“Comparative analysis of the accommodation capacities in selected European tourist destinations”

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COMPARATIVE ANALYSIS OF THE ACCOMMODATION CAPACITIES IN SELECTED EUROPEAN TOURIST DESTINATIONS

Abstract

This study aims to analyze the business view concerning the using the accommodation capacities in some central European countries, i.e. Austria, the Czech Republic and Slovakia in the NUTS-2 regional scope. The special attention is paid to Spain. The research is based on annual post-global economic crisis data. The authors apply a specific partial least squares (PLS) variant of multivariate methods, which relates many fundamental and derived tourism variables due to particular attention to using a weighting procedure. The authors determined that in order to encompass the territory predetermination for the best fit the changed conditions, the majority of significant cities have very good dynamics in capacity parameters and overnights for increasing the offers being greatly supplied by the annual changing number of visitors. However, Spain is substantially different from the other regions analyzed, forming ultimate conditions for mutual comparison. Moreover, the tracks of turning visitors into capital or significant cities, especially associated with the close natural attractions, are substantiated. The tourist's resource potential specific only to the target region as well as relevant additional potential origins are examined on the sample of countries. Covering tourism as the world's leading industry directly connected to accommodation tasks and a unique period examined, the results of this study can be used to formulate policy guidelines as well as to solve the tasks of attracting tourism and promote supply.

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INTRODUCTION

Currently, tourism is a versatile and rapidly expanding economic sector based predominantly on the service area and workforce and has fundamental cultural, social, and environmental connections. The vast number of previous studies confirms that tourism affects the economic growth positively, with significant indirect and induced effect (see, e.g., Neves & Maças, 2008; Li, Ma, & Yu, 2019). The less discussed indirect effect of tourism exists in areas like catering facilities, construction, aircraft and necessary infrastructure, handicrafts, marketing agencies and accounting services, with a substantial additive role in the economic development of an individual region. The number of worldwide, non-resident arrivals has risen from 25 million in 1950 and 674 million in 2000 to approximately 1.2 billion in 2015 (UNWTO, 2018). Considering the revenue from international tourism, arrivals, and other fundamental parameters, Europe is the fastest growing and leading territory in absolute terms, with Spain and France as some of the top destinations particularly joined with the highest investment in tourism (Obadić & Pehar, 2016). Traditionally, three most popular destinations among the EU countries for inter-

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national visitors are Spain, Italy, and France, followed by others such as Greece and Croatia. Spain, as one of the Mediterranean countries, combines all determinants of extensive tourism with longstanding popularity as a tourist destination. In actual comparison to others, based on the tourism-satellite accounts released by the individual national statistical offices, the average tourist expenditure per capita in Austria and Spain have been some of the highest in Europe. Despite tourism's significant workforce potential, the main issue lies in its seasonal nature, especially involving the problems of recruiting full-time, year-round staff among coastal regions. Although the effect of seasonal tourism exists, this can play a substitutional role in some cases, like mountain destinations, to reduce poverty and maintain population proportions, decreasing rural exodus. In Spain, the total contribution of tourism activities to GDP was 14.2% in 2016 (WTTC, 2019), and this share has not risen in more recent years in comparison to Central European countries. General forecasts for the increasing tourist intensity are moreover directed to Central Europe, thus forming the background to improve economic activity and employment (Eurostat Statistics Explained, 2018).

The selected countries, based on NUTS2 regional scope, were analyzed for their differing histories, generally distinctive behavior and location, specifically Austria, the Czech Republic, and Slovakia vs. mainland Spain. The approaches of PLS (more specifically titled intercorrelations analysis, canonical covariance or robust canonical analysis), PLS variant of linear discriminant technique and principal component analysis were used (see, e.g., the works of Malec (2013) or Wegelin (2000)). From the large extent of data, the post-global economic crisis period is selected due to superior properties of the outputs and results interpretation, covering relative short lapse of time after economic shift. The intention is to analyze the accommodation capacity and its particular connection with overnights (nights spent) and derived indicators such as length of stay or non-residents share.

1. LITERATURE REVIEW

Over the last sixty years, tourism has undergone substantial evolution and diversification. Current trends of tourism promote the unique characteristics, assets of each region as the smart specialization as well as highlight their competitiveness (EC, 2012; Lopes, Ferreira, & Farinha, 2018). For this reason, the regional level is substantial to analyze individual economic accounts (Spilanis, Le Tellier, & Vayanni, 2012). The regions considered do not equally succeed in tourism (WTTC, 2019; Eurostat Statistics Explained, 2018), presenting undoubtedly great differences in various economic parameters. For accommodation input data, the range of standard multivariate statistical methods with solutions by generalized eigenvalue problem is no longer appropriate in cases of high-dimensional settings (in case of rank-deficiency) or when the variables are highly correlated within sets (Vinzi & Russolillo, 2013; Langhamrová & Bílková, 2011). While the occupancy rate of accommodation establishments dynamics and other economic issues as changes in the length of stay are the usual research topics (see, e.g., Xianrong & Jigang, 2019; Popa, 2014) together with investigation of living conditions, the approach used in this study is innovative, specifically considering the weights incorporation and PLS variants applied on the input data (Malec, 2013; Wegelin, 2000; Seber, 2004). Linear discriminant analysis and its corresponding theoretical background are presented in the works of Zhu and Martinez (2006, 2008) or Barker and Rayens (2003). Moreover, prior information can be put as weights for individual variables based on covariance matrices input, bringing together dimensionality reduction and external information to reach a consistent representation of the original data (De Bie & De Moor, 2003). There is a possibility to set weights only based on statistical methods (Adler, Friedman, & Sinuany-Stern, 2002), but there also exists an alternative to prioritize components that are considered as more influential by expert evaluation, before the analysis. Such data pre-processing reflects fundamental courses and considers a wide range of policy priorities. For instance, Verboon, Van der Lans, and Heiser (1991) introduce loss weights in their algorithm, which fits four different multivariate models. The weights are used in the EU economic sentiment indicators (EC, 2007) and OECD composite leading indicators (Gyomai & Guedette,

