputs. The decades-long search for adequate measures of technical efficiency came up with the data envelope analysis (DEA) in the 20th century, based on the work of Michael James Farrell (1957). The development of this method has enabled the measurement of efficiency on a scale from 0 to 1 based on the ratio of the weights of multiple inputs and outputs simultaneously, expressed in different units of measurement.

The creators of the first DEA CCR model had in mind a variety of applications in testing the effectiveness of both profit and non-profit institutions. Data envelope analysis can be defined as a nonparametric method in decision making for maximum efficiency (Charnes, et al., 1978).

Important for the successful application of DEA methods is that decision making units (DMUs) are organizations, i.e. entities, of the same type. Also, it is necessary that the same variables are taken as inputs and outputs for each separate DMU, as well as that there are quantitative data on the variables used as inputs and outputs. Similar to the Farrell's (1957) method, DEA remains sensitive to the choice of input and output variables as well as the selection of DMUs.

The main shortcomings of the DEA are that it remains sensitive to the choice of input and output variables and its inability to predict. DEA is an ex-post analysis based on already established data (Škare & Rabar, 2016). The “thumb rule” dictates that for an effective DEA to be implemented, at least two or three times more DMUs than the input and output variables combined must be analyzed to ensure that efficiency data are adequately distributed (Sarkis, 2007).

There are different formulations of optimisation models used in DEA analysis. In this paper, the output-oriented DEA model with a variable return to scale is applied to evaluate efficiency of tourism in 24 Serbian regions in 2020. The analysis is performed by solving the following model (Banker et al., 1984) of linear programming for each DMU and each period of time:

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

"where *n* is the number of DMUs (Decision Making Units – countries in our case) and DMU_o 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 DMU_o, while x_{io} is the amount of input *i* used by DMUo. λ is the DMU's weight and the efficiency score is ϕ" (Marcikić Horvat & Radovanov, 2020, p. 18).

The main goal of this paper is to examine the efficiency the tourism sector in different regions of Serbia. DEA is a useful approach of efficiency evaluation in tourism industry, because it allows various number and measuring units of input and output variables. In this analysis 24 (out of 25) regions in Serbia have been included, since for one region (Pirot region) input data were missing. Data were collected from the annual report published by the Statistical Office of the Republic of Serbia. In the abovementioned DEA model, four input and two output variables were selected (Appendix 1). Annual average share of employment in accommodation and food service activities (AFS), annual average share of employment in arts, entertainment and recreation (AER), realized investments in new fix assets in accommodation and food service activities and realized investments in new fix assets in arts, entertainment and recreation were used as input variables. Investments were presented in thousands RSD. Number of tourists and number of overnight stayswereoutput variables.

Results and Discussion

In the above mentioned DEA model, region is observed as one DMU and its relative technical efficiency is analysed by solving DEA model (1) for every region. Results of output - oriented DEA model with variable return to scale are presented in the next tables.

Table 1: *Results of DEA model*

DMU	Efficiency Score	Benchmark (Lambda)
Belgrade region	1.00	Belgrade region (1.000000)
Bor region	1.00	Bor region (1.000000)
Braničevo region	0.82	Rasina region (0.421204); Srem region (0.530703); Raška region (0.048094)

Jablanica region	1.00	Jablanica region (1.000000)
South Bačka region	0.49	Srem region (0.559204); Belgrade region (0.005551); Raška region (0.435245)
South Banat region	0.57	Jablanica region (0.263972); Toplica region (0.286168); Mačva region (0.441617); Raška region(0.008243)
Kolubara region	1.00	Kolubara region (1.000000)
Mačva region	1.00	Mačva region (1.000000)
Moravica region	0.96	Rasina region (0.456590); Mačva region (0.508682); Raška region (0.034728)
Nišava region	0.79	Mačva region (0.706762); Srem region (0.233094); Rasina region (0.060143)
Pčinj region	0.10	Toplica region (0.577960); Rasina region (0.071265); Raška region (0.350776)
Danube region	1.00	Danube region (1.000000)
Morava region	0.19	Rasina region (0.362808); Srem region (0.635942); Raška region (0.001250)
Rasina region	1.00	Rasina region (1.000000)
Raška region	1.00	Raška region (1.000000)
North Bačka region	0.60	Srem region (0.897170); Raška region (0.102830)
North Banat region	0.96	Central Banat region (0.317891); Toplica region (0.682109)
Central Banat region	1.00	Central Banat region (1.000000)
Srem region	1.00	Srem region (1.000000)
Šumadija region	0.82	Bor region (0.206536); Srem region (0.793464)
Toplica region	1.00	Toplica region (1.000000)
Zaječar region	1.00	Zaječar region (1.000000)
West Bačka region	0.41	Jablanica region (0.273258); Toplica region (0.088351); Mačva region (0.635861); Zaječar region (0.000230); Raška region (0.002300)
Zlatibor region	0.76	Toplica region (0.051846); Mačva region (0.001034); Kolubara region (0.049976); Belgrade region (0.026281); Raška region (0.870862)

