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Tourism Competitiveness and Cultural Resources in the EU: Travel and Tourism Development Index-Based Analysis

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Abstract

Cultural heritage is central to tourism competitiveness, yet its role as a competitive asset remains unclear in many heritage-rich destinations. This paper uses the Travel and Tourism Development Index (TTDI) as a proxy framework to examine cultural resource intensity and indicators associated with event-related activation capacity in relation to tourism performance across EU member states. Through cluster analysis, we identify cultural resource profiles, and via regression-based normalization, we evaluate tourism performance while controlling for population size and cultural intensity. Within the TTDI, cultural activation is captured indirectly through indicators which capture the intensity and structural capacity of cultural assets relevant for tourism performance, treating events as channels that transform cultural endowments into measurable tourism outcomes. This method allows the identification of systematic patterns of relative over- and under-performance. The findings reveal a competitiveness paradox: destinations with abundant cultural assets lead in absolute tourism volumes, but those with more modest cultural stocks often exceed expectations once scale is considered. Some destinations with fewer yet more effectively used cultural resources perform above expectations, suggesting that observed competitiveness is more closely associated with the effective activation of cultural assets than on sheer cultural richness. The paper also shows that regression-based normalization is methodologically valuable for exposing structural competitiveness differences that per capita indicators can obscure.

Keywords: cultural activation; cultural resources; events; tourism competitiveness; tourism demand; TTDI

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1. Introduction

Cultural tourism is an important part of the tourism industry and has been recognized as one of the main components of destination competitiveness in Europe. Heritage, culture, events, and creative industries contribute to tourism and create a favorable impression of destinations (Richards, 2000; Ritchie & Crouch, 2003). In established tourism markets, cultural attractions have been identified as strategic assets. However, there is still little consistency in empirical research on the relationship between cultural attractions and tourism performance (Patuelli et al., 2016; Yang et al., 2019; Mariani & Guizzardi, 2020). Therefore, having cultural resources does not automatically provide a competitive advantage.

Research has shown that competitiveness is also dependent on the activation of cultural resources through institutional coordination, infrastructure, events, and cultural mediation (Daskalopoulou & Petrou, 2009; García-Almeida & Gartner, 2021; Ziakas, 2023). Therefore, it is possible for two destinations with the same level of cultural resources to

have vastly different levels of tourism performance, depending on the governance structure, history, and development strategy of each destination (Mior Shariffuddin et al., 2023).

The Travel and Tourism Competitiveness Index (TTCI), developed by the World Economic Forum, was one of the most commonly used tools for assessing these types of differences in a cross-country context (Kayar & Kozak, 2010; Maráková, 2021). Nowadays, Travel and Tourism Development Index (TTDI) is deployed for these purposes. The index includes a "Cultural Resources" sub-index to measure cultural heritage, creative cities, events, and digital cultural demand. The index has been extensively used in comparative studies, although the results of TTCI/TTDI-based studies are often limited to providing insights into the correlation between the level of cultural resources and realized tourism performance. For this reason, the study draws on the internal Cultural Resources dimension of the TTDI rather than the composite index, allowing a more fine-grained examination of cultural resource components than is possible using an aggregated measure.

One of the primary issues of tourism studies is the common practice of using per capita normalization to account for population size differences. Normalization is often performed to allow for comparison of large and small destinations, but normalization can be problematic if not performed properly (Kratochvíl & Havlíček, 2024). If the normalization ratio violates the proportional scaling assumption, then per capita measures will lead to biased comparisons, favoring smaller populations and reducing the variability in tourism demand or cultural consumption in larger destinations. Previous critiques of comparative tourism studies have emphasized the potential for systematic distortion in the ranking of destinations based on the use of ratio variables, and spurious relationships may occur when ratio variables are used without adequate theoretical justification (Uslaner, 1976; Bollen & Ward, 1979). This is especially relevant in tourism since visitors are not drawn from resident populations.

In response to previous criticisms, researchers have started to apply regression and efficiency-based benchmarking techniques to analyze the conversion of resources into tourism outcomes. Instead of analyzing destinations relative to each other, regression techniques were used to analyze how well each destination performs relative to its resource endowment (Cracolici et al., 2008; Herrero-Prieto & Gómez-Vega, 2017). In this context, regression residuals are interpreted as deviations from expected tourism performance given a destination's cultural resource endowment and population size, allowing for comparative diagnostics. Results show large discrepancies in how efficiently cultural resources are converted into tourism outcomes (Gómez-Vega et al., 2022; Vašaničová et al., 2021). However, the existing literature has neglected the fact that scale effects are embedded in composite indicators used to evaluate the effectiveness of destinations in converting cultural resources into tourism outcomes.

Contribution of the present study is threefold. Conceptually, this study adopts a reconceptualized framework of tourism competitiveness that shifts the emphasis from the mere possession of cultural assets to their strategic activation and utilization. Methodologically, the study transfers the regression-based normalization approach proposed by Kratochvíl and Havlíček (2024) into tourism research, applying it to comparative benchmarking of cultural resources and tourism performance. Empirically, the study identifies systematic patterns of relative overperformance/underperformance of tourist destinations and indicates that when there are similar levels of cultural stock within the same country, the level of effectiveness in activating those cultural resources may result in significant differences in terms of tourism outcomes.

Against this background, the present study addresses the following research questions:

- Q1: How are cultural resources structurally distributed across EU member states, and can meaningful typologies of cultural capacity be identified?

- Q2: Does a higher stock of cultural resources translate into superior tourism performance once population scale is explicitly controlled for?
- Q3: How does the choice of normalization method (per capita versus regression-based) affect the assessment of tourism competitiveness across culturally heterogeneous destinations?

2. Literature Review

Tourism competitiveness is a dynamic construct that has been refined through diverse theoretical and empirical approaches, reflecting the inherently multidimensional nature of tourism systems (Cronjé & du Plessis, 2020; Ritchie & Crouch, 2003; Dwyer & Kim, 2003; Medina-Muñoz et al., 2013). The early integrated models, especially the Ritchie–Crouch model, conceptualized competitiveness as the result of interactions between natural/cultural resources, enabling infrastructures, policy environments, and the capability to manage a destination (Cronjé & du Plessis, 2020). In addition, within this view, competitiveness was explicitly related to a destination's capability to reconcile economic performance with environmental integrity and cultural sustainability (Hassan, 2000); hence, it is not simply based upon the asset base of a destination.

Although the Ritchie–Crouch model has had a profound impact on the study of tourism competitiveness, the concept itself remains a highly debated topic. There is still a high degree of theoretical pluralism and conceptual fragmentation in the literature regarding competitiveness. No single model can account for competitive outcomes across different contexts (Cronjé & du Plessis, 2020). For example, there remain ongoing debates concerning the significance of resource endowments, governance structures, market demand, and institutional environments (Mior Shariffuddin et al., 2023). Therefore, competitiveness is increasingly viewed as a dynamic process. It is not simply a matter of what destinations possess, but how they mobilize, organize, and transform their resources into differentiated tourism experiences (Denicolai et al., 2010; Saffu et al., 2008; Sauvage, 2023; Vargas-Hernández, 2012). This shift towards viewing competitiveness as a dynamic process is particularly evident in cultural tourism research, where researchers emphasize the strategic deployment of tangible and intangible cultural assets through management, interpretation, and product design (García-Almeida & Gartner, 2021; Mardhiyah et al., 2025).