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2012) as other examples that implicitly suppress the significance of more irregular series in cycles of composite indicators or use prior smoothing in time series. Westhead, Wright, and Ucbasaran (2004) studied the exporting propensity and firm operation using a weighted group of performance proxies such as sales revenue growth, return of equity, and both gross and net profits by multivariate regression for cross-sectional data. Percival (2004), in her dissertation work dealing with the realization of advanced manufacturing technologies, implements penalties in one solution of factor analysis. The other type of penalties can be defined considering, e.g., the temporal weights for individual observations. The outcomes are particularly significant, covering also small and medium-sized firms as discussed in the work of Ključnikov, Belás, Kozubíková, and Paseková (2016). In the connection to a unique period examined, this leads to important results and their interpretation.

2. DATA AND METHODS

2.1. Data used

The set of annual indicators describing the Central European and Spanish regional accommodation establishments was gathered from the European Statistical Office (Eurostat database, 2019), with other information sources such as Helgi library (2019) and national statistical offices. Resulting indicators are especially capacities of the collective accommodation establishments, occupancy rate of bed places, number of overnights, share of non-residents on nights spent, and arrivals during the period 2009–2015. This period is considered a source of information having its value for great economic changes starting future economic processes and development. The unique data characteristics are supported, especially by the Great Recession until 2012 and specifically the Spanish financial crisis up to 2014. Along with some economic indicators, these are the fundamental measures of the efficiency of tourism activities in the targeted regions (Spilanis, Le Tellier, & Vayanni, 2012). Due to the complex evaluation of capacity parameters over the years, as well as its significance, the "Hotels and similar accommodation" sector was selected from all provided by the Eurostat database. The parameter occupancy rate of bed places is standardly computed as a ratio of the total number of overnights and the number of bed places on offer (with no extra beds), taking into account the number of days with strict exception net of seasonal closures and other temporary closures. For this reason, the capacity of accommodation establishments in this study was computed as theoretically full-year possible bed capacity related to the real occupancy rate for the reference year 2014 in all the corresponding regions. Although the changes in methodology used between 2011 and 2012 considering the Regulation (EC) No. 692/2011 should have been small, especially in the "Hotels and similar accommodation" sector, breaks were observed at capacity parameters in the Czech Republic and Slovakia. Therefore, data for the differences in capacities of accommodation establishments were neglected between 2011 and 2012 in all the countries examined.

There are used Eurostat NUTS2 abbreviations described in Regulation (EC) No 1059/2003 within this study, beginning with a two-letter code corresponding to the country analogical to the ISO 3166-1 alpha-2 system with the subdivision referred to as two numerals. However, the scopes of data used also incorporate the countries of one NUTS1 region or cases with NUTS2 corresponding to the capital city or the region encompassed the capital. The summary of NUTS0 and NUTS1 regions codes in studied countries are as follows for Austria: AT0 – Austria, AT1 – East Austria, AT2 – South Austria, and AT3 – West Austria, for the Czech Republic: CZ0 – Czech Republic, for Slovakia: SK0 – Slovakia and for mainland Spain: ES0 – Spain, ES1 – North West, ES2 – North East, ES3 – Community of Madrid, ES4 – Centre, ES5 – East, and ES6 – South. The individual NUTS2 regions' abbreviations are mentioned to fit the content of the study. In the following, Central European countries are ordered and arranged according to their code initials.

2.2. Methods

The PLS variant of canonical correlation analysis is used within this study (Wegelin, 2000; Malec, 2013). The discriminant analysis is applied in the definition close to the works of Zhu and Martinez (2006, 2008) for identity within-sets covariance matrices covered as a special case of the method developed by Barker and Rayens (2003). Moreover, to reveal an average linear trend in data, principal component analysis is extended by incorporating the time variable directly into analysis. The MATLAB 7.1 (Mathworks, Natick, MA, USA) software platform is used, considering especially the singular and spectral decompositions of targeted matrices. The quadratic forms in optimization tasks describing the degrees of some measures of interrelations (or dissimilarity) are studied on the description profiles in the time series. In practical situations, the variables are often standardized excepting specific cases (see, e.g., Bílková, 2015). But due to weights incorporation, the non-standardized form of variables is used herein (except for principal component analysis), providing roughly more significant variables with a greater proportion of initial variances (Assaker, Hallak, Vinzi, & O'Connor, 2013; Wegelin, 2000). There is introduced the penalizing technique in PLS as the variables on accommodation capacity are handled in the way as being weighted to prioritize less significant tourism regions operated the between-sets covariance matrices. This is introduced to solve an economic task whether the dynamics of the processes over the years dealing with the capacity of accommodation establishments are typical for only overnights of individual regions within the country or vice versa. One boundary of the potential functional relation across PLS is encompassed with constraints by additional information, such as large regions with low arrivals being preferred in the analysis. Malec and Janovský (2019) describe the relationship between multivariate methods. Similar to the ridge regression cost function, the weighted approach operates on the term constraining the eigenvectors. In this study, the elements of such eigenvectors are scaled to a unit norm, a posteriori.