Source: *Author's calculations*

Results show that relative efficiency score of tourism sector in Serbian regions lie between 10% and 100%. Average efficiency score is 81%, which indicate that majority of Serbian regions obtained high efficiency score values. Twelve regions have the highest efficiency score, while Pčinj and Morava region achieved the lowest relative efficiency (under 20%).

DEA also provides information on how relative efficiency can be improved for inefficient DMUs. The last column in Table 1 presents the benchmark for inefficient regions and the corresponding values of lambda. Benchmarks represent the set of efficient DMUs from which the DMU's inefficiency has been determined. Therefore, it can be concluded that North Bačka region (for example) should look up to the Srem and Raška region in order to improve efficiency in allocation of observed outputs and inputs.

Conclusion

More detailed information on possible ways of efficiency improvement for inefficient Serbian regions can be found in the Appendix 2, where necessary proportionate and slack movements of input and output variables are presented.

Since selected DEA model is output oriented, "proportionate movements of output variables show necessary increase of the output levels in order to achieve the highest efficiency score" (Marcikić Horvat & Radovanov, 2020, p. 22). Usually, besides above mentioned proportionate movements, it is important to analyse both proportionate movements and slack variables (Coelli et al., 1999). For example, if Braničevo region aims to improve its efficiency, it should reduce share of employment in both AFS and AER and investments in AER. Those reductions should be followed by increase of both output variables number of tourists and overnight stays.

It is unrealistic to expect that the results of the research will generate a general view: on the efficiency of the tourist destination, on the role of investing in tourist destinations in the future development of tourism. As a limitation in this research, there is a problem: the small number of input-output variables, the immeasurability of some elements in which it is invested, and the insufficient amount of data collected in the field. The question of accuracy, acceptability of the measure of efficiency of tourism that is mentioned in the paper is also raised. The results of the research show the great importance of investing in the tourism sector in the future, it is not questionable whether investing in this industry is necessary.

References

1. Banker, D., Charnes A., Cooper, W. (1984). Some models for estimating technical and scale inefficiencies in data envelopment analysis. *Management Science*, Vol. 30, No. 9, 1078-1092.

2. Bod'a, M., Zimková. E. (2015). Efficiency in the slovak banking industry: A comparison of three approaches. *Prague Economic Pap*ers, Vol. 24, No. 4, 434–451.

3. Charnes, A., Cooper, W., Rhodes, E. (1978). Measuring the efficiency of decision making units. *European journal of operational research*, Vol. 2, No. 6, 429-444.

4. Ćirić, Z., Sedlak, O. (2018). Measuring a Tourism Destination in the Context of Digital Transformation with Multiple Attribute Decision Making. In D. Cvijanović (Ed.): *The Third International Scientific Conference: Tourism in Function of Development of the Republic of Serbia - Tourism in the Era of Digital Transformation*. University of Kragujevac, Faculty of Hotel Management and Tourism in Vrnjačka Banja, Vrnjačka Banja, Vol. 3, No. 1, 356-373.

5. Ćirić, Z., Sedlak, O. (2019). Performance Indicators for Measuring Tourism Destination Competitiveness with a Fuzzy Method. In D. Cvijanović (Ed.): *The Fourth International Scientific Conference: Tourism in Function of Development of the Republic of Serbia - Tourism as a Generator of Employment.* University of Kragujevac, Faculty of Hotel Management and Tourism in Vrnjačka Banja, Vrnjačka Banja, Vol. 4, No. 2, 672-686.

6. Coelli, T., Perelman, S. (1999). A Comparison of Parametric and Non-parametric Distance Functions: With Application to European Railways. *European Journal of Operational Research*, Vol. 117, No. 2, 326-339.

7. Crocombe, G., Enright, J., Porter, E. (1991). *Upgrading New Zealand's Competitive Advantage*, Oxford University Press, Auckland.

8. Crouch, I., Ritchie, B. (1999). Tourism, Competitiveness, and Social Prosperity. *Journal of Business Research*, Vol. 44, No. 3, 137–152.