In the context of cultural tourism research, concepts such as cultural value activation, heritage activation, and knowledge-based utilization are used to explain why destinations with similar cultural capital produce markedly different tourism outcomes (Ruan et al., 2025; Daskalopoulou & Petrou, 2009; Mammadova & Abdullayev, 2025). These contributions have challenged static, resource-based views of competitiveness by demonstrating that cultural endowment alone cannot explain performance. Rather, competitive advantage emerges from the institutional, organizational, and symbolic mechanisms that enable cultural resources to be transformed into experiences that resonate with tourists.

Concurrently, a body of empirical literature exists that seeks to operationalize tourism competitiveness through various quantitative and semi-quantitative measurement frameworks. These frameworks vary in terms of scope and intent. Some of the frameworks examine efficiency and productivity, examining how destinations convert input resources into tourism output (Abad & Kongmanwatana, 2015). Other frameworks rely upon macro-level demand-side indicators, such as tourist satisfaction and loyalty, that are typically assessed using large-scale surveys (Štumpf et al., 2018). Multi-criteria decision-making techniques, including PROMETHEE and GAIA, have been applied to comparatively assess a limited number of destinations along multiple dimensions (Lopes et al., 2018). This body of work reflects the methodological maturity of the field, as well as its persistent fragmentation, particularly regarding indicator selection, scale, and interpretive validity.

Therefore, in comparative tourism research, benchmarking has developed primarily as a diagnostic tool, as opposed to an explanatory one (Anderson & Morrissey, 2006; Assaf & Dwyer, 2013; Croes & Kubickova, 2013). Benchmarking serves to identify relative positions, performance gaps, and structural asymmetries between destinations, rather than to elucidate causality between determinants and outcomes. This framework underlies the broad use of composite indices, most notably the Travel and Tourism Competitiveness Index (TTCI) and its successor, the Travel and Tourism Development Index (TTDI), which were both produced by the World Economic Forum.

The TTCI/TTDI frameworks are standardized, multidimensional platforms for cross-country benchmarking (Maráková, 2021). These frameworks combine indicators covering regulatory environments, infrastructure, natural/cultural resources, and environmental management (Purwono et al., 2024; Kayar & Kozak, 2010; Rasethuntsa & Perks, 2022). Their appeal stems from the transparent construction of the frameworks, public availability of data, and long-term consistency of data collection, which collectively enable comparative analysis of heterogeneous national contexts. Thus, a considerable amount of research has adopted TTCI/TTDI-based data for purposes of clustering, pillar-level decomposition, and cross-sectional comparisons (Allahverdi et al., 2025; Jovanović et al., 2014; Nazmfar et al., 2019; Qazi, 2024; Uyar et al., 2023)

Empirical studies illustrate the analytical flexibility of these indices. European destinations have been clustered according to TTCI pillars (Gabor et al., 2012), specific drivers such as ICT have been isolated (Petrović et al., 2016, output-oriented measures of competitiveness have been examined (Maráková et al., 2016), and competitiveness gaps between Central and Eastern European countries and more mature markets have been benchmarked (Krstić et al., 2016). However, despite their methodological diversity, these studies share a common limitation. TTCI and TTDI are typically treated as static representations of competitiveness (Nunes et al., 2025). Little attention is paid to how aggregation rules, indicator composition, or scale effects shape observed rankings and cluster structures (Korol & Krul, 2020; Mihalic & Aramberri, 2015).

This critique aligns with a broader methodological debate surrounding composite indices. Scholars have highlighted that aggregation and weighting procedures embed normative assumptions that can significantly influence results, particularly when heterogeneous indicators combine objective statistics with perception-based survey data (Gómez-Vega & Picazo-Tadeo, 2019). Empirical evaluations further show that changes in TTCI/TTDI scores often exhibit weak alignment with core tourism performance indicators, raising concerns about their reliability as proxies for realized competitiveness (Kunst & Ivandić, 2021). As a result, TTCI/TTDI-based analyses tend to capture co-movement among indicators rather than underlying causal mechanisms, limiting their suitability for policy inference despite their usefulness for descriptive benchmarking (Pérez León et al., 2021).

Within these composite frameworks, cultural resources are explicitly recognized as contributors to destination image and experiential value (Dugulan et al., 2010; Jovanović et al., 2015). Empirical research generally supports the strategic relevance of cultural heritage, with several studies finding that cultural and natural resources exert stronger influences on international tourism growth than infrastructure alone (Joshi et al., 2016). UNESCO World Heritage Site designation has also been associated with increases in arrivals and receipts in some contexts (Bacsi & Tóth, 2019; Kutlu et al., 2024). Yet this evidence is far from uniform.

Considerable research shows that heritage designation has mixed, weak, or context-dependent effects. Meta-analyses and regional studies find that World Heritage inscription does not reliably increase tourism and can even harm destinations with mature markets or limited management capacity (Ivanunik et al., 2021; Mariani & Guizzardi, 2020; Pat-

uelli et al., 2016; Tan et al., 2024; Yang et al., 2019). This highlights the gap between cultural endowment and its effective use, and that heritage status alone does not ensure competitive advantage.

This distinction becomes particularly salient in the context of events. Event tourism research consistently conceptualizes events not as primary drivers of competitiveness, but as catalysts or mediators that amplify processes already present within destinations (Liu, 2014; Ziakas, 2023). Events function by accelerating image formation, mobilizing stakeholders, and concentrating attention, rather than by creating sustained demand independently. Consequently, destinations embedded within more developed and diverse cultural ecosystems are better positioned to appropriate long-term value from events than those relying on isolated, one-off spectacles (Ďad'o et al., 2020; Richards, 2000; Ziakas & Boukas, 2013).

Empirical studies caution that cultural resources and event infrastructure require complementary conditions such as governance coordination, marketing capacity, and digital visibility, to generate measurable tourism outcomes (Bacsi et al., 2023; Li et al., 2022). Evaluative research further shows that many destinations endowed with heritage assets struggle to convert them into compelling visitor experiences without adequate interpretation and integration into broader tourism strategies (Laing et al., 2014). The same pattern is evident in mega-event research, where post-event underutilisation of infrastructure is common when legacy planning is weak or disconnected from local cultural systems (Hartman & Zandberg, 2015; Preuss, 2007; Solberg & Preuss, 2007).

Against this background, methodological choices in comparative tourism analysis become particularly consequential. Per capita normalization remains widely used to adjust for population differences in cross-country comparisons. However, recent methodological work demonstrates that such normalization is not neutral. Kratochvíl and Havlíček (2024) show that per capita ratios are valid only under restrictive assumptions of proportional scaling be-tween population and the variable of interest; assumptions rarely met in tourism demand or cultural consumption. When violated, per capita measures systematically bias comparisons by overestimating performance in small countries and underestimating it in larger ones, distorting rankings and masking structural differences.

