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An exploratory assessment of tourism sustainability in Croatian coastal destinations

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Abstract

This paper applies an indicator system for evaluating the sustainability of tourism in Croatian coastal tourist destinations. The applied indicator system is based on the guidelines provided by the World Tourism Organization, EUROSTAT, the Organization for Economic Co-operation and Development, and the European Union Tourism Sustainability Group. To simplify measurement and facilitate comparative analyses between analyzed destinations, synthetic indicators are constructed based on normalized indicator data and multivariate analysis-based indicator weights. The results in this paper are a first, though still rough, quantification of tourism sustainability in Croatia.

Key words
tourism, sustainability, composite indicator, index, Croatia

JEL classification
Q01, Q26, Q56

1. Introduction

Tourism is an important subsystem of the Croatian economy, having a significant share in overall Croatian exports, and being a key-factor of regional development. However, uncontrolled development, especially with regard to excessive (ab-)use of environmental resources, might impose limits on potential future benefits from tourism, and even turn it into a limiting factor of overall economic growth and development (Kozic and Mikulic, 2011).

In this regard, the focus of many contemporary studies from the tourism development literature has been on the need of implementing development policies that are based on the principles of sustainable development. Planning and managing sustainable tourism development requires, however, a detailed insight into present levels of sustainability (or at least sustainability performance), as this is a precondition for formulating effective and efficient policies.

In light of this, the aim of this study is to provide an empirical contribution, the first of its kind, on the measurement of tourism sustainability in Croatia. Since the coastal area accounts for 86% of international tourist arrivals to Croatia in 2009 (Croatian Bureau of Statistics, 2010), the pressure of tourism activities on the sustainability of tourism is particularly strong here. Accordingly, the focus of this paper will be on Croatian coastal counties. Moreover, the dominant tourism product in the coastal area (i.e. sun and sea family product) significantly differs from the tourism products in the continental part of Croatia (e.g. rural tourism, city-break tourism), which is another reason for excluding the 13 continental counties and the city of Zagreb from the analysis. An overview of the Croatian coastal counties is provided in Figure 1.

Figure 1: Croatian coastal counties

In order to assess levels of tourism sustainability in the Croatian coastal counties, a synthetic indicator system is used. In constructing the indicator system, a thorough literature review on sustainable tourism and its measurement was conducted in order to (i) identify relevant tourism sustainability indicators, and to (ii) evaluate existing approaches for modeling synthetic indicators of tourism sustainability. Guidelines provided by relevant international organizations, involving the *United Nations World Tourism Organization* (UNWTO), *EUROSTAT*, the *Organization for Economic Co-operation and Development*

(OECD), the *European Environmental Agency* (EEA), and the *Tourism Sustainability Group* (TSG), were taken into consideration in modeling the indicator system.

The remainder of the paper is organized as follows. The theoretical framework and data selection process in modeling the indicator system for measuring the sustainability of tourism is presented in Section 2. The statistical procedures used to model and estimate the synthetic indicators of tourism sustainability are presented in Section 3. Main study results are presented in Section 4. The paper concludes with a brief summary and a discussion of the main study limitations.

2. The Indicator System for Measuring Tourism Sustainability

Since tourism sustainability is an abstract and complex construct that cannot be measured directly, a synthetic composite indicator, consisting of several formative sub-indicators (or just indicators), is modeled and used for measuring tourism sustainability in this study.

A not sufficient, but necessary precondition for assuring the quality of a synthetic indicator is to assure the quality of its formative parts—i.e. to assure the quality of manifest indicators that form the synthetic indicator representing the focal latent construct. In this regard, when specifying the theoretical indicator framework and selecting the data, it is crucial that the indicator data fulfill the following criteria (OECD, 2008):

(1) *Indicator relevance*: Departing from the definition of the focal construct, it is important that the indicators chosen to model the synthetic indicator cover significant parts of the focal construct's conceptual domain, and, optimally, the whole domain.
(2) *Indicator credibility:* Indicator credibility is very closely related to indicator accuracy (criterion 3). It can be defined as the trust in the objectivity of the indicator data, which usually implies that the indicators have been produced in accordance with professional standards. "Official sources", such as national statistics bureaus, governmental organizations or research institutes are typically considered to be credible sources of indicator data.
(3) *Indicator data accuracy:* Indicator accuracy can be defined as the degree to which indicators correctly estimate or describe what they are supposed to estimate or describe (OECD, 2008). Accordingly, under the assumption that valid and reliable measurement procedures have been used, and that no errors have occurred during the process of collecting, saving and processing indicator data, the degree of indicator accuracy is basically influenced by the representativeness of the sample used in estimating the indicators. In this regard, a census (i.e. sample = focal population) would imply perfect indicator accuracy.

