The determinants of tourism destination competitiveness in 2006–2016: a partial least square path modelling approach

I determinanti della competitività di destinazioni turistiche tra 2006 e 2016: un approccio partial least squares a equazioni strutturali

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Abstract The present research addresses the analysis of tourism destination competitiveness (TDC) at national level in the period 2006–2016. A partial least square path model (PLS-PM) is developed where TDC and its determinants vary through time according to a second-degree polynomial trend, while their relationships remain constant, thus allowing to draw conclusions on their long-term association. Results show that the most important TDC determinants are cultural heritage, communication technology and tourism infrastructure.

Abstract *Questa ricerca ha l'obiettivo di analizzare la competitività di destinazioni turistiche a livello nazionale nel periodo 2006–2016. È stato sviluppato un modello PLS a equazioni strutturali dove la competitività e i suoi determinanti variano nel tempo secondo un trend quadratico mentre le loro relazioni rimangono costanti, così da poter trarre conclusioni sulla loro associazione a lungo termine. I risultati mostrano che i principali determinanti della competitività sono le risorse culturali, le tecnologie di comunicazione e le infrastrutture turistiche.*

Key words: country-level, formative constructs, PLS, structural equation models, time series.

1 Introduction

As the tourism and travel sector has become an important driver of the contemporary economy, contributing significantly to social, technological and economic develop-

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ment [6], the ongoing study of tourism destination competitiveness (TDC) has acquired increasing importance for tourism researchers and policy makers [12]. Over the last decade, several conceptual models for TDC have been proposed [4, 8, 6], and structural equation models (SEMs, see for example [9]) have proved to be a powerful methodology for TDC analysis [11, 10, 2, 7, 1, 16]. The main advantage of SEMs relies in the opportunity to estimate the weights of each indicator and each determinant of competitiveness from data, overcoming the great limitation of constant weights underlying the Tourism and Travel Competitiveness Index [17]. In recent years, particular attention was paid to partial least squares path models (PLS-PMs, see for example [14]), a non parametric formulation of SEMs with weaker sample size requirements, making no assumptions on the distribution of data, and allowing formative constructs. According to several authors, PLS-PMs have introduced a substantial improvement in the methodology for tourism research compared to parametric SEMs, also called covariance-based (CB) SEMs (see the review in [5]). In particular, formative constructs appears more adequate than reflective ones to represent TDC determinants (see the discussion in [11]). However, existing applications focus on one year at a time, failing to capture the substantive (time-invariant) pattern relating TDC and its determinants.

The present research addresses the analysis of TDC at national level in the period 2006–2016. A PLS-PM is developed where TDC and its determinants vary through time according to a second-degree polynomial trend, while their relationships remain constant, thus allowing to draw conclusions on their long-term association.

This paper is structured as follows. In Section 2, a description of the data and the methodology of the research is provided. In Section 3, results are presented. Section 4 includes the discussion of the contribution.

2 Materials and methods

In this research, TDC is understood in the widely accepted definition suggested by [13, page 2]: "*a destination's ability to increase tourism expenditure, to increasingly attract visitors while providing them with satisfying, memorable experiences, and to do so in a profitable way, while enhancing the well-being of destination residents and preserving the natural capital of the destination for future generations*".

The following TDC determinants are considered: core resources and attractiveness (CRA), communication technology (ICT), tourism infrastructure (TOU), demand conditions (DEM).

Data on 20 indicators covering TDC and its determinants (see Table 1 for a description) were gathered from several sources, mostly the World Bank, the World Tourism and Travel Council and the World Economic Forum. The data referred to 264 countries in the period 2006–2016. Destinations were selected in a two-stage procedure. Firstly, the ones with a surface area less than 2000 squared kilometers and less than one million population were merged with a contiguous one, if possible, or excluded. Secondly, the remaining destinations were selected to obtain a dataset

with no more than 15% of missing values, as suggested by [15]. The selection procedure led to a total of 130 tourism destinations with a total percentage of missing values of 14%.

A deterministic trend across destinations was taken into account to impute missing values. Due to the limited length of the time series, a total of 15 geographic zones were defined based on physical proximity and economic similarities between the destinations, and each missing datum was replaced with its conditional mean predicted by a linear regression model with destination-specific intercept and geographic zone-specific (instead of destination-specific) second-degree polynomial trend.

The PLS-PM consisted of three parts: a *formative part*, representing the relationships between each TDC determinant and the respective indicators, with the latter determining the former; a *reflective part*, representing the relationships between TDC and the outcomes of tourism activity, with the former determining the latter; and a *structural part* representing the relationship between TDC and its determinants, with the latter determining the former. Destination-specific intercepts and geographic zone-specific second-degree polynomial trends were assumed for each construct.