The authors find that their results align with long-standing critiques of ratio variables in tourism development, including denominator-driven bias and spurious associations when used without a clear conceptual basis (Bollen & Ward, 1979; Uslaner, 1976). In tourism, an added complication is that international tourists are not part of local populations, and factors such as population density, territorial size, and climate further hinder interpretation. Nevertheless, per capita indicators remain widely used, constraining deeper comparative benchmarking.

As a result of the constraints associated with using per capita indicators for tourism development, a number of researchers in cultural tourism have employed regression- and efficiency-based benchmarking techniques. Instead of assessing destination performance based on the ratio of one dimension of tourism performance to another, these studies compare destination performance against what would be expected based upon their input or "resource" characteristics. In this context, two-stage models involving frontier estimation followed by regression analysis have been used to assess how well destinations convert cultural resources into tourism activity (Cracolici et al., 2008; Herrero-Prieto & Gómez-Vega, 2017). Applications at both the regional and national levels illustrate that having many cultural resources does not guarantee high performance and that there is significant variation in efficiency even among destinations with large numbers of cultural resources (Figueroa et al., 2018; Gómez-Vega et al., 2022).

Regression-based benchmarking has likewise been utilized in frameworks associated with the TTCI. For instance, Vašaničová et al. (2021) employ quantile regression to investigate the relationship between the TTCI's cultural resources component and competitive-ness outcomes, while recognizing that regression should be viewed as a comparative rather than a causal technique. However, this literature has generally inherited the same limitations as composite indices, with little attention paid to scale effects and aggregation bias.

Regression residual–based benchmarking offers a conceptually robust alternative to per capita normalization by modeling expected performance as a function of structural conditions and interpreting deviations as relative performance. In line with its established use across the social sciences, including education, public health, and country-level development analysis (Wang & Jamison, 1998; Gerring et al., 2013; Horn & Lee, 2016); this approach assesses performance relative to structurally expected outcomes rather than absolute levels. Residuals capture systematic gaps between observed and expected outcomes given initial conditions, allowing over- and under-performance to be interpreted as conditional efficiency rather than a scale-driven advantage.

The existing literature shows that regression-based benchmarking is a viable alternative to per capita normalization for cultural tourism analysis, but it has seldom been applied to composite indicators such as the TTDI to correct scale-related bias. This gap motivates the methodological approach of the present study.

To identify patterns of relative over- and under-performance across European Union Member States in terms of the realization of cultural potential, the study employs regression-based benchmarking to evaluate tourism outcomes as a function of population scale using an operationalization of cultural resources, which is the element of the TTDI framework. As is consistent with the benchmarking tradition, the goal is diagnostic rather than causal: to provide insight into differences in realizing cultural potential while acknowledging the interpretative limitations of composite indices (Cernat & Gourdon, 2012).

3. Materials and Methods

3.1. Research Design and Analytical Framework

This study uses a quantitative cross-sectional research design in order to investigate the level of cultural resources in association with tourism performance throughout the member states of the European Union. This study uses the Travel and Tourism Development Index (TTDI) in its theoretical framework and examines structural differences between destinations rather than temporal differences. Although there have been increasing numbers of studies recently that use multiple years of panel data to examine trends over time (e.g., Kutlu et al., 2024), a cross-sectional approach is appropriate for examining how the present levels of cultural intensity relate to the present levels of tourism performance in countries with relatively stable macroeconomic environments. The goal of the study is not to demonstrate causation but to identify comparative trends amongst a common spatial dataset.

The primary research question is to determine the extent to which structural cultural resources differ among the member states of the European Union in terms of tourism performance. Using theoretical frameworks that conceptualize cultural capital, infrastructure, and policy as enablers of cultural engagement and event-based activity, the study proposes that countries with greater cultural endowments will experience better tourism performance when controlling for population size. Therefore, cultural resources are treated as structural conditions associated with observed tourism outcomes through cultural programming, creative participation, and event-based activity.

3.2. Data Sources and Variables

The data set considers all 27 member states of the European Union. Analysis builds on Travel and Tourism Development Index (TTDI), an index published by The World Economic Forum. TTDI is a composite, multi-pillar framework to assess the structural conditions and enabling environment for the sustainable development of the travel and tourism sector across economies. The framework consists of 102 individual indicators aggregated into 17 pillars and 5 dimensions. The study analyses the second edition of the TTDI, published in 2024, which accounts for the latest available data from the previous edition until the end of 2023. EU-wide descriptive statistics of the TTDI cultural resource indicators in their original units are provided in Appendix B.

The study focuses on one of the 17 pillars—the Cultural Resources sub-pillar (TTDI.D/13). The pillar aggregates five indices: World Heritage Sites, Intangible Cultural Heritage, Stadium Capacity, Digital Demand, and UNESCO Creative Cities. In this study, these are understood as structural cultural tourism capacity. WEF's methodology is explained in Table 1.

Table 1. Descriptions and sources of indices [1].

Index	Description	Source
13.01 Number of World Heritage cultural sites	The total number of UNESCO-designated cultural properties located within each country, reflecting internationally recognized tangible cultural heritage assets (2023).	UNESCO World Heritage Centre
13.02 Oral and intangible cultural heritage	The number of nationally recognized oral and intangible cultural heritage practices inscribed under UNESCO conventions, capturing the diversity and vitality of living cultural expressions (2023).	UNESCO Intangible Cultural Heritage
13.03 Number of large sports stadiums	The number of large sports stadiums with a seating capacity exceeding 20,000, reflecting a country's ability to host major sports and entertainment events (2023).	Worldofstadiums.com
13.04 Cultural and entertainment tourism Digital Demand	Measurement using an index of online search interest related to cultural attractions, heritage sites, events, gastronomy, and entertainment activities, serving as a proxy for international interest in cultural tourism offerings (2020, 2021, 2022 moving average)	Bloom Consulting and D2 Digital Demand © data, market leader search engines across the world (mobile and desktop)
3.05 Number of UNESCO Creative Cities	The number of cities within each country that are members of UNESCO's Creative Cities Network, capturing the institutionalized integration of cultural and creative industries into urban development strategies.	UNESCO Creative Cities Network

[1] World Economic Forum (2024).

To illustrate tourism activity, the study uses statistics of realized tourism performance outcomes (i.e., indicators) published by Eurostat until 2023. These are the dependent variables upon destination. Precisely, the study uses international arrivals at tourist accommodations (tour_occ_arnat) (Eurostat, 2025a), nights spent by non-residents (tour_occ_ninat) (Eurostat, 2025c), and travel receipts from the balance of payments (bop_c6_q) (Eurostat, 2025b). Since balance payments are published quarterly, these were aggregated to produce annual values. All variables used for computations are z-standardized so that they may be compared on equivalent scales. While z-standardization improves cross-country comparability across heterogeneous indicators, it also means results are interpreted in relative rather than unit-based terms. For analytical clarity, the tourism performance indicators are denoted by the variable labels X_1–X_3 throughout the empirical analysis. These variables were

taken as proxy measurements for realized tourism performance, which cultural resources may influence but do not exclusively determine. They are explained in Table 2 below.