Another important aspect which is not directly related to indicator quality, but to the quality of the synthetic indicator they form, is the availability of particular indicator data, or of data needed to model particular indicators. This is a very pragmatic, but, unfortunately frequently not met precondition for assuring high quality synthetic composite indicators. Replacing focal indicators with adequate proxy-measures is the only appropriate solution to this problem, though this is typically sub-optimal, and, unfortunately, not always possible. If using "official" sources, typical problems analysts encounter are: (i) uncovered themes by available data sources; (ii) unavailability of data for a specific time period (e.g. data are collected every third year); and/or (iii) unavailability of dis-aggregated data (e.g. data are available for the national level, but not for the county or municipality level). Since the efforts of collecting primary data for desired indicators are typically insurmountable, analysts are frequently forced to make significant quality tradeoffs in constructing synthetic indicators, either (i) by eliminating some indicators, (ii) by using (sub-optimal) proxy measures, or (iii) by decomposing aggregated data (which is typically sub-optimal, too).

Following the abovementioned criteria, the first step in modeling the indicator system in our study was to define tourism sustainability in terms of its formative parts. In order to do so, we departed from the (probably most) common conception of tourism sustainability as consisting of (or, relying on) three distinct sustainability dimensions—i.e.: (i) environmental sustainability, (ii) social sustainability, and (iii) economic

sustainability. This conception is based on the general concept of sustainable development introduced by the WCED (1987), which was transferred to the tourism sector several years later by the UNWTO.

As these three sustainability dimensions are abstract and complex constructs as well (i.e. they cannot be measured directly), the task of defining focal constructs, and finding suitable indicators measuring the constructs, has only been shifted to a lower level of abstraction. In order to define and choose appropriate measures for the three sustainability dimensions, in the next step a detailed literature review has been conducted, mainly to identify indicator-lists officially proposed by relevant international organizations, government bodies, national institutes or agencies. In creating the indicator list for this study, particular attention has such been paid to the indicators proposed by EUROSTAT (2006 a, b) and the TSG (2007), which are based on the "drivers-pressures-state-impact-responses" approach proposed by the EEA (1999). Moreover, the general tourism sustainability indicators proposed by the UNWTO (2004) have been studied in particular detail (for a detailed review of these indicator lists and respective methodologies see Kozic and Mikulic, 2011). In compiling the final indicator list, attention has been paid to achieve a balanced distribution of indicators forming each sustainability dimension, and to cover a wide range of different sustainability-related aspects within each dimension. Noteworthy, all indicators are based on data that were obtained from "official" sources—i.e. from the Croatian Bureau of Statistics (croat. Državni Zavod za Statistiku-DZS), and the Croatian Institute for Tourism (croat. Institut za Turizam Zagreb-IZTZG). Accordingly, this satisfies the criteria 2 and 3 (i.e. credibility and accuracy, respectively). The final item list used in this study is presented in Table 1.

As can be seen from Table 1, two different types of measures were used—i.e. ratio and direct measures. Ratio measures are used for two different reasons. First, such measures are used for indicators that are ratio measures by definition (e.g. EC1 - seasonality). Second, ratio measures are further used for indicators that require a common base in order to be comparable across different samples (i.e. in our case for across different counties). For instance, "SL2 - Peak season (month) arrivals *per capita*", which is an indicator of tourism-generated pressures on local communities, has been used instead of "Peak season (month) arrivals", without breaking them down *per capita*. The reason for this is that a comparison of absolute numbers of tourist arrivals across e.g. different counties would be valid only if all counties that are being investigated were equal in size of territory and/or had equal number of inhabitants. Although such ratios are not an optimal solution[1], they are superior to direct measures in many situations. Conversely, direct measures are used for indicators that need no adjustments in order to be understandable/clear, or to be comparable across different samples. In our case, direct measures are mainly direct performance ratings of tourists for various aspects of the destination.

