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SUSTAINABLE REGIONAL DEVELOPMENT TROUGH TOURISM: CASE OF THE CZECH MUNICIPALITIES OF VYSOCINA REGION

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Abstract. Cultural monuments are one of the key factors in tourism and they influence the economic and social development of the municipality or region and above its degree of sustainability tourism. The analysis of the potential of the tourism in municipalities and its comparison can be made by various methods and techniques such as local expenditure model, cost-benefit analysis, multi-criteria evaluation of alternatives or cluster analysis. The method that can give an objective comparison of the size of anthropogenic sphere potentials of individual regions or possibly other territorial units is Data Envelopment Analysis (DEA). DEA models are usually used to find the relative efficiency among homogenous units according to selected criteria (inputs and outputs). According to the data taken from the Czech Statistical Office about the municipalities with extended powers in the Vysocina Region as basic spatial units we try to apply DEA analysis in terms of utilization of cultural and natural heritage for tourism. The main task is to identify the problematic places in this region and then suggest ways for improvement so that the region's potential is primarily to fulfill sustainable tourism.

Keywords: Sustainable Regional Development; Cultural Monuments, DEA Models, Vysocina Region, Potential of the Tourism, Sustainable Tourism,

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1. Introduction

Tourism belongs to one of the sectors that is especially well known by the several services provided to clients. As it is connected with natural heritage, cultural monuments, accommodation conditions in the given area, sport and cultural activities, the potential of tourism (describing the attractiveness of the area) is sometimes hard to define and difficult to measure (Stepaniuk, 2018; Yang, Černevičiūtė, 2017; Rivza, Kruzmetra, 2017). It should include:

- Nature's full potential (mountains, national parks, lakes, ponds)
- Cultural potential (monuments, world or urban or rural heritage)
- Potential of infrastructure (types of accommodation and accommodation capacity, transportation, routes)
- Potential given by actions (sports, festivals, music, theatre, cinema)
- Potential given to destination safety, health level and environmental level.

The aim of our research is to compare the 15 municipalities with extended competences (ORP) in the Vysocina Region (Czech Republic) from the tourism potential (based on cultural potential) using multi-criteria evaluation of alternatives methods and Data envelopment analysis (DEA) models. As the number of municipalities in the region is small, only few inputs (two) and outputs (two) were used for DEA models to obtain relevant results. As the inputs number of monuments or utility based on the monuments and accommodation were used, outputs were represented by the number of overnight stays, domestic and foreign. All these inputs and outputs represent the quantitative non-monetary characteristics that might be used in DEA models for the destinations comparison (Fuchs 2004) from the destinations perspective – Fig. 1. Data from the Czechtourism (2017), Czech Statistical Office (2017), National Information and Consulting Centre for Culture (2016), National Heritage Institute (2016) and Institute for Spatial Development (2017) were used in this paper as well as coefficients calculated by us for the monuments utility.

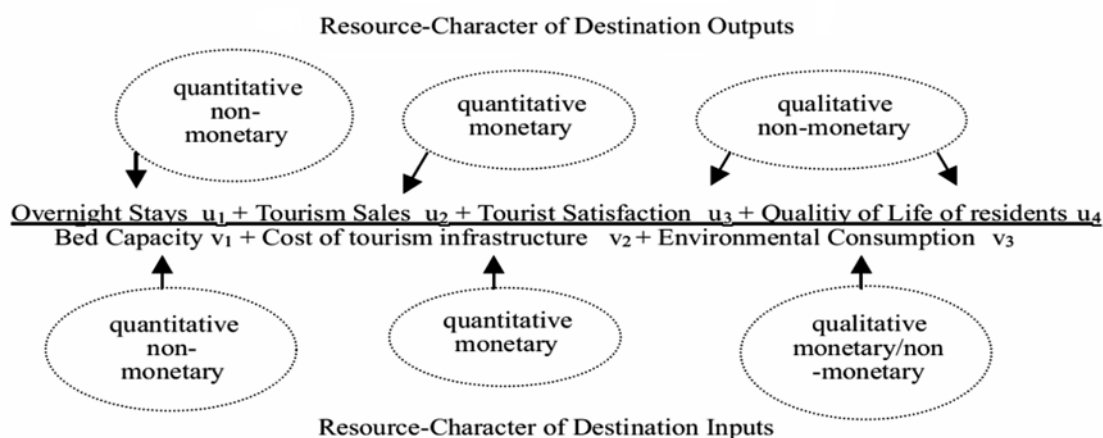


Fig. 1 DEA indicator to benchmark destination efficiency.