Table 2. Definition and measurement of tourism performance variables used in the analysis.

Indicator	Variable	Definition
Foreign arrivals at tourist accommodation	X_1	Total number of non-resident arrivals at tourist accommodation establishments (annual count; persons)
Nights spent at tourist accommodation	X_2	Total number of nights spent by non-residents at tourist accommodation establishments (annual count; persons)
Balance of payment—Travel Receipts (credit)	X_3	Total international travel receipts recorded in the balance of payments (annual value; euros)

3.3. PCA, Cluster Analysis, and Regression-Based Benchmarking

Principal Components Analysis (PCA) was applied to the five indicators of cultural intensity. The first principal component accounted for most of the variance in the cultural indicators and was retained as a composite indicator of Cultural Intensity. Additionally, k-means cluster analysis was applied to the same indicators to portray the diversity in cultural intensity across countries. The PCA and clustering techniques provide a descriptive and exploratory function and are not directly entered into the regression equations.

The principal component analysis of the five TTDI Cultural Resources indicators revealed a highly coherent latent structure. The overall Kaiser–Meyer–Olkin measure confirmed excellent sampling adequacy (KMO = 0.837), while Bartlett's test of sphericity ($\chi^2(10) = 134.79$, $p < 10^{-23}$) indicated that the correlation matrix was suitable for factor extraction.

As shown in Table 3, the first principal component (PC1) explained 79.35% of the total variance, with second subsequent component (PC2) contributing around 13.00%; meanwhile, the majority of the other components are below 5%. Therefore, we retained PC1 and PC2. While the proportion of explained variance justifies the retention of PC1 and PC2, their substantive interpretation relies on the PCA loadings reported in Table 4. The two clusters from k-means clustering based on PCA scores were determined by k-means clustering, which is a type of cluster analysis that partitions data into groups based on centroids. A k = 2 cluster solution was selected due to the strong dominance of PC1, and a relatively symmetrical variance structure in the lower-dimensional component space, providing a simple and parsimonious classification along the spectrum of cultural capacity.

Table 3. Principal Component Analysis—Variance.

Standard Deviation	Proportion of Variance	Cumulative Proportion
1.9919	0.7935	0.7935
0.8065	0.1301	0.9236
0.4752	0.0452	0.9688
0.3190	0.0204	0.9891
0.2334	0.0109	1.0000

One major methodological issue in comparing cross-country tourism volume is the dependency of tourism volumes on the size of the population of each country. Countries with large populations will have much higher absolute volumes of tourists because of the sheer size of the population, while countries with smaller populations will appear to have lower per capita volumes of tourism, both because of the smaller denominator and because the effect of size on the numerator is likely to be underestimated. Both raw

and per capita measures of tourism volume thus create structural biases. In response to recent methodological developments made by Kratochvíl and Havlíček (2024), this study employs a regression-based normalization technique to treat the size of the population as an explanatory variable, rather than a divisor.

Table 4. Principal Component Analysis—Loadings.

Index	PC1	PC2
Tangible Cultural Heritage	0.482	−0.017
Intangible Cultural Heritage	0.335	−0.919
Stadium	0.476	0.261
Digital Demand	0.475	0.200
Creative Cities	0.451	0.216

Tourism volume has been modeled as a function of population size and cultural resources through the application of log–log regression models of the following type:

$$\ln(Y_i) = \alpha + \beta_1 \ln(\text{population}) + \beta_2 \ln(\text{cultural resources}) + \varepsilon_i \quad (1)$$

where Y_i represents the number of international arrivals, nights spent, or travel receipts in country i. The logarithm was used to address non-linear scaling issues. Population size is intended to capture the scale factor while cultural resources represent the potential for tourism. The residual term ε_i represents the difference between actual and expected tourism performance. Positive residuals reflect the existence of positive structural surprises (over-performance); negative residuals reflect the presence of negative structural surprises (under-performance). Since the models are estimated in logarithms, the residuals are interpretable as multiplicative deviations from expected values.

Diagnostics of the residuals were used in this study as part of the process to confirm that they could be validly used as the basis for comparative benchmarking of the models developed in the study. Model diagnostics were specifically targeted at those aspects of the residuals that are relevant to residual-based comparisons versus those which are relevant to estimating coefficients. Tests are evaluated at the 5% significance level. They are presented in Table 5 below. The explanatory power of the models was found to be moderate (adjusted R^2 between 0.61 and 0.72), which is typical of the specification of parsimonious cross-country models.

Table 5. Model Adequacy for Benchmarking.

Cluster	X_1	X_2	X_3
N	27	27	27
Adjusted R^2	0.72	0.61	0.72
AICc	62.00	75.40	58.01
Skewness (per capita indicator)	1.32	1.84	3.03
Skewness (regression residuals)	0.98	0.62	0.01
Spearman ρ (per capita, log population)	−0.38	−0.35	−0.40
Spearman ρ (residuals, log population)	0.02	−0.04	0.01
Breusch–Pagan *p*-value	0.29	0.58	0.30
Max Cook's D	0.16	0.15	0.23

The skewness for all the per capita indicators for each of the tourism outcomes is high, at least 1.32 up to 3.03. The skewness for the per capita Indicators also shows an approximately linear relationship with the logarithm of the population size (Spearman ρ = −0.35 to −0.40). These findings provide evidence that per capita indicators tend to

systematically over-penalize larger countries while exaggerating the apparent success of smaller ones.

On the other hand, the skewness of the regression residuals for each of the tourism outcomes is much less extreme (ranging from 0.01 to 0.98) and shows nearly no relationship with the population size (Spearman $\rho = -0.04$ to 0.02). Thus, the computation might have effectively accounted for the scale effects related to the population size, leading to residuals that are much closer to being normally distributed and are therefore better suited for cross-country benchmarking purposes.

Finally, influence diagnostics provided additional evidence for the robustness of the benchmarking framework. The Breusch–Pagan tests do not reject the null hypothesis of homoskedasticity for any of the specifications, and the maximum Cook's Distances (ranging from 0.15 to 0.23) indicated the existence of some degree of influence for a few countries. However, this was expected given the nature of cross-country tourism data. Additionally, the values for Cook's Distance did not indicate that any one country had undue influence over the regression results or the resultant rankings based on the residuals. This supported the idea that the regression residuals represent indicators of relative tourism performance given the country's population size and cultural endowments, but not as efficiency or causal measures. All analyses were conducted utilizing R (Version 4.3.3).

4. Results

4.1. Structure of Cultural Resources and Typology of EU Destinations

The following analysis addresses Research Question 1 by examining the structural distribution of cultural resources across EU member states using PCA and cluster analysis.

To uncover structural similarities among EU member states, a k-means cluster analysis was performed on the standardized TTDI Cultural Resources indicators. The algorithm identified two stable groups (Table 6) that best represented the distribution of cultural endowment. This simple partition already reveals a divide within Europe's tourism landscape. One small group of cultural giants versus a larger circle of moderate performers.

Table 6. TTDI Pillar D.13—Cultural Resources (Cluster Score Averages).