Table 1: Sustainability indicators grouped by dimension of tourism sustainability

Indicator	Dimension	Sign	Type of measure
SL1. Tourists to locals	social-locals	-	ratio
SL2. Peak season (month) arrivals per capita	social-locals	-	ratio
SL3. Average net wage in the hospitality industry to average County net wage	social-locals	+	ratio
SL4. Low quartile to peak quartile permanent employees in hospitality subjects	social-locals	+	ratio
ST1. Accommodation – Value for money	social-tourists	+	direct
ST2. Gastronomy – Value for money	social-tourists	+	direct
ST3. Personal safety	social-tourists	+	direct
ST4. Host friendliness	social-tourists	+	direct
ST5. Natural beauty and scenery	social-tourists	+	direct
ST6. Entertainment, sports and culture	social-tourists	+	direct
ST7. Transport accessibility	social-tourists	+	direct
ST8. Overall tourist satisfaction with stay	social-tourists	+	direct

[1] E.g. the number of inhabitants may be the same across two counties, but the size of territory may significantly differ, leading to a larger base pressure for the smaller county.

EC1.Low quartile to peak quartile tourist arrivals (seasonality)	economic	-	ratio
EC2.Total number of tourist overnights per capita	economic	+	ratio
EC3.Tourist expenditures in the destination per capita (€)	economic	+	ratio
EC4. Average daily tourist expenditures in the destination (€)	economic	+	direct
EC5. Expenditures not related to accommodation, food and beverages (€)	economic	+	direct
EC6. Hospitality subjects (peak quartile) per 1000 locals	economic	+	ratio
EC7. Beds in accommodation per 1000 locals	economic	+	ratio
EC8. Beds in collective accommodation to overall beds (accommodation quality)	economic	+	ratio
EC9. 4* and 5* beds to total beds (accommodation quality)	economic	+	ratio
EN1. Water quality on beaches (percentage of acceptable water samples)	environmental	+	ratio
EN2. Number of tourists per square km of territory (density)	environmental	-	ratio
EN3. Public sanitary facilities (total per peak month arrivals; inflate 10.000)	environmental	+	ratio
EN4. Public green areas (m2 per peak month arrivals)	environmental	+	ratio
EN5. Wastewater management (investments and expenditures per annum; 000 €)*	environmental	+	direct *
EN6. Biodiversity and landscape protection (investments and expenditures per annum; 000 €)*	environmental	+	direct *
EN7. Waste management (investments and expenditures per annum; 000 €)*	environmental	+	direct *
EN8. Soil and water protection (investments and expenditures per annum; 000 €)*	environmental	+	direct *
EN9. Tourist perceived cleanliness of beaches	environmental	+	direct
EN10. Tourist perceived ecological preservation	environmental	+	direct

Note: To obtain the share of investments and expenditures attributable to tourists, the following correction factor is used:* $\left(\frac{tourist\ overnights}{inhabitants * 365 + tourist\ overnights}\right)$.

3. Assessment Tool

As has been mentioned earlier, the tool for assessing the tourism sustainability is a synthetic or composite indicator, which provides analysts with an efficient way to compress the information contained in a number of individual indicators. A synthetic indicator not only facilitates the evaluation process, but also it enables comparative analysis and makes the interpretation of data by stakeholders much easier (Blancas et al., 2010). Moreover, a synthetic indicator further minimizes the measurement error inherent in all measured variables, and clearly represents multiple aspects of the analyzed concept (Anderson et al., 2010). The use of synthetic indicators surely has many advantages, but it also has some limitations. A serious disadvantage of synthetic indicators is the risk of sending misleading policy messages if poorly constructed, which is especially the case if synthetic indicators lack a base of sound statistical and conceptual principles (UNWTO, 1996). Hence, synthetic indicators should be used very carefully.

Despite the widespread use of synthetic indicators, it has to be noted that there is no exact method, nor a universally accepted way of constructing them. Rather there are many, conceptually quite distinct methods for constructing synthetic indicators proposed in the literature, and there is no established theoretical framework for their appliance in a specific type of analysis (Saisana and Tarantola, 2002). From a methodological point of view, the most important issue in synthetic indicator development is to determine the values of weights of each particular formative indicator. It actually implies a quantification of relative importance of each individual indicator. There is no reference source in the tourism sustainability literature that allows this quantification to be fully objective (Blancas et al., 2010). The starting point in this procedure should thus be the analyst's level of knowledge about sustainability issues and the relevancy of each indicator in a specific case. In current practice, it has become widely known that local community managed by sustainability experts can carry this task very well. This approach is widely used by UNWTO in many tourism sustainability projects. Its experiences are clearly elaborated in two publications of the UNWTO: *What Tourism Managers Need to Know* and *Indicators of Sustainable Development for Tourism Destination*. But, what if such an approach was not feasible, typically due to a lack of research funding? In such a situation, it would be reasonable to minimize the analyst's subjectivity by using an exact and