The data matrices X and Y are considered in the centered form by individual columns (variables) to define the sample between-sets covariance matrix $C_{XY} = X'Y/(n-1)$, where n is the number of observations and the standard matrix between sets B. Both these matrices are symmetric and positive semidefinite. Xu and Yv are the corresponding linear combinations (summarily called latent variables) defined for maximization in the specific task. W_X is the diagonal matrix with non-negative elements on the main diagonal. The PLS multivariate approach, according to Vinzi and Russolillo (2013), De Bie and De Moor (2003), and Wegelin (2000), is based on the solution of the following optimization task:

$$\max_{u\neq 0, v\neq 0} \frac{u'C_{XY}v}{(u'u)^{1/2}(v'v)^{1/2}}. \qquad (1)$$

Based on the preceding algorithm, the PLS variant of linear discriminant analysis as a special case of, e.g., Barker and Rayens (2003) techniques or given by Zhu and Martinez (2006, 2008) definition, is formulated as follows:

$$\max_{u\neq 0} \frac{u'Bu}{u'u}. \qquad (2)$$

Using the Lagrange method, the solution of expressions (1) and (2) can be transformed into a generalized task on the symmetric standard eigenvalue problem (solved by spectral or singular decomposition theories) with rank $r = r(C_{XY})$, resp. $r = r(B)$, equal to the number of strictly positive eigenvalues λ_i, $i = 1, 2, \dots, r$ arranged to the non-decreasing sequence. The solution of (1) and (2) then has forms (λ_i, u_i, v_i) and (λ_i, u_i), respectively. The eigenvectors u_i and v_i are scaled to a unit norm and further satisfy (Seber, 2004, p. 258) that, in the case of PLS, every vector (u_i, v_i) solves (1) and the latent variables are not correlated between X and Y sets for $j < i$, resp. every vector u_i solves (2) and holds $u_i'Bu_j = 0$ for $j < i$.

An alternative definition for PLS is introduced in this study as a boundary point of the functional relation (see Bunse-Gerstner, Byers, Mehrmann, & Nichols, 1991). In the numerator of expression (1), a simple modified form of an input data is used in the way $X_W = XW_X^{-1/2}$, where W_X considers the weighting elements. For matrix X_W holds that it has a Frobenius norm as the original one. The exponent $-1/2$ is set due to a straightforward connection with regularization approaches in constraints of the canonical correlation analysis. But from the reason of substitution in symmetric eigenvalue problem, the eigenvector of X differs by powered multiple of penalizing weights. Here, the formula without matrix W_X incorporation corresponds to the standard version PLS, while the other case is equal to its weighted counterpart.

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3. RESULTS

In PLS, of special interest is the comparison of the same region relations (diagonal elements of between-sets covariance matrices) compared to the dependencies of distant locations (off-diagonal elements) measured by coefficients of a linear combination metric. First, the descriptive statistics, principal component analysis with inserting linear trend, and PLS variant of the discriminant analysis, are processed. The elements of eigenvectors are generally considered significant in a magnitude larger than 0.3. If one pays attention to the results from Table 1, it can be seen that the most visited regions in Austria were Tyrol, Styria, Salzburg, and Lower Austria at the greatest variability of Vienna annual data on capacities. Vienna, as well as Salzburg, is the most increasing for the capacities while Upper Austria and Tyrol dropped during our time interval (variance explained on first principal component 34.4% and magnitude of time coefficient 0.446). There the greatest distances were recognized between capacities of accommodation establishments and overnights in Styria, Tyrol, and Lower Austria with corresponding significance revealed by eigenvalue of the first latent variable 3.59×10^{16}. The Czech Republic and Slovak tourism was generally less pronounced. In the Czech Republic, the highest capacity was identified in Prague and then the Northeast, where the Northeast region also proved the greatest variability. The capacities of individual accommodation establishments grew on average only in Prague during the time interval considered, while the others dropped, except for the Southeast, which stagnated (variance explained 40.1% and time coefficient 0.312). The greatest distances between capacity offered and overnights were also detected in the Northeast and Prague with eigenvalue 1.965×10^{15}. In Slovakia, the greatest capacities were found in Central Slovakia, with simultaneous large variability in the Bratislava Region. All regions increased in capacities with the exception of Central Slovakia, which stagnated (variance explained 41.7% and time coefficient 0.532). The greatest distances between capacity offered and nights spent was also identified in Central Slovakia with corresponding eigenvalue 3.60×10^{14}.

Table 1. Capacity for the selected Central European countries on descriptive statistics, principal component analysis, and discriminant results

Source: Authors.