Cluster	Cultural Heritage Sites	Intangible Heritage	Stadiums	Digital Demand	Creative Cities
1	6.44	5.96	5.64	5.81	6.60
2	2.56	3.53	1.58	1.93	2.06

Cluster 1 (Heritage Powerhouses) brings together Western and Southern European destinations (Germany, France, Italy, Spain, and Portugal). They lead the EU by a wide margin, averaging 6.44 Heritage Sites and 6.60 Creative Cities. Equally notable is their strong Stadium score (5.64), which reflects substantial infrastructure for hosting major events, from concerts and festivals to international sports competitions. Their high Digital Demand (5.81) indicates strong online interest in cultural and entertainment content, reinforcing global visibility.

Cluster 2 (Moderate Heritage) gathers most Central, Eastern, and Northern European countries. Their average values remain modest across all five indicators. Only 2.56 World Heritage Sites, 3.53 Intangible Heritage elements, and fewer than two Creative Cities per country. These destinations hold moderate cultural assets, yet much of their potential is either underpromoted or insufficiently connected to international tourism flows. Their comparatively low Stadium score (1.58) indicates a limited capacity to host large cultural or sports events, while the low Digital Demand score (1.93) suggests weak online interest in cultural or other tourism-related content, events included.

The biplot (Figure 1) visualizes the distribution of EU member states across the first two principal components of the TTDI Cultural Resources indicators. The first axis (PC1, 79.4% of variance) represents a gradient of cultural intensity, dominated by tangible cultural resources. The second axis (PC2, 13.0%) distinguishes countries with relatively stronger intangible heritage traditions from those emphasizing material and institutional assets. Two clusters emerge. A compact group of Heritage Powerhouses (Germany, France, Italy, Spain, Portugal) occupying the positive side of PC1, and a broader set of Moderate-Heritage destinations form the lower-intensity group. The configuration highlights Europe's cultural hierarchy, where Western and Southern nations combine rich heritage and creative capacity, while Central and Northern members show more balanced but less internationally visible cultural profiles.

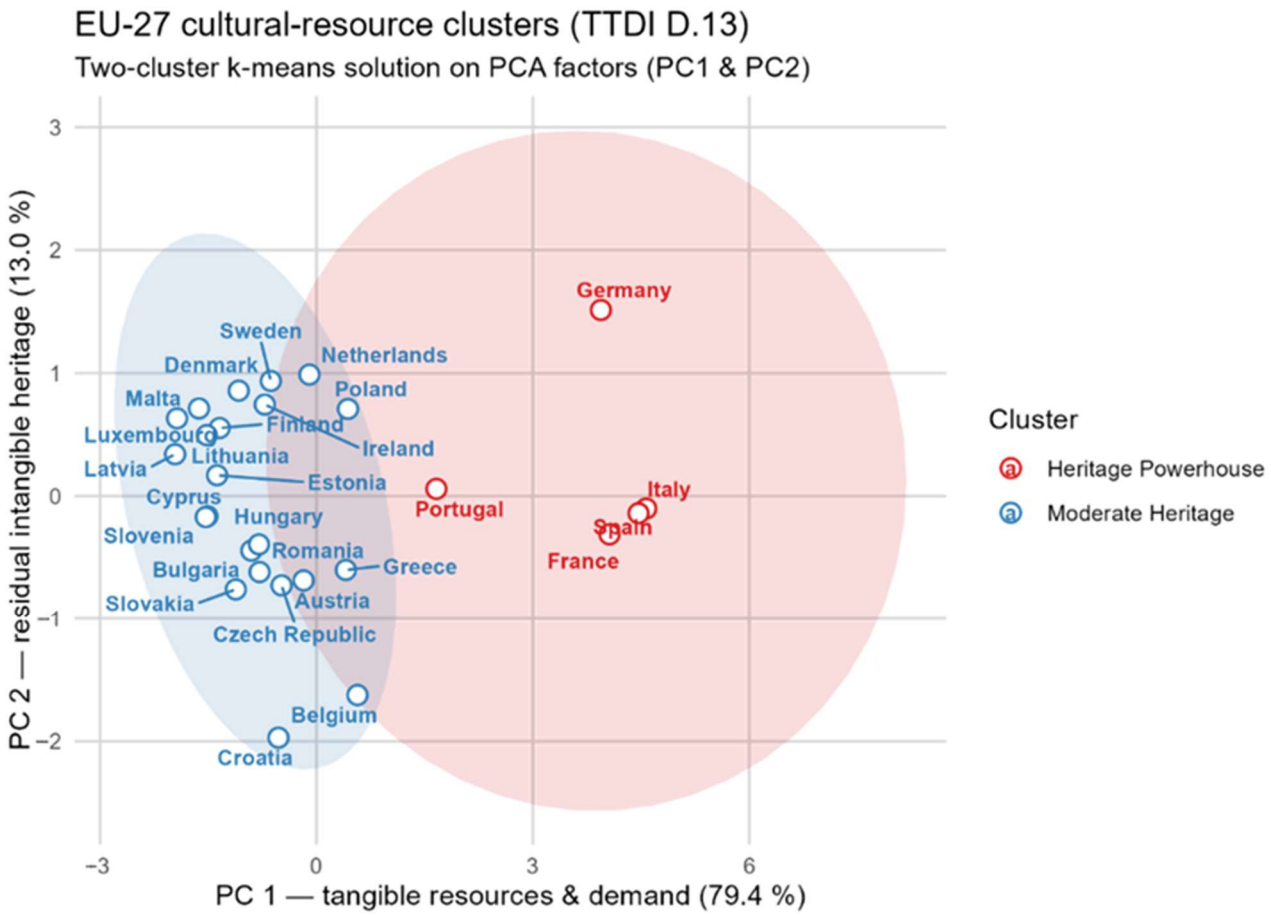

Figure 1. PCA Bi-Plot clustering solution.

4.2. Tourism Performance: Absolute and per Capita Methodology

Tourism performance data amplify this distinction. Tables 7–9 summarize tourism performance across the two clusters under three alternative normalization procedures: absolute totals, per capita ratios, and regression-based residuals. In absolute terms, the Heritage Powerhouse cluster (Cluster 1), comprising Western and Southern European destinations, dominates the EU tourism landscape. In 2023, these countries received on average 49.0 million foreign arrivals, 162.00 million overnight stays, and generated approximately EUR 52.6 billion in travel receipts. By contrast, the Moderate-Heritage cluster (Cluster 2) averaged only 7.0 million arrivals and EUR 7.8 billion in receipts. These gaps largely reflect differences in population size, market capacity, and the maturity of cultural infrastructure.

Table 7. Tourism Performance Indicators in 2023 (Cluster averages)—absolute measures.

Cluster	Absolute Measures		
	X_1	X_2	X_3
1	49,268,851.40	162,346,765.40	52,606,600,000.00
2	7,133,524.50	25,676,228.41	7,843,600,000.00

Table 8. Tourism Performance Indicators in 2023 (cluster averages)—per capita.