transparent method in indicator weighting. Factor analysis as an exact multivariate technique is a reasonable choice in such a case. The application of factor analysis in synthetic indicator development is based on the joint variability principle. If two or more variables (i.e. indicators) vary together, it is reasonable to assume that their joint variability reflects an underlying construct. In our case, the underlying construct is tourism sustainability, and each of the individual indicators is weighted by the quantity of information that it explains (Blancas et al., 2010). The quantity of information is assumed to be represented by the indicator's share in common variance—i.e. an indicator's coefficient of correlation with the latent focal construct. Such an approach should be regarded as a good second best solution, if a larger scale research is not feasible. Moreover, it is noteworthy that there is in fact no available alternative statistical approach that would be feasible for indicator weighting in a case like ours (e.g. multiple regression- or structural model-based weights), because there simply exists no objective quantification of the dependent variable (i.e. tourism sustainability). After all, a quantification of the dependent variable is basically the main reason for conducting this study.

Factor analysis thus is a multivariate analysis technique that is often used to analyze interdependence among a large number of variables with a primary purpose to define the underlying structure among them (Anderson et al., 2010). It is a data reduction technique by which a large number of starting variables is combined in a smaller number of latent variables named factors. The factors and starting variables are connected by the correlation coefficients. Depending on the existence and level of prior knowledge about the concept that is researched, factor analysis could be explanatory or confirmatory. The second refers to a technique which aims to verify the analyst's assumptions about the underlying structure and the number of factors. The technique that we apply in our case could thus be qualified as confirmatory factor analysis. In particular, the factor analysis is used to determine the values of weights in the synthetic indicator(s). Since our aim is not to generalize results from sample to population, factor analysis can be used in a slightly loose form. This means that it is used with a lack of mathematical rigidity, but still in compliance with all established theoretical rules. Hence, first we normalized all the individual indicators by using *min-max re-scaling*. This method is also called *distance-to-ideal(anti-ideal)-point* or just *re-scaling* by some authors. The equation for this procedure in case of positive character of indicator *x* (i.e. positive influence on tourism sustainability), is:

$$x_{NORM} = \frac{x - x_{MIN}}{x_{MAX} - x_{MIN}}$$

In case that indicator *x* has a negative character, the respective equation is:

$$x_{NORM} = \frac{x_{MAX} - x}{x_{MAX} - x_{MIN}}$$

In a next step, normality of indicator distributions and linear relationships between them were checked. This was done through a visual examination of bivariate scatterplots. Next, overall factorability was tested by examining the matrix of intercorrelations. After all, the confirmatory factor analysis was conducted. The method of factor extraction applied was the *common factor analysis* (or *principal factor analysis* called by some authors). We extracted only a single factor, whose factor loadings, i.e. correlations of the factor with the individual indicators are considered to be weights of individual indicators in the synthetic indicator(s) construction. The correlations are used as absolute values in order to ensure the positive character of the synthetic indicator, meaning that higher values represent higher levels of sustainability. All calculations and estimations were performed with *Statsoft Statistica 9.1.* The indicator weights obtained are shown in Table 2.

Table 2: Indicator weights

Indicator	Weight
SL1. Tourists to locals	0.84297
SL2. Peak season (month) arrivals per capita	0.71866
SL3. Average net wage in the hospitality industry to average County net wage	0.70735
SL4. Percentage of permanent employees in hospitality subjects (Low quartile to peak quartile)	0.41882

ST1. Accommodation - Value for money	0.78876
ST2. Gastronomy - Value for money	0.82012
ST3. Personal safety	0.28486
ST4. Host friendliness	0.75013
ST5. Natural beauty and scenery	0.37889
ST6. Entertainment, sports and culture	0.94469
ST7. Transport accessibility	0.37055
ST8. Overall satisfaction with stay	0.55389
EC1. Low quartile to peak quartile tourists (seasonality)	0.45577
EC2. Total number of tourist overnights per capita	0.88372
EC3. Tourist expenditures in the destination per capita (€)	0.84548
EC4. Average daily tourist expenditures in destination (€)	0.21285
EC5. Expenditures non-related to accommodation, food and drink (€)	0.29838
EC6. Hospitality subjects (peak quartile) per 1000 locals	0.70193
EC7. Beds in accommodation per 1000 locals	0.78676
EC8. Beds in collective accommodation to overall beds (accommodation quality)	0.94734
EC9. 4* and 5* beds to total beds (accommodation quality)	0.73116
EN1. Water quality on beaches (percentage of acceptable water samples)	0.34244
EN2. Number of tourists per square km of territory (density)	0.93173
EN3. Public sanitary facilities - total per peak month arrivals (inflate 10.000)	0.36302
EN4. Public green areas (m2 per peak month arrivals)	0.42079
EN5. Wastewater management - investments and expenditures to tourists per annum (000 €)	0.88489
EN6. Biodiversity and landscape protection - investments and expend. to tourists per annum (000 €)	0.33068
EN7. Waste management - investments and expenditures to tourists per annum (000 €)	0.86101
EN8. Soil and water protection - investments and expenditures to tourists per annum (000 €)	0.33512
EN9. Tourist perceived cleanliness of beaches	0.47921
EN10. Tourist perceived ecological preservation	0.45825