Region	NUTS2 abbreviation	Arithmetic mean $\times10^7$	Standard deviation $\times10^6$	Principal coefficient	Discriminant coefficient
Austria					
Burgenland	AT11	2.852	0.347	–0.157	0.262
Lower Austria	AT12	4.672	0.860	–0.119	0.418
Vienna	AT13	2.598	2.001	0.449	0.147
Carinthia	AT21	3.913	0.690	–0.053	0.320
Styria	AT22	5.677	0.428	0.041	0.490
Upper Austria	AT31	3.284	0.527	–0.428	0.281
Salzburg	AT32	4.850	0.416	0.429	0.330
Tyrol	AT33	7.276	0.300	–0.416	0.442
Vorarlberg	AT34	1.476	0.145	0.127	0.097
Czech Republic					
Prague	CZ01	2.502	0.381	0.374	0.511
Central Bohemia	CZ02	0.572	0.268	–0.425	0.186
Southwest	CZ03	1.061	0.367	–0.409	0.342
Northwest	CZ04	1.110	0.321	–0.275	0.297
Northeast	CZ05	1.598	0.594	–0.390	0.512
Southeast	CZ06	1.132	0.250	–0.099	0.380
Central Moravia	CZ07	0.785	0.165	–0.298	0.253
Moravian–Silesian Region	CZ08	0.511	0.138	–0.297	0.171
Slovakia					
Bratislava Region	SK01	0.521	0.359	0.507	0.379
Western Slovakia	SK02	0.662	0.214	0.387	0.489
Central Slovakia	SK03	0.854	0.219	0.059	0.615
Eastern Slovakia	SK04	0.686	0.073	0.554	0.490

Table 2. Capacity for mainland Spain on descriptive statistics, principal component analysis, and discriminant results

Source: Authors.

Region	NUTS2 abbreviation	Arithmetic mean $\times 10^7$	Standard deviation $\times 10^6$	Principal coefficient	Discriminant coefficient
Galicia	ES11	2.242	0.584	0.276	0.213
Asturias	ES12	0.842	0.239	0.250	0.076
Cantabria	ES13	0.593	0.030	–0.139	0.050
Basque Community	ES21	0.968	0.585	0.284	0.072
Navarre	ES22	0.448	0.252	0.248	0.042
La Rioja	ES23	0.215	0.020	0.244	0.017
Aragon	ES24	1.371	0.134	0.230	0.133
Madrid	ES30	3.776	1.047	0.286	0.264
Castile-Leon	ES41	2.169	0.437	0.288	0.207
Castile-La Mancha	ES42	1.239	0.295	0.269	0.128
Extremadura	ES43	0.712	0.414	0.259	0.071
Catalonia	ES51	8.548	2.754	0.275	0.530
Valencian Community	ES52	4.417	0.343	0.253	0.275
Andalusia	ES61	8.965	2.657	0.268	0.655
Region of Murcia	ES62	0.632	0.045	0.066	0.051

In Spain (Table 2), the regions with the largest capacities were Andalusia and Catalonia, and then the Valencian Community, Madrid, Galicia, and Castile-Leon. The most variable were also Catalonia and Andalusia. All regions growth on average, except for two of them as the Region of Murcia stagnated and Cantabria even slightly decreased (variance explained 46.8% and time coefficient 0.260). The most differing regions between capacities and overnights were also Andalusia and Catalonia and then the Valencian Community, Madrid, Galicia, and Castille-Leon with corresponding eigenvalue 1.776×10^{16}.

The process of centroids studied (see Figure 1), consisting of Austria, the Czech Republic, and Spain, reveals increasing occupancy of bed places for more recent years compared to the opposite evolution in Slovakia. While the Czech Republic continuously decreases for the distances of centroids in the period 2009–2015, Austria and Spain demonstrate the maximum value as well as the minimum within the time interval, and Slovakia reveals only a minimum registered in 2013, excluding boundary points. On the other hand, the magnitude of differences marks the lowest centroid distances at Slovakia, evidently due to the total volume of tourism.

In the following, the relations between capacity and nights spent are studied. The shifts in coefficients are expressed as a unit norm of differences between the weighted and original results, where the stars are used to distinguish the tourism significance of individual region as *** for the most outstanding, ** for moderate ones and * for less significant, considering our specific weight incorporation. It can be seen from the coefficients of PLS describing the similarity of accommodation capacities and overnights profiles (Table 3) that for the same regions, only Vienna is significant and positively related in Austria, where no other relations of the regions occurred. The corresponding eigenvalue expressing the significance of first latent variable has a magnitude of 8.93×10^{24}. This situation fits the property as Vienna generally has rapid adaptation to new conditions occurring in the dynamics of process. The most significant tourist regions based on our specific definition of weights are Tyrol, Vienna and Salzburg. It seems that Tyrol, being originally opposite related between capacity and nights spent, decreases only slightly in the significance of capacity parameter with the weights incorporation (the corresponding eigenvalue 4.56×10^{24}). Because the only exceptional congruent sign of coefficients in nights spent to capacity and corresponding turns due to weights incorporation, it seems the Tyrol may not compensate successfully from the other regions in the dynamics of nights spent. Vienna decreases in relations which situation fits a standard pattern for nights spent being typical for only the specific re-

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Source: Authors.