Cluster	Adjusted—Per Capita		
	X_1	X_2	X_3
1	1.12	1289.61	1115.69
2	1.34	1711.75	1499.74

Table 9. Tourism Performance Indicators in 2023 (cluster averages)—controlled for population size and cultural resources.

Cluster	Adjusted—Residuals		
	X_1	X_2	X_3
1	−0.1444	−0.2214	−0.0927
2	0.0328	0.0503	0.0211

When tourism indicators are expressed per capita, the hierarchy partially reverses. The moderate-heritage destinations outperform the powerhouses in all three measures, registering 1.34 arrivals per inhabitant, 1711 overnight stays per inhabitant, and EUR 1500.00 in receipts per inhabitant. This indicates that smaller and medium-sized EU members, despite limited absolute volumes, generate relatively higher tourism intensity. Generally said, they accommodate more visitors and earn more revenue relative to their population base.

4.3. Tourism Performance: Regression-Based Methodology

This subsection addresses Research Question 2 by examining whether tourism performance deviates from structural expectations once population size and cultural resources are explicitly accounted for through regression-based normalization.

As discussed earlier, per capita ratios can distort cross-country comparisons if the underlying relationship between tourism outcomes and population size is non-proportional. Following the argument of Kratochvíl and Havlíček (2024), a regression-based normalization was applied. The resulting values are shown in Table 6.

Values of cluster 1 (Heritage Powerhouses) display negative residuals, suggesting modest under-performance relative to their cultural and demographic potential. Cluster 2 (Moderate Heritage) shows residual values slightly above zero across all indicators, meaning these countries attract marginally more visitors and revenue than predicted by their cultural endowment and population.

4.4. Tourism Performance: Comparison of the Methodologies Used

The comparisons between the per capita ratio and regression-based ranking methods illustrate a comparison of the top-performing countries for select variables (Figure 2), with the Spearman rank correlation between the per capita and regression-based rankings ranging between $\rho = 0.75$ and $\rho = 0.79$ ($p < 0.001$). As such, while the two methods appear to be producing very similar country orders based upon tourist performance, there is an imperfect correlation between the two. The difference between the two rankings illustrates

that per capita ratios and regression-based scaling do not produce equivalent measures of tourist performance.

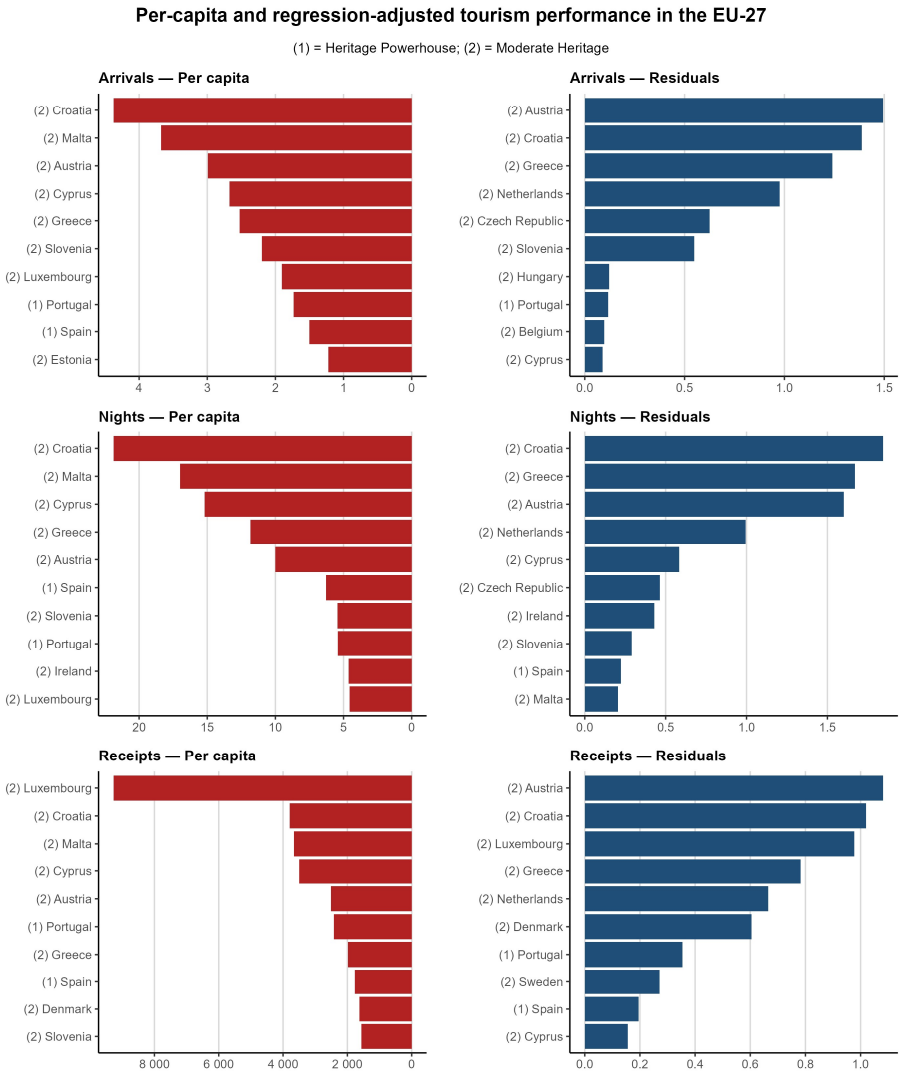

Figure 2. Comparison of ranking of top 10 performing countries using two different methodological approaches.

There is a moderate amount of systematic re-ordering of the countries when comparing per capita and regression-based rankings for the selected variables once population size and cultural resources have been factored into each method's results. The results are found in Appendix A.

The disproportionate effect of the normalization choices on the relative position of small and medium size economies is illustrated in Figure 3, which compares the displacement of rank positions as a result of the shift from per capita to regression-based benchmarking. The relatively large range (dispersion) between rank changes in moderately culturally endowed destinations, when compared to the more stable ranking of the culturally rich systems, shows how the choice of normalization can affect the comparative standing of less culturally endowed tourism economies.