Source: Fuchs, 2004

DEA belongs to the operational research methods, especially to the linear programming models, that have been used many times in private or public sector to evaluate the performances of many different kinds of entities (countries, regions, enterprises, schools, hospitals, insurance companies, military units etc.) engaged in many different kinds of activities in various contexts (Cooper et al., 2004). These entities must have identical inputs and outputs to measure the efficiency from the same parameters. DEA models are widely used in comparison of countries, regions or districts from various points of view. Melecky and Stanickova (2012) evaluated the performance of the four Visegrad countries and their NUTS 2 regions. Friebel and Friebelova (2012) measured life quality in 14 Southwest Czech districts (LAU 1) by DEA using 4 inputs and 1 output. Kuncová and Sekničková (2013) compared economic performance of the 14 Czech regions.

The basic idea of DEA models consists in estimation of an efficient frontier that defines production and the possible set of problems (Charnes et al., 1978). Based on the set of available decision making units (DMUs) DEA estimates the so-called efficient frontier, and all DMUs projects on this frontier. If a DMU lies on the frontier, it is referred to as an efficient unit, otherwise it is considered inefficient (Cooper et al. 2004). DEA models can be oriented to inputs or outputs. In the case of input oriented models, we assume a fixed level of outputs (model CCR-I), the output oriented model assumes a fixed level of inputs and a maximize level of outputs with respect to given inputs (model CCR-O). These models are used if we assume constant returns to scale. In the case of variable returns to scale BCC (Banker, Charnes, Cooper) models are usually used. The review and detailed information about DEA models described Cooper et al. (2006). The basic idea for the efficiency calculation is to maximize the rate of the weighted sum of outputs divided by the weighted sum of inputs. For example, the model transformed (Charnes-Cooper transformation) into the linear programming form can be defined as follows (CCR-I):

Maximize

$$z = \sum_{i=1}^r u_i y_{iq} \quad (1)$$

Subject to:

$$\sum_{i=1}^r u_i y_{ik} \leq \sum_{j=1}^m v_j x_{jk}, k = 1, 2, \dots, n \quad (2)$$

$$\sum_{j=1}^m v_j x_{jq} = 1 \quad (3)$$

$$u_i \geq 0, i=1,2,\dots,m \quad (4)$$

$$v_j \geq 0, j=1,2,\dots,r, \quad (5)$$

where q represents the evaluated DMU, y_{rj} are known outputs, x_{ij} are known inputs of the j th DMU, u_i and v_j are the variable weights to be determined by the solution of this problem. The efficient unit U_q lies on the efficient frontier in case that the optimal efficiency (calculated by the model) $z = 1$. The inefficient units have z lower than 1 (in CCR-I model) (Charnes et al., 1978). In the BCC-I model the formula (1) and the left hand side of the formula (2) they are expanded by a variable μ (dual variable assigned to the convexity condition) and the variables in the formulas (4) and (5) could be higher than a small number ϵ . In the BCC-O model the main aim is to minimize the weighted sum of inputs, so the formula (3) becomes an objective function to be minimized (with additional dual variable v that could achieve any value and that is also added into the right hand side of the condition (2)), the z from the (1) formula must be equal to 1, and the conditions (4) and (5) are slightly changed as the u_i and v_j should be higher than a small number ϵ . For the BCC-efficient units the optimal value is equal to 1, inefficient units have the objective function above 1. As it is usual to interpret inefficiency as a percentage, the inverted value of the indicators are used for the efficiency description.

2. Brief Literature Review

As mentioned above, it is not so easy to measure the tourism potential. Several methods and principles were applied: Beciu and Hontus (2014) measured the potential of tourism destinations by using the indicators of tourist traffic. Rufaidah (2016) used 4 different indexes (Index of Global Tourist Demand Change, Index of Domestic and Foreign Demand Variation in Time, Indicator of Total Accommodation Capacity Evolution, Index of Global Tourist Demand Distribution) to measure destination potentials in West Java, Indonesia. The study made by Dupeyras and MacCallum (2013) suggest several core indicators for measurement of the tourism potential, including not only the economic ones but also the number of overnight stays or natural, cultural and creative resources. DEA models were used by Fuchs (2004) for the efficiency measures for a benchmarking group comprising a total of 21 Tyrolean destination units.