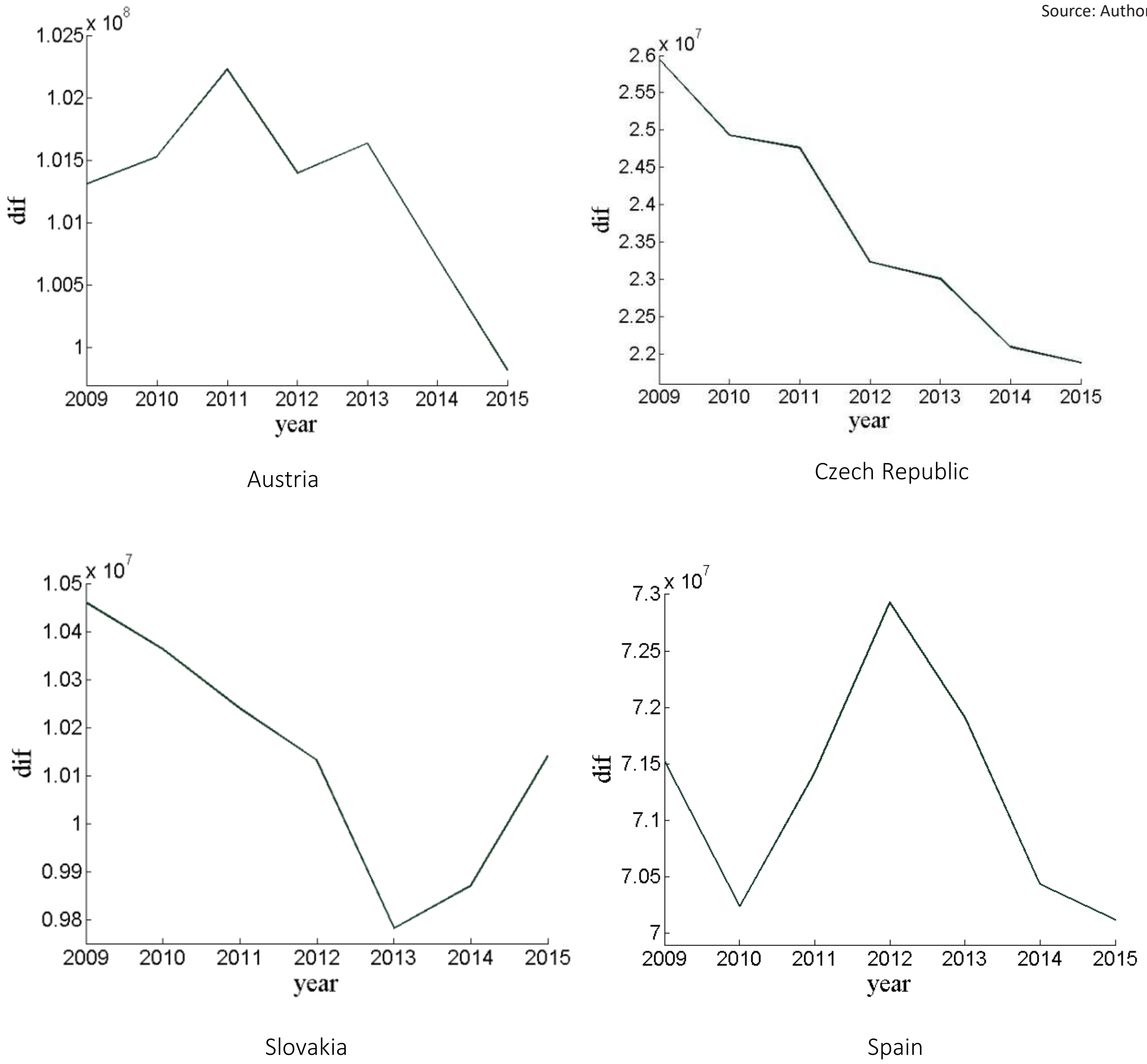

Figure 1. Differences of centroids in PLS variant of linear discriminant analysis

gion. The shift of Salzburg is minor but even positive in both the endpoints. Salzburg is probably an important region despite its artificial reduction of significance in accommodation capacity by incorporating weights due to the process of the analysis. There is also an evident increase of Burgenland in close positive connection to the dynamics of both parameters, although different to the others. Interestingly, the biggest turn to the opposite relationship between capacities and overnights was revealed in Upper Austria.

For the Czech Republic, only Prague is significantly and positively related between sets. Generally, the capacities of accommodation establishments in Prague, as opposed to the Northeast and Southwest, are greatly and positively related only to Prague overnights. Prague overnights are supplied here by decreasing capacities in the Northeast and Southwest. It should be noted that the leading eigenvalue has a magnitude 0.95×10^{24}. The most important tourist region, Prague, also reveals the greatest decrease in capacity by incorporating the weights (eigenvalue 1.24×10^{24}). In Slovakia, the Bratislava Region is only significantly and positively related between capacities and nights spent. The eigenvalue corresponding to the first latent variable has a magnitude of 1.55×10^{22}. Bratislava Region from capacities is also positively related to Central and Eastern Slovakia in overnights. According to our definition of weights, all of the regions are relatively significant with the predominance of the Bratislava Region, where the standard decrease of capacity parameter was de-

Table 3. Selected Central European countries for PLS coefficients of accommodation capacity vs. overnights and weights

Source: Authors.