9. Cvetkoska, V., Fotova Čiković, K. (2021). Efficiency Analysis of Macedonian and Croatian Banking Sectors with DEA. *Economy, Business & Development,* Vol. 2, No. 2, 1-19.

10. Enright, J., Francès, A., Scott-Saavedra, E. (1996). *Venezuela: The Challenge of Competitiveness*, St. Martin's Press, New York.

11. Farrell, J. (1957). The measurement of productive efficiency. *Journal of the Royal Statistical Society*. Vol. 120, No. 3, 253–290.

12. Ilić, I., Petrevska, I. (2018). Using DEA method for determining tourism efficiency of Serbia and the surrounding countries. *Hotel and Tourism Management*, Vol. 6, No. 1, 73-80.

13. Johnes, G. (2013). Efficiency in English higher education institutions revisited: a network approach. *Economics Bulletin,* Vol. 33, No. 4, 2698-2706.

14. Kočišová, K. (2015). Application of the DEA on the measurement of efficiency in the EU countries. *Agricultural Economics,* Vol. 61, No. 2, 51–62.

15. Koopmans, C. (1951). Efficient allocation of resources. *Econometrica: Journal of the Econometric Society,* Vol. 19, No. 4, 455-465.

16. Marcikić Horvat, A., Matkovski, B., Zekić, S., Radovanov, B. (2020). Technical efficiency of agriculture in Western Balkan countries undergoing the process of EU integration. *Agricultural Economics,* Vol. 66, No. 2, 65-73.

17. Marcikić Horvat, A., Radovanov, B. (2017). Primena analize obavijenosti podataka u komparaciji efikasnosti sistema visokog obrazovanja. *Anali Ekonomskog fakulteta u Subotici*, Vol. 38, No. 53, 23-35.

18. Marcikić Horvat, A., Radovanov, B., Popescu, G., Panaitescu, C. (2019). A Two-Stage DEA Model to Evaluate Agricultural Efficiency in Case of Serbian Districts. *Economics of Agriculture*, Vol. 66, No. 4, 965-974.

19. Marcikić Horvat, A., Radovanov, B. (2020). Efficiency of Tourism Development: Application of DEA and Tobit Model. In V. Bevanda & S. Štetić (Ed.): *5th International Thematic Monograph – Modern Management Tools and Economy of Tourism Sector in Present Era*, Association of Economists and Managers of the Balkans, Belgrade, 15-28.

20. Milenković, N., Radovanov, B., Kalaš, B., Horvat, A. M. (2022). External Two Stage DEA Analysis of Bank Efficiency in West Balkan Countries. *Sustainability,* Vol. 14, No. 2, 978-992.

21. Nourani, M., Malim, K., Mia, A. (2021). Revisiting efficiency of microfinance institutions (MFIs): An application of network dataenvelopment analysis. *Economic Research,* Vol. 34, No. 1, 1146–1169.

22. Pavković, V., Jević, G., Jević, J., Nguyen, T., Sava, C. (2021). Determining Efficiency Of Tourism Sector In Certain European Countries And Regions By Applying DEA Analysis. *Journal of Process Management and New Technologies,* Vol. 9, No. 3-4, 49-61.

23. Porter, E. (1990). *The Competitive Advantage of Nations*, The Free Press, New York.

24. Prorok, V., Šerić, N., Peronja, I. (2019). Analysis of Overall and Pure Technical Efficiency of Tourism in Europe. *Transactions on Maritime Science,* No. 8, Vol. 2, 219-229.

25. Radovanov, B., Dudić B., Gregus, M., Marcikić Horvat, A., Karović, V. (2020). Using a Two-Stage DEA Model to Measure Tourism Potentials of EU Countries and Western Balkan Countries: An Approach to Sustainable Development. *Sustainability,* Vol. 12, No. 2, 4903-4915.

26. Radovanov, B., Marcikić Horvat, A., Stojić, D., Sedlak, O. (2021). A two-stage DEA model to assess the efficiency performance of Serbian insurance companies. *Contemporary Challanges and Sustainability of the Insurance Industry*, Univerzitet u Beogradu, Ekonomski fakultet, Beograd, 355-372.

27. Sarkis, J. (2007). Preparing your data for DEA. In J. Zhou & W. D. Cook (Eds.): *Modeling data irregularities and structural complexities in data envelopment analysis*, Springer, Boston, 305-320.