3. Purpose

One of the basic assumptions of tourism development is the balance of the country. Tourism develops when there are natural, cultural or historical monuments and where as yet there has been no disruption of the balance between the elements of the environment. (Jurigová, Lencséssová, 2016)

Tourism is without a doubt a significant industry, helping many economies in many states grow. Various studies have proven the significance of tourism in today's economy. Firstly, its economic value is regularly measured by the indicator of economic performance known as gross domestic product (GDP). The direct contribution of Travel & Tourism to GDP was 3.4% of total GDP in 2014 and is forecasted to grow in the period 2015-2025 by 2.8% per year. (Tučková, Kuncová, 2016)

The tourism potential components can be considered as follows:

- the potential of the natural components of the landscape (Bína, 2010),
- the potential of anthropogenic landscape components (Chalupa et al., 2016),
- the potential of infrastructure, especially accommodation and catering services and transport accessibility (Czech Statistical Office, 2017),

Tourism prerequisites could be also represented a set of natural and anthropogenic aspects, including their multi-level links, which create the prerequisites for the realization of tourism.

According to Mariot (1983), it can be divided into localization, realization and selection based. Three areas are crucial:

- the natural potential of tourism,
- tourism cultural potential,
- tourism infrastructure potential.

On the basis of this classification, it can be deduced that the potential of tourism includes within itself the set of spatial potentials of the various components of nature. Natural potential is therefore a complex combination of different influential geo-factors, such as geographic location, terrain morphology, climatic and hydrological conditions and vegetation. Tourist cultural potential, on one hand, is man-made with his activities and on the other hand, by the built anthropogenic environment he/she uses (the human component of the geosphere). It includes, for example, culture, tradition, religion, language of the area, specific way of production, transport and land use, but also urban and village buildings in various vertical and horizontal forms as well as the building materials used. Those which serve, for example, as institutions of culture, education, or tourism. Tourism infrastructure with its quantitative and qualitative aspects is an important prerequisite for the use of tourist natural and cultural potential, such as catering, transport, or sports and recreational opportunities. The tourist potential with its components (natural potential, tourism cultural potential and tourism infrastructure potential) is dynamically and constantly changing. The different phases of development of a tourism receiver area show a very close connection to the capacity of hotels, accommodations, tourist traffic of the hotels and the most important tourist traffic and utilisation indexes. (Attila, 2016)

Our comparison is aimed at the Vysocina region as one of the 14 regions in the Czech Republic. This region lies in the center of the Czech Republic between Bohemia and Moravia and its main region city is Jihlava (Fig.2).



Fig. 2 Czech Republic and the Vysocina region (in blue).

Source: cestovatelskyraj.cz

Vysocina region is considered to be mainly connected with agriculture and industry. The unemployment rate is usually below the republic average (in October 2017 it was 3.27% and the republic average was 3.6% - Czech Statistical Office, 2017) but it differs from the districts inside the region. The highest unemployment rate is in the Trebic district. The average wages, however, are lower than in other regions. The regional disparities can be seen especially in the socio-economic indicators. If we take into account the GDP per capita and unemployment rate we can see that there are also big differences between the centers of the region and in the municipalities. Those which lie far from the industrial centers or from the highways have lower GDP and also higher unemployment (Kuncová, Sekničková, 2013).

In our analysis of the tourism potential in the Vysocina region we decided to compare selected municipalities inside this region. As there are only 5 districts in Vysocina region it is not enough for the DEA model. It is not possible to obtain the relevant data for all 704 municipalities, so we analyzed the municipalities with extended competence referred to as ORO in Czech (15 in Vysocina region). These municipalities lie between the NUTS IV (LAU 1) – districts (5 in Vysocina region), and NUTS V (LAU 2) – municipalities (704 in Vysocina region) – Fig. 3.



Fig. 3 District and municipalities with extended competences (ORP's) in Vysocina region.

Source: Czech Statistical Office, 2017

For the DEA model it is necessary to define inputs and outputs. Inputs should characterize the important sources of the area that influence (usually in a positive way) the outputs. In the model two inputs and two outputs were used.

First input is connected with the number of monuments in the OPR area. Vysocina region is famous especially because of 3 UNESCO monuments (it is the highest number in comparison with other Czech regions) – these are the historical centre of Telc, the Pilgrimage Church of St. John of Nepomuk at Zelena Hora near Zdar nad Sazavou and the Jewish Ghetto combined with the St. Prokopus Basilica in Trebic (Kraj Vysočina, 2017). There are also other interesting and famous historical buildings and places – Fig. 4. The input in the first model covered all these monuments but as UNESCO monuments are more significant and attractive for the visitors than the others, we decided to change this input for the second model into monuments utility instead of the number of monuments. The monuments utility was calculated via WSA (Weighted Sum Approach) method (also called WSM – Weighted Sum Method - for details see Triantaphyllou (2000)), where the weights for each type of monuments were set according to our previous research defining the importance (points) for each monument type (Vojáčková et al., 2016) – Table 1.