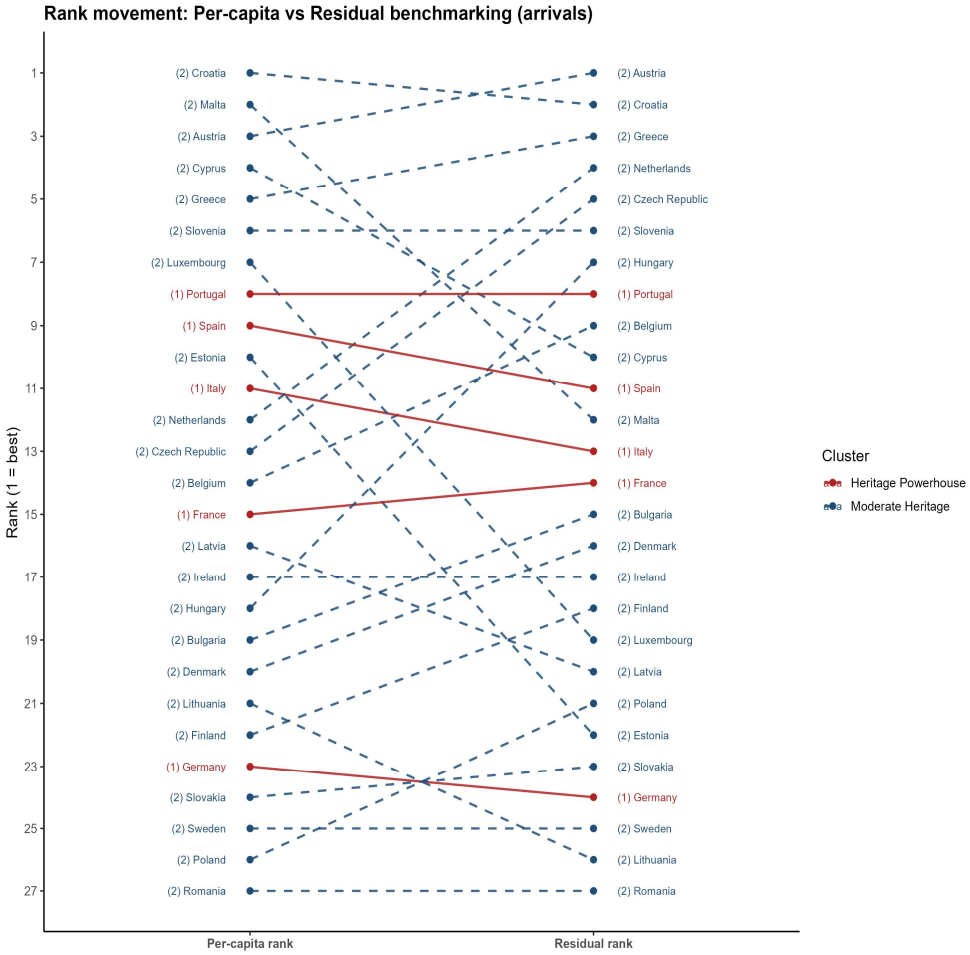

Figure 3. Rank re-ordering: per capita versus regression-based benchmarking (international arrivals).

Per capita vs. regression-based normalization across all three tourism performance indicators—international arrivals, nights spent in tourist accommodations, travel receipts reveal a similar pattern. Figure 2 presents the top ten countries under the regression-based framework and contrasts their relative positions. Per capita measures generate relatively stronger results for small and medium-sized destinations than regression-based measures; however, many destinations exhibit improved rankings under the regression-based framework. This suggests that scale effects are important in evaluating relative destination performance. Additionally, while large heritage-rich systems show little difference between the two methods used to measure their performance, there is greater disparity among the other destination types than the larger heritage-rich systems. Furthermore, the differences are more pronounced when accommodation-based indicators such as nights spent are compared, while less distortion occurs with monetary indicators such as receipts.

Collectively, the per capita and alternative normalization techniques answer RQ3 by demonstrating systematic differences in assessing relative tourist destination performance using per capita ratios versus regression-based benchmarks.

Results from residual-based methodologies provide particularly insightful information on relative tourism performance conditional on structural capacity (cultural resources). Those destinations that exceeded structural expectations are not necessarily those with the largest cultural asset base, but rather those where tourism performance appears more closely aligned with indicators commonly associated with cultural infrastructure, such as event-related infrastructure and digital visibility.

The three normalization approaches showcase different interpretations of tourism performance. Absolute measures reflect scale and historical accumulation, and per capita ratios might systematically privilege small populations, while regression-based residuals enable examination of relative performance conditional on structural capacity. The latter observations suggest that several moderate-heritage destinations outperform expectations despite limited cultural stocks, whereas heritage-rich destinations appear to exhibit patterns consistent with diminishing returns to additional cultural endowment. While the total EU tourism competitiveness ranking is largely unaffected, the size and direction of rank shifts points at the fact that population-based normalization has a material impact on how comparative assessments are made. This distinction is critical for making sense of competitiveness within a large, diverse tourism space such as the European Union.

5. Discussion

This study examined whether there, according to values of TTDI, is a single competitive asset in Europe's cultural resources or separate structural forms of cultural capacity. With respect to Research Question 1, the study found that cultural resources in EU member countries are interconnected but have significant differences across each country. Instead of being reduced to a single common latent factor, this study shows that cultural capacity is formed along a primary axis of structuring related to tangible heritage, creative capacity and demand for culture. The secondary dimension of differentiation is related to intangible heritage. The structure of cultural capacity in European tourism is therefore more complex than earlier studies based on TTCI- and TTDI (e.g., Gabor et al., 2012) that treated cultural resources as multiple dimensions within each individual resource type. The concentration of symbolic authority and global visibility among the top tier of destinations also matches other research that has identified enduring hierarchies in European tourism (Krstić et al., 2016). Overall, this study demonstrates that the cultural capacity of European tourism is inequitably distributed and structurally centralized.

With respect to Research Question 2, the second issue that is related to the first issue is whether increased cultural stock leads to better tourism performance after adjusting for differences in population size and cultural intensity. Although the heritage-rich destinations still dominate in absolute tourism volume, the regression adjusted results show diminishing marginal returns to increasing levels of cultural resources. These results support other empirical studies that have shown that the designation of cultural heritage sites does not always lead to an increase in tourist demand (Patuelli et al., 2016; Yang et al., 2019; Mariani & Guizzardi, 2020); however, these results are at odds with earlier research that associated cultural abundance with tourism growth in a linear fashion (Joshi et al., 2016). A number of destinations with relatively lower cultural stocks have achieved higher-than-expected tourism outcomes. It is possible that some of the research that portrayed smaller destinations as having an inherent competitive advantage (Kayar & Kozak, 2010; Krstić et al., 2016) has done so because of scale-based distortion rather than an actual underlying competitive advantage.

With respect to Research Question 3, these findings raise the methodological issue of how different normalization approaches affect comparative assessments of tourism competitiveness. The comparison between per capita indicators and regression-based benchmarks demonstrated that per capita measures consistently favor smaller population sizes, and that there is compression of variation among larger tourism systems. This result is similar to those found in long-standing critiques of ratio-based indicators in cross-national research (Uslaner, 1976; Bollen & Ward, 1979) and provides direct support for recent methodological research that has demonstrated that proportionate scaling assumptions are not met in most tourism applications (Kratochvíl & Havlíček, 2024). Regression-based benchmarking, by

comparison, evaluates destinations upon expected performance based upon their demographic and cultural characteristics; therefore, regression-based benchmarking produces a more differentiated and structurally consistent picture of relative competitiveness.

From a theoretical perspective, the findings are consistent with criticisms of the Resource Based View (RBV) when applied to established tourism destinations. The findings are consistent with the arguments of Cucculelli and Goffi (2016) and Li et al. (2022) that the competitive advantage of tourism destinations is increasingly dependent on how cultural assets are combined and leveraged rather than simply accumulating cultural assets. Therefore, the relative out-performance of destinations with relatively modest amounts of cultural resources can be seen as a reflection of greater strategic flexibility and not necessarily greater resource endowments.