Region	NUTS2 abbreviation	Accommodation capacity		Overnights	
		Coefficient	Shift	Coefficient	Shift
Austria					
Burgenland	AT11	–0.049	–0.399	–0.007	–0.229
Lower Austria	AT12	–0.029	–0.110*	0.045	0.418
Vienna	AT13	0.939	–0.341**	0.895	–0.094
Carinthia	AT21	0.019	0.068*	–0.104	0.653
Styria	AT22	0.034	0.089*	0.120	0.103
Upper Austria	AT31	–0.240	–0.823*	0.061	0.466
Salzburg	AT32	0.196	0.055**	0.296	0.123
Tyrol	AT33	–0.131	0.091***	0.274	0.246
Vorarlberg	AT34	0.025	0.104*	0.075	–0.186
Czech Republic					
Prague	CZ01	0.362	–0.851***	0.874	0.174
Central Bohemia	CZ02	–0.211	–0.438*	0.088	–0.075
Southwest	CZ03	–0.464	–0.258*	0.146	–0.523
Northwest	CZ04	0.132	0.079*	0.244	0.368
Northeast	CZ05	–0.724	0.055*	0.153	–0.692
Southeast	CZ06	0.251	0.015*	0.298	–0.018
Central Moravia	CZ07	0.069	0.085*	0.168	–0.245
Moravian-Silesian Region	CZ08	–0.006	–0.015*	0.081	–0.130
Slovakia					
Bratislava Region	SK01	0.952	–0.347***	0.679	–0.091
Western Slovakia	SK02	0.243	0.871**	0.271	0.791
Central Slovakia	SK03	–0.076	–0.096**	0.513	–0.545
Eastern Slovakia	SK04	0.170	0.336**	0.450	0.262

Note: ***tourism leading region, **intermediate significant region, *less significant region.

tected (eigenvalue 1.09×10^{22}). The greatest shift is identified in Western Slovakia toward the positive relations in both parameters. This corresponds to the situation of Western Slovakia fitting the dynamics caused by its increased significance using the weights incorporation.

In Spain, Catalonia and Andalusia are both mutually positively related through the similarity of profiles between accommodation capacity and overnights. The leading eigenvalue is of a magnitude 3.49×10^{26}. From the extent of all other coefficients, only Madrid is positively related to them considering the nights spent. Significant tourism regions are Catalonia, Madrid, and Andalusia, according to weights definition. The most significant one, Catalonia, reveals a decrease in the importance of the parameter accommodation capacity by incorporating the weights, but overnights significance increases (eigenvalue 3.00×10^{26}). It seems that overnights are not typical for this region as the coefficient magnitude increases in a great extent being rather related to other regions capacities in the dynamics of relations. On the other hand, Madrid reveals only a slight change in both parameters by incorporating weights. This region is well adapted to decrease in capacities of accommodation establishments. In Andalusia, the great decrease in the significance of overnights shift indicates specific visitors and in dynamics oriented to this region. Generally, the absolute values of turns are rather lower with outstanding extreme values in comparison to other countries. The greatest positive shifts in relations considering capacities of accommodation establishments are evaluated in Extremadura and the Basque Community with negligible change for overnights.

The final step is to evaluate the relationship between capacity and length of stay, as well as between capacity and non-resident share, using PLS. As the first two columns of coefficients in Table 5 are taken, in Austria, no significant relations are seen for the same regions, where Vienna's capacity is negatively related to Tyrol, Salzburg, Carinthia, Vorarlberg, and Styria in length of stay. The leading eigenvalue

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Table 4. Mainland Spain for PLS coefficients of accommodation capacity vs. overnights and weights

Source: Authors.

Region	NUTS2 abbreviation	Accommodation capacity		Overnights	
		Coefficient	Shift	Coefficient	Shift
Galicia	ES11	0.127	0.303*	–0.028	–0.293
Asturias	ES12	0.052	0.275	0.022	–0.068
Cantabria	ES13	–0.005	–0.035	–0.007	–0.066
Basque Community	ES21	0.130	0.450*	0.089	0.038
Navarre	ES22	0.039	0.322	0.028	0.004
La Rioja	ES23	0.003	0.034	0.007	–0.012
Aragon	ES24	0.024	0.097	0.017	–0.106
Madrid	ES30	0.252	0.023**	0.309	–0.067
Castile-Leon	ES41	0.102	0.239*	0.002	–0.185
Castile-La Mancha	ES42	0.055	0.273	–0.027	–0.090
Extremadura	ES43	0.070	0.458	0.006	0.015
Catalonia	ES51	0.683	–0.372***	0.773	0.520
Valencian Community	ES52	0.071	0.052*	0.208	–0.227
Andalusia	ES61	0.640	–0.176**	0.502	–0.723
Region of Murcia	ES62	–0.000	–0.002	0.006	–0.029

Note: ***tourism leading region, **intermediate significant region, *less significant region.