28. Sedlak, O., Ćirić, Z., (2017). Konkurentnosti turističke destinacije: donošenje odluke pomoću metode ocenjivanja podržano informacionim tehnologijama. In V. Bevanda & S. Štetić (Eds.): *International Thematic Monograph - Modern Management Tools and Economy of Tourism Sector in Present Era*. Association of Economists and Managers of the Balkans, Belgrade, 223- 240.

29. Škare, M., Rabar, D. (2016). Measuring economic growth using data envelopment analysis. *Economic Journal*, Vol. 18, No. 2, 386-406.

30. *Statistical Office of the Republic of Serbia*, https://www.stat.gov.rs/publikacije/publication/?p=13352, (26 February 2022).

31. Stefko, R., Gavurova, B., Kočišová, K. (2018). Healthcare efficiency assessment using DEA analysis in the Slovak Republic. *Health Economics Review*, Vol. 8, No. 6, 1-12.

32. Tovmasyan, G. (2016). Tourism Development Trends in the World. *European Journal Of Economic Studies*, Vol. 17, No. 3, 429-434.

Appendix 1 – Database overview

Table 2: *Input and output variables*

	Employment in AFS	Employment in AER	Investments in AFS	Investments in AER	Number of tourists	Overnight stays
Belgrade region	4.1	2.1	1418042	3278410	330897	928233
West Bačka region	3.3	1.3	8839	44945	13178	54296
South Banat region	3.3	1.4	12403	35311	17990	66246
South Bačka region	4.2	1.9	362354	1023751	90921	215661
North Banat region	2.7	2.0	2408	25991	19846	90908
North Bačka region	4	2.1	106022	1381394	54053	133054
Central Banat region	2.8	1.6	1127	16131	10904	40275
Srem region	2.8	1.5	29113	109869	61913	164508
Zlatibor region	5.6	1.7	807089	156412	237827	846352
Kolubara region	2.9	1.5	369465	49905	66966	235097
Mačva region	2.8	1.2	7533	62079	38523	150058
Moravica region	4	1.4	35190	154274	44029	192843
Morava region	3.8	1.8	22960	185031	10069	32197
Rasina region	3.7	1.6	9577	92319	37771	178997
Raška region	6	1.7	777040	77094	342358	1223428
Šumadija region	3.6	1.6	24544	274441	46815	120609
Bor region	3.6	1.7	6991	61707	39960	111143
Braničevo region	3.9	1.7	56855	149369	53511	181732
Zaječar region	5.1	1.3	528432	17949	174439	828668
Jablanica region	2.7	1.4	6861	15897	16055	78202
Nišava region	3.9	1.3	58844	116653	49063	96558
Pirot region	4	1.7		70957	14935	30167
Danube region	2.9	1.2	7669	26513	8900	15568
Pcinj region	3.9	2.2	274986	39810	13843	52767
Toplica region	2.3	1.7	3005	10707	25255	133723

Source: *Statistical Office of the Republic of Serbia*

Appendix 2 – Possible improvements for inefficient DMUs

Table 3: *Proportionate and Slack Movements of selected variables*

DMU	Slack Movement (EmployementAFS)	Slack Movement (EmployementAER)	Slack Movement (Investments AFS)	Slack Movement (Investments AER)	Proportionate Movement (Number of tourists)	Slack Movement (Number of tourists)	Proportionate Movement (Overnight stays)	Slack Movement (Overnight stays)
Braničevo region	-0.567017	-0.148261	0	-48468.39651	11720.96183	0	39806.27974	0
South Bačka region	0	-0.309621	0	-910559.6419	94547.33621	0	224262.5254	189713.3369
South Banat region	-0.643103	0	0	0	13309.76188	0	49011.58896	20005.85326
Moravica region	-0.677939	0	0	-77866.28612	1759.088	2943.253816	7704.644831	0
Nišava region	-0.907541	0	0	-42531.37368	13185.76697	0	25950.1312	95474.28469
Pčinj region	-0.202359	-0.507126	0	0	122362.7186	1173.248847	466424.4436	0
Morava region	-0.669473	-0.263469	0	-81570.25319	43435.60378	0	138891.2638	0
North Bačka region	-0.870945	-0.579434	0	-1274895.239	36698.03433	0	90333.93633	50008.33523
North Banat region	-0.241054	-0.331789	0	-13559.75719	846.940895	0	3879.557737	9229.129164
Šumadija region	-0.634771	-0.058693	0	-174519.2099	10563.90467	0	27215.67826	5661.50251
Western Bačka region	-0.563612	0	0	0	18763.2597	0	77308.38886	0
Zlatibor region	0	0	-74498.18254	0	73711.99318	0	262317.9574	0

Source: *Author's calculations*