Let j, k and t indicate the destination, the geographic zone and the year, respectively. The formulation of the PLS-PM was the following:

$$\begin{aligned}
\mathrm{E}[\mathrm{CRA}^{(j,k,t)}] &= \delta_{\mathrm{CRA}}^{(j)} + \gamma_{\mathrm{CRA}}^{(k)} t + \nu_{\mathrm{CRA}}^{(k)} t^2 + \sum_s \lambda_{\mathrm{CRA},s} \cdot X_{\mathrm{CRA},s}^{(j,k,t)} \\
\mathrm{E}[\mathrm{ICT}^{(j,k,t)}] &= \delta_{\mathrm{ICT}}^{(j)} + \gamma_{\mathrm{ICT}}^{(k)} t + \nu_{\mathrm{ICT}}^{(k)} t^2 + \sum_s \lambda_{\mathrm{ICT},s} \cdot X_{\mathrm{ICT},s}^{(j,k,t)} \\
\mathrm{E}[\mathrm{TOU}^{(j,k,t)}] &= \delta_{\mathrm{TOU}}^{(j)} + \gamma_{\mathrm{TOU}}^{(k)} t + \nu_{\mathrm{TOU}}^{(k)} t^2 + \sum_s \lambda_{\mathrm{TOU},s} \cdot X_{\mathrm{TOU},s}^{(j,k,t)} \\
\mathrm{E}[\mathrm{DEM}^{(j,k,t)}] &= \delta_{\mathrm{DEM}}^{(j)} + \gamma_{\mathrm{DEM}}^{(k)} t + \nu_{\mathrm{DEM}}^{(k)} t^2 + \sum_s \lambda_{\mathrm{DEM},s} \cdot X_{\mathrm{DEM},s}^{(j,k,t)} \\
\mathrm{E}[\mathrm{TDC}^{(j,k,t)}] &= \delta_{\mathrm{TDC}}^{(j)} + \gamma_{\mathrm{TDC}}^{(k)} t + \nu_{\mathrm{TDC}}^{(k)} t^2 + \beta_{\mathrm{CRA}} \cdot \mathrm{CRA}^{(j,k,t)} + \\
&\quad + \beta_{\mathrm{ICT}} \cdot \mathrm{ICT}^{(j,k,t)} + \beta_{\mathrm{TOU}} \cdot \mathrm{TOU}^{(j,k,t)} + \beta_{\mathrm{DEM}} \cdot \mathrm{DEM}^{(j,k,t)} \\
\mathrm{E}[X_{\mathrm{TDC},s}^{(j,k,t)}] &= \alpha_{\mathrm{TDC},s} + \lambda_{\mathrm{TDC},s} \cdot \mathrm{TDC}^{(j,k,t)}
\end{aligned} \tag{1}$$

where parameters denoted with letter α, δ, γ, ν, λ and β represent the destination-free intercepts, the destination-specific intercepts, the zone-specific linear trend components, the zone-specific quadratic trend components, the factor loadings and the path coefficients, respectively. The regression with the greatest number of predictors in the PLS-PM has 9 observations per parameter, which allow to detect correlations with absolute value 0.6 with a power of 0.5 [3].

3 Results

Results of PLS-PM estimation are shown in Table 1. The model explains 64% of data variability.

An overall evaluation of the performance of the considered destinations in the period 2006–2016 can be provided by the mean across years of estimated TDC ranks (Table 2). Iceland, with an average rank equal to 1, results the most competitive destination throughout the whole decade. Overall, North and South-West European destinations are the best performing ones (they all appear within the first 25 positions), together with Qatar (17th), Cyprus (19th), United Arab Emirates (23th) and Lebanon (24th).

Table 1 Results of PLS-PM estimation.

Formative part

Indicator	Construct	Std. loading	Variance
Protected areas (% surface area)	CRA	0.1297	1.7%
Number of natural world heritage sites to population	CRA	0.2535	6.4%
Number of cultural world heritage sites to population	CRA	0.8947	80.0%
Number of art museums (> 8000 m^2) to population	CRA	0.5580	31.1%
Number of mobile cellular subscriptions to population	ICT	0.6016	36.2%
Number of individuals using the Internet to population	ICT	0.9837	96.8%
Number of fixed broadband subscriptions to population	ICT	0.9580	91.8%
Number of aircraft departures to population	TOU	0.5089	25.9%
Number of airports to surface area	TOU	0.5814	33.8%
Scheduled available seat kilometers per week	TOU	0.2186	4.8%
Number of hotel rooms to population	TOU	0.2041	4.2%
Number of automated teller machines to adult population	TOU	0.6961	48.5%
Presence of seven major car rental companies	TOU	0.8748	76.5%
Power purchasing parity	DEM	0.5958	35.5%
Consumer price annual inflation	DEM	0.8852	78.4%

Reflective part

Indicator	Construct	Std. loading	Variance
Number of international arrivals to population	TDC	0.8782	77.1%
International tourism receipts to population	TDC	0.9534	90.9%
International tourism expenditure to population	TDC	0.7747	60.0%
Tourism's direct contribution to employment (share)	TDC	0.4716	22.2%
Tourism's direct contribution to GDP (share)	TDC	0.1039	1.1%

Structural part

Path	Std. path coefficient			
	Estimate	Std. error	t-statistic	p-value
CRA $\longrightarrow$ TDC	0.1287	0.0289	4.4480	0.0000
ICT $\longrightarrow$ TDC	0.1001	0.0402	2.4876	0.0130
TOU $\longrightarrow$ TDC	0.1057	0.0214	4.9358	0.0000
DEM $\longrightarrow$ TDC	-0.0084	0.0096	-0.8703	0.3843

Table 2 Best 25 destinations with respect to the TDC rank averaged in the considered period (2006–2016).