was 5.37×10^{11}. It seems that increased capacities in Vienna, possibly accompanied by a decrease in prices for accommodation, corresponds to visitors turning to the capital. On the other hand, non-resident share (last two columns in the table) has a straightforward positive relation to accommodation capacity for Vienna (eigenvalue 1.15×10^{11}). Here, the year-to-year increased values of capacity are substituted directly by non-resident visitors. Generally, Vienna, Lower Austria, and Carinthia's capacities are positively related to non-resident share only in Vienna, but opposite to Tyrol. It seems that Tyrol is the source of non-resident turned to other regions in cases of their increasing capacities. In the Czech Republic, the Northeast and Southwest are generally both positively related to accommodation capacity and length of stay. The eigenvalue corresponding to the first latent variable here is 4.07×10^{10}. For those regions, the shorter stay of visitors moreover accomplishes the decreased capacities. Generally, the Northeast and Southwest opposite, to Prague for capacities are positively related to the Northwest, Northeast, and Southwest for length of stay. Here, the Northwest, Northeast, and Southwest short length of stay supplies Prague visitors. Considering non-resident share, none of the same regions are significantly related to capacity (eigenvalue 1.21×10^{11}), although a similar pattern was revealed in length of stay parameter where, from the extent of regions, only the Northwest is significant for non-resident share. It seems that the non-residents from the Northwest turn to Prague due to the increasing capacities of accommodation establishments. In Slovakia, significant relations are not recognized for the same region between capacity and length of stay. The leading eigenvalue is 2.99×10^{9}. However, a negative relationship between the Bratislava Region for capacity and Central Slovakia for length of stay is apparent. It seems that increasing capacity in the Bratislava Region is substituted by decreasing length of stay in Central Slovakia. There is a very strong positive relation between capacity and non-resident share in the Bratislava Region (eigenvalue 1.83×10^{9}), where the increased capacities are supplied by non-resident visits to the same region, as well as substituted from Western and Central Slovakia.

For Spain, none of the same regions are related between capacity and length of stay. The eigenvalue corresponding to first latent variable is 4.29×10^{11}. But generally, Catalonia and Andalusia for capacity are negatively related to Galicia, Aragon and the Region of Murcia for length of stay. It seems both Catalonia and Andalusia at increasing capacities are supplied by decreasing length of stay in the other regions. Catalonia and Andalusia are both positively related between capacity and non-residents share (eigenvalue 1.40×10^{12}) where only those two regions are significant for the given parameter in Spain. Especially for such regions the increased capacities are substituted by non-residents.

Table 5. Selected Central European countries for PLS coefficients of capacity vs. length of stay and non-residents share

Source: Authors.

Region	NUTS2 abbreviation	Accommodation capacity	Length of stay	Accommodation capacity	Non–res. share
Austria					
Burgenland	AT11	0.050	0.248	–0.062	–0.010
Lower Austria	AT12	0.040	0.100	0.363	0.027
Vienna	AT13	–0.938	0.084	0.792	0.931
Carinthia	AT21	–0.012	0.425	0.353	–0.054
Styria	AT22	–0.022	0.323	0.017	0.040
Upper Austria	AT31	0.242	0.194	–0.264	0.077
Salzburg	AT32	–0.190	0.426	0.183	0.115
Tyrol	AT33	0.139	0.538	–0.092	–0.305
Vorarlberg	AT34	–0.030	0.358	0.036	–0.126
Czech Republic					
Prague	CZ01	–0.453	0.284	0.449	–0.012
Central Bohemia	CZ02	0.277	0.261	–0.262	0.006
Southwest	CZ03	0.471	0.350	–0.463	0.035
Northwest	CZ04	–0.077	0.633	0.154	–0.991
Northeast	CZ05	0.684	0.459	–0.672	–0.092
Southeast	CZ06	–0.147	–0.131	0.194	–0.040
Central Moravia	CZ07	–0.008	0.275	0.042	0.020
Moravian-Silesian Region	CZ08	0.005	0.156	0.021	0.074
Slovakia					
Bratislava Region	SK01	–0.952	0.070	–0.963	–0.720
Western Slovakia	SK02	–0.086	0.081	–0.156	0.557
Central Slovakia	SK03	0.272	0.990	0.175	0.324
Eastern Slovakia	SK04	–0.114	0.087	–0.138	0.258

Table 6. Mainland Spain for PLS coefficients of capacity vs. length of stay and non-residents share

Source: Authors.

Region	NUTS2 abbreviation	Accommodation capacity	Length of stay	Accommodation capacity	Non-res. share
Galicia	ES11	0.139	–0.660	0.165	0.140
Asturias	ES12	0.060	–0.176	0.066	0.058
Cantabria	ES13	–0.005	–0.051	–0.003	0.052
Basque Community	ES21	0.120	0.104	0.140	0.180
Navarre	ES22	0.040	–0.137	0.060	0.083
La Rioja	ES23	0.002	–0.158	0.003	0.038
Aragon	ES24	0.016	–0.389	0.012	0.093
Madrid	ES30	0.262	0.163	0.291	0.122
Castile-Leon	ES41	0.094	–0.178	0.099	0.089
Castile-La Mancha	ES42	0.057	–0.282	0.078	0.036
Extremadura	ES43	0.070	–0.243	0.100	0.011
Catalonia	ES51	0.693	0.177	0.701	0.824
Valencian Community	ES52	0.055	0.067	0.048	0.240
Andalusia	ES61	0.626	0.028	0.585	0.377
Region of Murcia	ES62	–0.003	–0.304	–0.002	0.150