Table 1. Historical monuments' weights calculation.

Criterion (monuments)	points	weight
UNESCO	73.82	62.09%
MPR	20.82	17.51%
MPZ	3.33	2.80%
VPR	13.76	11.57%
VPZ	3.98	3.35%
NKP	3.18	2.67%

Source: Vojáčková et al., 2016, own calculations



Fig. 4 Cultural monuments in Vysočina region (NKP=national historic landmark; MPR=urban conservation area; MPZ=urban conservation zone; VPR=village conservation area; VPZ=village conservation zone).

Source: Kraj Vysočina, 2017

Table 2. Data for ORP in Vysočina region (inputs are in red, outputs in blue).

ORP	MONUM. utility	MONUM. (number)	ACCOMODATION (number)	NIGHTS domestic	NIGHTS foreign
Bystřice nad Pernštejnem	0.033	1	21	42446	4335
Havlíčkův Brod	0.237	8	31	67715	10037
Humpolec	0.044	1	27	41196	8257
Chotěboř	0.009	1	23	44230	6168
Jihlava	0.275	7	45	95015	31236
Moravské Budějovice	0.032	3	12	10725	1727
Náměšť nad Oslavou	0.066	3	16	27873	1631
Nové Město na Moravě	0.045	4	66	236192	13468
Pacov	0.043	2	8	9691	593
Pelhřimov	0.169	3	50	74888	30841

Světlá nad Sázavou	0.053	2	18	59890	3715
Telč	0.823	5	29	20755	10528
Třebíč	0.804	7	41	104097	13225
Velké Meziříčí	0.018	2	20	42429	6758
Žďár nad Sázavou	0.664	2	45	86294	14366

Source: Czech Statistical Office, 2017; own calculations

The second input covers all types of accommodation that are available within the given municipality area. Two outputs are aimed at the overnight domestic and foreign stays that are usually used as quantitative non-monetary characteristics of compared units (Fuchs, 2004). All inputs and outputs data are in Table 2.

Results

The comparison of municipalities with extended competences in Vysocina region was made according to the 2 inputs and 2 outputs through DEA models to describe the potential of tourism of these destinations. Finally, 4 DEA models were tried to see the influence of the selected inputs and outputs on the results (Table 3). For all of them the BCC output oriented models were used according to the selected inputs and outputs, the outputs could be changed a little easier than the inputs. Model BCC was used as variable returns to scale were expected.

Table 3. Selected inputs and outputs in models

Model number	MONUM. utility	MONUM. (number)	ACCOMODATION (number)	NIGHTS domestic	NIGHTS foreign
1	X			X	X
2			X	X	X
3	X		X	X	X
4		X	X	X	X

Table 4 summarizes all results. The numbers inside show the score of the DEA model for each ORP in the given model. The score 1 means that the ORP lies on the efficient frontier (so it can be seen as the best one according to the given inputs and outputs). Score lower than 1 shows the percentage of efficiency for the given unit. According to all models, only 2 ORP (Jihlava and Nové Město na Moravě) are efficient. Jihlava is the capital of the region and also the biggest town so it was expected to be as efficient. Nové Město na Moravě has fewer monuments (and its utility is small) but it has the biggest number of different types of accommodation and also very high number of overnight stays. This fact is probably influenced not only by the monuments but mainly by the famous cross-country skiing area that hosts several competitions, European and World Cups. Two other ORP's were efficient in 3 models (Pacov, Světlá nad Sázavou). Pacov has the smallest number of accommodation and only 2 important monuments. When monuments utility is taken into account (model 1), this ORP is very inefficient – this is mainly due to the fact that other ORP's (like Nové Město na Moravě or Humpolec) have similar monuments utility but a higher number of overnight stays. However, if we take into account accommodation only or the number of monuments (both small) and number of overnight stays (again small), this unit seems to be efficient as the share of overnight stays per type of accommodation and 1 monument, it ranks much higher and is considered to be among the best ones. For Světlá nad Sázavou the reasons for its good position are similar.