After obtaining all the necessary data input (i.e. indicator data and indicator weights), the following equation was used to model the synthetic indicators (SI):

$$SI_i = \sum_{j=1}^{p} x_{NORMj} * w_j$$

where i = 1, 2, …, n, n is the number of observations, p the number of individual indicators, and w_j the weight of j-th individual indicator (i.e. the correlation between the j-th individual indicator and the extracted factor).

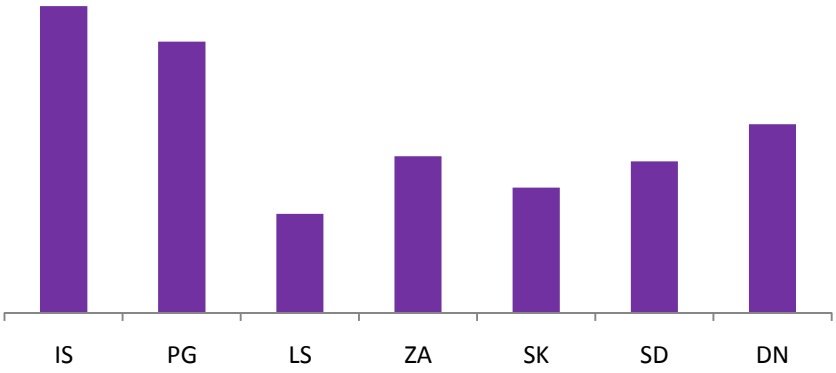
Overall, four synthetic indicators were constructed; one that represents the overall sustainability of tourism, whereas the other three represent each particular dimension of sustainability. The main findings are presented and discussed in the following section.

4. Results

At the beginning, it is worthwhile to mention that the results are largely in line with our prior expectations about relative sustainability of each destination. It could be understood as a verification of the validity and applicability of the method used.

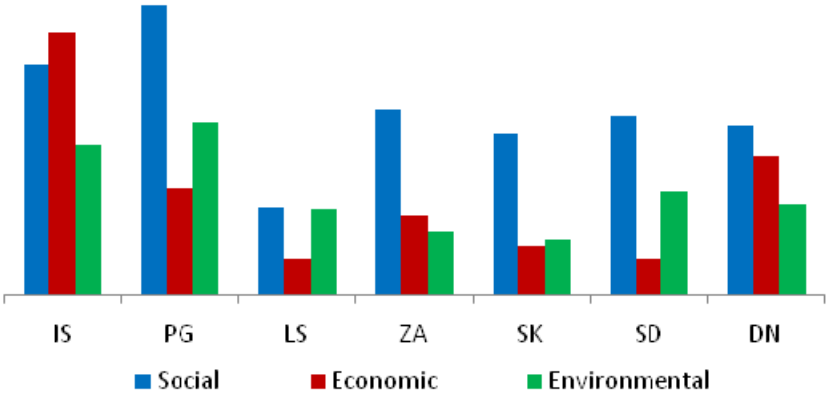
Results for overall tourism sustainability are shown in Figure 2. According to the Figure, tourism is relatively most sustainable in the Istarska County, while relatively lowest sustainability is recorded in the Licko-Senjska County. Relatively high indicator values are also recorded in the Primorsko-Goranska County, while the other four Counties are roughly equally ranked according to the level of overall tourism sustainability.

Figure 2: Overall sustainability of tourism in Croatian costal destinations



The background of this general picture is portrayed in Figure 3. It is highly conclusive that the best performing destination in accordance with overall sustainability has also favorable performance in accordance with each of its three dimensions. It is also obvious that all destinations perform relatively well regarding the social dimension, while the biggest differences are recorded with regard to the economic dimension. The least differences across destinations are present with regard to the environmental dimension.