Iceland	1.00	Finland	10.64	Qatar	17.27
Norway	2.64	Greece	11.73	Netherlands	18.27
Denmark	4.18	Latvia	12.18	Cyprus	19.00
Estonia	5.36	Belgium+Luxembourg	13.00	United Kingdom	19.55
Sweden	7.45	Spain	14.73	Germany	20.64
Austria	8.00	Lithuania	15.18	Italy	22.09
Ireland	9.45	France	15.73	United Arab Emirates	22.27
Switzerland	10.45	Portugal	16.73	Lebanon	25.00

4 Discussion

The present research addresses the analysis of tourism destination competitiveness (TDC) at national level in the period 2006–2016. through a partial least square path modelling approach. Differently from existing applications which focus on one year at a time, our contribution is based on time series data and is able to capture the substantive (time-invariant) pattern relating TDC and its determinants.

The main limitation of the present research is represented by the difficulty to find long and almost complete time series. This issue forced us to select 130 on an original number of 260 tourism destinations, and to impute a number of missing values corresponding to almost 15% of total data. The limited length of our time series also precluded a reliable estimation of destination-specific trends, thus we assumed trends to be equal within 15 geographic zones. Being aware that the choice of the geographic zones may significantly affect the results, particular attention was paid to define them so that each included countries with as homogeneous economic characteristics as possible. We hope that future data collection may lead to long enough time series to specify country-specific trends.

The selection of the indicators is a further critical step of our research. In the present contribution, we focused on a limited set of TDC determinants. Future work could consider a broader set of TDC determinants, like public expenditure for the tourism sector, regulation and social aspects.

References

[1] S. Alves and A. R. Nogueira. Towards a Sustainable Tourism Competitiveness Measurement Model for Municipalities: Brazilian Empirical Evidence. *Pasos*, 13(6):1337–1353, 2015.

[2] G. Assaker, R. Hallak, V. Vinzi, and P. O'Connor. An Empirical Operationalization of Countries' Destination Competitiveness Using Partial Least Squares

Modeling. *Journal of Travel Research*, 53(1):26–43, 2014.

[3] W. W. Chin and P. R. Newsted. Structural Equation Modeling Analysis with Small Samples Using Partial Least Square. In R. H. Hoyle, editor, *Statistical Strategies for Small Sample Research*, pages 307–341. Sage Publications, Thousand Oaks, US-CA, 1999.

[4] G. I. Crouch and J. R. B. Ritchie. Tourism, Competitiveness, and Societal Prosperity. *Journal of Business Research*, 44(3):137–152, 1999.

[5] P. O. do Valle and G. Assaker. Using Partial Least Squares Structural Equation Modeling in Tourism Research: A Review of Past Research and Recommendations for Future Applications. *Journal of Travel Research*, 55(6):695–708, 2016.

[6] L. Dwyer and C. Kim. Destination Competitiveness: Determinants and Indicators. *Current Issues in Tourism*, 6:369–414, 2003.

[7] C. Estevao, J. Ferreira, and S. Nunes. Determinants of Tourism Destination Competitiveness: A SEM Approach. *Advances in Culture, Tourism and Hospitality Research*, 10: Marketing Places and Spaces, 2015.

[8] S. S. Hassan. Determinants of Market Competitiveness in an Environmentally Sustainable Tourism Industry. *Journal of Travel Research*, 38(3):239–245, 2000.

[9] R. H. Hoyle. *Handbook of Structural Equation Modeling*. Guilford Press, New York, US-NY, 2012.

[10] J. A. Mazanec and A. Ring. Tourism Destination Competitiveness: Second Thoughts on the World Economic Forum Reports. *Tourism Economics*, 17(4): 725–751, 2011.

[11] J. A. Mazanec, K. Wober, and A. H. Zins. Tourism Destination Competitiveness: From Definition to Explanation? *Journal of Travel Research*, 46:86–95, 2007.

[12] K. Namhyun. Tourism Destination Competitiveness, Globalization, and Strategic Development from a Development Economics Perspective. PhD thesis, 2012.

[13] J. R. B. Ritchie and G. I. Croutch. *The Competitive Destination: A Sustainable Tourism Perspective*. Oxford University Press, Oxford, UK, 2005.

[14] V. E. Vinzi, W. W. Chin, J. Henseler, and H. Wang. *Handbook of Partial Least Squares: Concepts, Methods and Applications*. Springer-Verlag, Berlin, DE, 2010.

[15] C. Weismayer. A Replacement Strategy for Missing Values in Destination Competitiveness Data. Diploma Thesis, University of Economics and Business Administration, Vienna, AT, 2006.

[16] H. G. Weldearegay. The Determinants of Tourism Destination Competitiveness: PLS Path Model of Structural Equation Modeling. *Journal of Tourism & Hospitality*, 6(5), 2017.

[17] World Economic Forum. The Travel & Tourism Competitiveness Report. Geneva, CH, 2007.