Other two municipalities were efficient in two models (model 1 and 3) where the monuments utility was an important input. These are Telč and Třebíč – both have UNESCO monuments in the area and the reason for the high monument utility. But when the number of monuments or the number of accommodation were used as inputs, these ORP's were inefficient, especially (and surprisingly) Telč. Despite the UNESCO monument, the number of overnight stays were lower compared to the number of accommodation or number of monuments than in the other ORP's. It might mean that the tourist goes to this municipality for a one-day trip without an overnight stay (therefore, affecting the low number of overnight stays) or the number of accommodation is too high for the given number of overnight stays.

The low number of overnight stays in Telč is a very interesting finding because Telč, together with Prague and Český Krumlov has the three most important UNESCO monuments in the Czech Republic, listed on the UNESCO list as the first one in 1992. To explain the situation in Telč, it is possible to mention the following reasons. All the sights of Telč including the castle are concentrated on a relatively small area of the square. A visit to the square and castle usually lasts about an hour. Telč offers quite a few other attractions that would make tourists to spend the night. The second reason for the low number of overnight stays is a large number of private lodgings (it is estimated that they contribute to accommodation up to 40% and their services are not captured in CZSO statistics).

Table 4. Results of DEA BCC-O models for ORP in Vysocina region

ORP (Municipalities with extended competences)	1.model monuments utility	2.model accomodation	3.model mon.utility + accomodation	4.model number of monuments + accomodation
Bystřice nad Pernštejnem	0.224037	0.659402	0.659402	1
Havlíčkův Brod	0.446825	0.768258	0.796784	0.930435
Humpolec	0.311194	0.607116	0.607116	1
Chotěboř	0.271671	0.680074	0.680074	1
Jihlava	1	1	1	1
Moravské Budějovice	0.071232	0.502012	0.502012	0.502012
Náměšť nad Oslavou	0.12019	0.559135	0.576618	0.884892
Nové Město na Moravě	1	1	1	1
Pacov	0.041966	1	1	1
Pelhřimov	0.987354	0.987354	0.987354	1
Světlá nad Sázavou	0.26051	1	1	1
Telč	1	0.585378	1	0.654082
Třebíč	1	0.844662	1	0.844662
Velké Meziříčí	0.280083	0.84065	0.84065	0.97828
Žďár nad Sázavou	0.823748	0.689166	0.823748	1

According to the 4. model there are next 5 ORP's that were efficient: Bystřice nad Pernštejnem, Humpolec, Chotěboř, Pelhřimov and Žďár nad Sázavou. The last one (Žďár na d Sázavou) has very high monuments utility as the third UNESCO monument in Vysocina region lies here. But, when only accommodation is taken into account, this ORP was not efficient as it had small number of overnight stays compared to number of accommodation. Three municipalities of these had very low monuments utility but when we combine the number of monuments and number of accommodation as inputs, they were efficient. Pelhřimov seems to be a special one among them – it has very high efficiency in all models as it has the second highest number of accommodation and the other characteristics were above average. The worst ORP from the cultural and an accommodation potential perspective was the municipality of Moravské Budějovice. It has an average number of monuments but a very low number of accommodation and the number of overnights stays per type of accommodation were the second lowest (only Telč was the worst in this comparison but it has higher number of monuments). This ORP lies on the border of the Region and also on the border of the Czech Republic far from highways and the monuments are probably less attractive than the other ones in Vysocina Region.

Conclusions

In conclusion, there is great potential of natural components in the ORP Jihlava and the related infrastructure for tourism which was confirmed during the research. ORP Jihlava should take advantage of this opportunity as there are more and more people who are attracted by nature, more so than exclusive holidays with long journeys and big crowds. The development of domestic tourism is also supported by the situation today where people or more afraid of international travel and realize that there are many beautiful places in Vysočina that offer beautiful holiday destinations. This is especially true for summer tourism when the potential of nature is sufficient to attract tourists from all over the Czech Republic and from neighbouring countries. UNESCO world heritage sites is a good example of how to increase attractiveness of the area. In nearby surrounding areas of Jihlava,

we can find three UNESCO sites which greatly increase the number of visitors to the area. The entire Vysočina region can be a desirable form of tourism for those who prefer quiet and ecologically clean tourism attractions which are prerequisite for most of the region. On the contrary, some tourists can be discouraged, in some places, by an unattractive, agriculturally exploited rural landscape and, in some cases even by insufficiently developed basic and also accompanying tourism infrastructure. As the potential of the area is, in terms of tourism, enormous, we expect great use of this area for tourism in the future.

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