Figure 3: Sustainability according to sustainability dimensions



Since the indicator weights allow for the identification of the particular indicators with the largest relative influence on tourism sustainability (Blancas et al., 2010), it is worthwhile to point out the individual indicators that have the highest weights. It suggests that these indicators heavily determine the final sustainability levels.

With regard to the social dimension, the highest weight is assigned to “tourist perceived entertainment, culture, and sport facilities”. Its non-normalized value is 66.12 for the highest sustainability-level destination, and 43.58 for the lowest sustainability-level destination. With regard to the economic dimension, the highest weight is assigned to the “ratio of beds in collective accommodation to overall beds”, which is used as an indicator of accommodation quality. Its non-normalized value is 76.98 for the highest sustainability-level destination, and only 32.79 for the lowest sustainability-level destination. With regard to the environmental dimension, the highest weight is assigned to the “number of tourists per square km of territory”, which is used as an indicator of carrying capacity. Its non-normalized value is 626 for the

highest sustainability-level destination, and 275 for the lowest sustainability-level destination. Other individual indicators with relatively high weights are as follows. Within the social dimension, indicators with relatively high weights are the "tourists to locals ratio", and the "tourist perceived value for money related to gastronomy". Within the economic dimension, indicators with relatively high weights are "tourist expenditures in destination per capita", and the "total number of tourist overnights per capita". Finally, within the environmental dimension, indicators with relatively high weights are "expenditures and investments in wastewater management", and "expenditures and investment in waste management".

5. Conclusion

Based on a review of existing methodologies and guidelines provided by relevant international organizations, in particular those provided by the UNWTO, OECD, EURSTAT and the European Union TSG, the authors of this study have modeled a synthetic indicator model for measuring the sustainability of tourism in Croatian coastal counties. In estimating the synthetic indicators for the investigated Counties, this study relied exclusively upon data provided by the Croatian Bureau of Statistics and the Croatian Institute for Tourism.

The results revealed significant differences with regard to both the levels of overall tourism sustainability and the particular dimensions of tourism sustainability among the seven coastal counties. However, despite the facts that results can be considered representative in a statistical sense, and that the findings are very indicative, the authors of this study would like to acknowledge that the individual findings should be considered and evaluated with particular care due to several limitations of the study. The particular limitations of this study are the following:

- A higher level of detail regarding the spatial scope of the sustainability assessment is required. This necessity emerges from the fact that pressures on the sustainability of tourism may be very unevenly distributed within a county. Such, e.g. within a county, tourism may be unsustainable in larger, industrial cities situated on the coast, whereas it may be very sustainable in surrounding, smaller places. This information is lost by aggregating data at the county level, but it would be necessary in order to formulate meaningful policies for each county.
- The weighting scheme for the indicators was based on a widely used statistical method (i.e. factorial analysis), the method itself, however, is less than optimal for indicator weighting as it relies on an indicator data-centric approach. In other words, the information about how important a particular indicator is for a particular sustainability dimension is extracted from the indicators themselves. A more reliable and meaningful approach would require an exogenous dependent variable. Such variables (i.e. indicators) do, however, not exist. Accordingly, there are only few alternative approaches to factor analysis for weighting indicators in a case like this (e.g. expert opinions or equal weights).
- The particular indicators in this study were chosen very carefully, and the results indicate relatively higher and lower levels of tourism sustainability at the level of Croatian counties. The results do, however, not reveal whether tourism is sustainable or unsustainable across the counties (in absolute terms). Hypothetically, it may be possible that all analyzed destinations in fact have very sustainable tourism in an absolute sense (though some perform relatively lower—but absolutely still high), or they may theoretically all have very unsustainable tourism. Accordingly, if the goal is to make absolute judgments upon tourism sustainability, besides a carefully chosen indicator system, thresholds for all the indicators need to be defined that represent the boundaries between sustainable and unsustainable indicator performance.

Despite all abovementioned limitations, the value of this study is mirrored in the fact that this is the first, though still very rough, quantification of the sustainability with regard to tourism in the coastal area of Croatia. Moreover, the indicator system (i.e. the indicators identified and chosen for modeling the synthetic indicator) has been carefully constructed based on previous research on guidelines provided by relevant international organizations, and thus the indicator system provides a valuable basis for future attempts of quantifying tourism sustainability. Finally, the limitations of this study point to important directions of

future research that has to be conducted to resolve the particular limitations mentioned in this study, with the goal of obtaining a valid and reliable means of measuring the sustainability of tourism.

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