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4. DISCUSSION

Due to distant evolution considering individual territories, the parameters overnight and capacity of accommodation establishment investigated in this study, are a serious economic issue (Gosar, 2012; Eurostat Statistics Explained, 2018). Generally, it is evident that the capacities are accumulated to places with natural attractions and coastal regions, resp. great cities with significant history. Austrian, but especially Spanish capacities are higher in comparison to the Czech Republic and Slovakia, particularly due to areas of individual regions. The arrivals to capital or big cities increase, which is consistent with general growth in urban tourism worldwide, see, e.g. the work of Ashworth and Page (2011). The capital city of Vienna and the region considering the Slovak capital Bratislava as well as Catalonia and Andalusia from Spain proved great variability of capacities over years. The most differing regions related to individual countries between capacities and overnights are the significant tourism ones, except for Vienna, Salzburg, and the Bratislava region. In Spain, Catalonia as the most important tourism region demonstrates a drop in the significance of the parameter accommodation capacity by weights incorporation while the importance of overnights increases. It seems that overnights are not typical for this region due to the variable prices of accommodation (Spilanis, Le Tellier, & Vayanni, 2012). The outputs of individual analyses can be discussed in unified way generating deeper sight into the phenomena studied. From the extent of results, only the ultimate interpretations are mentioned below.

In Austria, Vienna and Salzburg increase in capacities while Upper Austria and Tyrol drop. The greatest distances proven between accommodation capacities and overnights were Styria, Tyrol and Lower Austria, with a generally growing occupancy of bed places across the whole of Austria in the last years studied. While Vienna well fits the dynamics of change between capacities and overnights, it standardly falls with the incorporation of weights. Burgenland turns to positive relations between capacity and overnights by weights incorporation, but the relation is rather opposite to the others. This region has the exceptionally specific visitors. On the other hand, Upper Austria proves the greatest turn to the opposite relations by weights incorporation revealing the different dynamics between capacities and nights spent. It seems Vienna's capacities of accommodation establishments are substituted by other regions decreasing length of stay, where non-residents also supply the large values of capacities in Vienna. Tyrol is potentially unable to compensate nights spent from other regions. Salzburg is a significant region being only slight influenced by decreasing importance of capacity parameter in the dynamics of relations.

The Czech Republic proves growth of capacities in Prague, while the other regions drop except for the Southeast region, which stagnates for this parameter. The most significant differences between capacities and overnights were detected in the Northeast and Prague. In comparison to the other countries studied and the targeted time interval, only the Czech Republic is gradually increasing in occupancy rate of bed places. Prague well fits the dynamics of changes between capacities and overnights over the years where this region potentially substitutes nights spent by decreasing capacities in the Northeast and Southwest. Prague standardly falls in capacity by weights incorporation. It also seems that decreasing capacities in the Northeast and Southwest are moreover connected to shorter length of stay of the visitors supplying the Prague capacities. The Northwest probably supplies non-residents to Prague for its values of the great capacities.

In Slovakia, all of the regions grow in accommodation capacities where only Central Slovakia stagnates, and this territory also has the greatest distance between capacities and overnights. The Bratislava Region best fits the dynamics of changes between capacities and overnights. In contrast to the other studied countries, Slovakia drops in occupancy of bed places in more recent years. The Bratislava Region falls in capacity parameter significance at weights incorporation. The best benefited from the situation of increased capacities by weights incorporation is Western Slovakia, which fits the corresponding dynamics of relations. Moreover, decreasing lengths of stay in Central Slovakia are substituted by increasing capacities in the Bratislava Region. Non-residents from the other regions also supply the values of capacities greater in magnitude considering the Bratislava Region during the years.

In Spain, all regions grow in capacity parameter, with the exceptions of the Region of Murcia, which stagnates, and the slowly decreasing Cantabria. The most differing regions between capacities and overnights are Andalusia and Catalonia, while both best fit the dynamics of the variables during the years with Madrid incorporation for nights spent. Catalonia and Andalusia are also in capacities supplied by decreasing the length of stay in other territories and by non-residents. Generally, Spain is increasing for occupancy rate of bed places in more recent years. It seems that overnights are not typical for Catalonia by weights incorporation in the dynamics of relations between accommodation capacities and overnights. On the other hand, Madrid is well adapted to decreasing capacities by weights incorporation. Andalusia considers specific visitors in the nights spent oriented to this region. Extremadura and the Basque Community are the regions that best benefit from increasing capacities by weights incorporation.

CONCLUSION

Within the EU, tourism has a significant role due to its large economic, social and environmental potentials strongly regarding the periods of economic or financial crises. The Central European countries are variable in average capacity of accommodation establishments increase, or fall over the years where capital and the regions considering great cities best aligned with natural attractions in its environments are the best targeted tourism destinations. As the main result it was found out, that Spain was found to be substantially different from the other regions, i.e. Austria, the Czech Republic and Slovakia. Extraordinary dynamics in the parameters tourism overnights and capacity for the increasing offers were also proven for majority of significant cities supplied by the annual changing number of visitors. The capitals or regions considering the significant cities are also substituted in capacity by non-residents from other territories, with the typical exceptional cases. The results are especially significant for business sector that has to be prepared for changing conditions in the current competitive environment and can be used by many authorities at the national and local levels.

AUTHOR CONTRIBUTIONS

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