In the context of interpreting the role of cultural activation and event-based mechanisms, it is important to recognize that these are inferred rather than directly measured processes. For example, indicators such as stadium capacity and digital cultural demand provide insight into a destination's ability to activate its cultural resources; however, they do not measure the quality of events, governance, or the long-term legacies of events. Therefore, the relationship between relative performance and these indicators is consistent with earlier research that conceptualizes events as contingent catalysts and not as autonomous drivers of competitiveness (Ziakas & Boukas, 2013; Ziakas, 2023). Other factors including proximity to major source markets, pricing structures, transportation access and hotel accommodations, may also contribute to observed residual variance and cannot be isolated using the current study design.

6. Conclusions

The present study revisits cultural tourism competitiveness within the EU by differentiating between a destination's cultural endowment (cultural resources) and its relative cultural tourism performance considering structural constraints. The findings suggest that a destination's competitive position is determined not only by the magnitude of the cultural resources available; but also, by the effectiveness of a destination in converting cultural resources into cultural tourism products, relative to a destination's population size and its ability to develop and utilize cultural resources. Culturally rich heritage destinations will continue to dominate in an absolute sense; however, their adjusted performance appears to have diminishing returns based on the increasing amount of cultural capital. In contrast, destinations with relatively moderate amounts of cultural capital may realize outcomes that exceed their structural potential. In addition, from a methodological standpoint, the findings indicate that using per capita metrics to evaluate cultural tourism performance can mask relative performance; however, using regression-based benchmarks to evaluate comparative performance can be used as a more structural metric of comparative evaluation.

7. Limitations

7.1. Data-Related Limitations

This study uses the Travel and Tourism Development Index (TTDI) and it measures through its indicators and aggregation an idea of cultural resources and tourism development that reflects one particular model of these concepts. There was no direct measurement of events; the study approximates the impact of event related issues by using cultural resource indicators, a measure of how many seats there are in stadiums, and digital cultural demand, which is a measure of the ability to fill those seats rather than how well the event is run or governed.

7.2. Methodological Limitations

Since this study is cross-sectional it cannot identify changes over time that exist in the relationship among cultural resources, event-related capabilities, and tourism performance. While regression residuals indicate comparative performance based on population and cultural density, they also absorb unmeasured variables that include price, access to the destination, types of accommodations, and distance to the origin market.

7.3. Conceptual Limitations

This study adopted a diagnostic approach rather than a causal approach. The impact of cultural activation and event-related impacts were inferred from what the researchers found rather than being tested directly and should be viewed with caution.

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Abbreviations

The following abbreviations are used in this manuscript:

TTDI	Travel and Tourism Development Index
TTCI	Travel and Tourism Competitiveness Index
EU	European Union
PCA	Principal Component Analysis
PC	Principal Component
CA	Cluster Analysis

Appendix A

Table A1. Arrivals—Rank difference between per capita and regression-based methodology.

Country	Cluster	Arrivals per Capita	Arrivals Residuals	Rank per Capita	Rank Residuals	Rank Difference
Estonia	2	1.2225	−0.5221	10	22	12
Luxembourg	2	1.9038	−0.3999	7	19	12
Hungary	2	0.5716	0.1227	18	7	−11
Malta	2	3.6761	−0.0297	2	12	10
Czech Republic	2	0.8828	0.6247	13	5	−8
Netherlands	2	1.1399	0.9755	12	4	−8
Cyprus	2	2.6734	0.0887	4	10	6
Belgium	2	0.7902	0.0975	14	9	−5

Table A1. *Cont.*

Country	Cluster	Arrivals per Capita	Arrivals Residuals	Rank per Capita	Rank Residuals	Rank Difference
Lithuania	2	0.4793	−0.7546	21	26	5
Poland	2	0.1925	−0.4600	26	21	−5
Bulgaria	2	0.5617	−0.1665	19	15	−4
Denmark	2	0.5596	−0.1977	20	16	−4
Finland	2	0.4602	−0.3279	22	18	−4
Latvia	2	0.7376	−0.4449	16	20	4
Austria	2	2.9889	1.4938	3	1	−2
Greece	2	2.5232	1.2401	5	3	−2
Italy	1	1.1505	−0.1264	11	13	2
Spain	1	1.5003	0.0233	9	11	2
Croatia	2	4.3766	1.3882	1	2	1
France	1	0.7823	−0.1300	15	14	−1
Germany	1	0.4176	−0.6067	23	24	1
Slovakia	2	0.3725	−0.5993	24	23	−1
Ireland	2	0.7276	−0.2772	17	17	0
Portugal	1	1.7308	0.1175	8	8	0
Romania	2	0.1104	−0.9463	27	27	0
Slovenia	2	2.1975	0.5479	6	6	0
Sweden	2	0.2434	−0.7305	25	25	0

Table A2. Nights—Rank difference between per capita and regression-based methodology.

Country	Cluster	Nights per Capita	Nights Residuals	Rank per Capita	Rank Residuals	Rank Difference
Estonia	2	2.4680	−1.0449	14	25	11
Luxembourg	2	4.5585	−0.7852	10	21	11
Czech Republic	2	2.1576	0.4634	16	6	−10
Malta	2	16.9852	0.2060	2	10	8
Netherlands	2	3.3183	0.9946	12	4	−8
Poland	2	0.4628	−0.5959	26	19	−7
Hungary	2	1.4765	0.0094	20	15	−5
Italy	1	3.9694	−0.1070	11	16	5
Portugal	1	5.4150	0.0424	8	13	5
Sweden	2	1.4808	0.0116	19	14	−5
Lithuania	2	1.0506	−1.1100	22	26	4
Bulgaria	2	2.2572	0.1309	15	12	−3
Finland	2	1.0338	−0.6047	23	20	−3
Latvia	2	1.3690	−0.9771	21	24	3
Slovakia	2	0.8695	−0.8456	25	22	−3
Spain	1	6.2775	0.2229	6	9	3
Austria	2	9.9973	1.6010	5	3	−2
Cyprus	2	15.2024	0.5835	3	5	2
Denmark	2	2.4740	0.1927	13	11	−2
Greece	2	11.8213	1.6707	4	2	−2
Ireland	2	4.6216	0.4304	9	7	−2
Belgium	2	1.8390	−0.1709	18	17	−1
France	1	2.0266	−0.3470	17	18	1
Germany	1	0.9670	−0.9183	24	23	−1
Slovenia	2	5.4478	0.2901	7	8	1
Croatia	2	21.8801	1.8436	1	1	0
Romania	2	0.2344	−1.1867	27	27	0

Table A3. Receipts—Rank difference between per capita and regression-based methodology.

Country	Cluster	Receipts per Capita	Receipts Residuals	Rank per Capita	Rank Residuals	Rank Difference
Estonia	2	2.4680	−1.0449	14	25	11
Malta	2	3655.9291	−0.2115	3	17	14
Estonia	2	1008.1383	−0.9176	13	26	13
Poland	2	378.1820	−0.0416	25	16	−9
Sweden	2	868.1511	0.2707	16	8	−8
Czech Republic	2	664.0204	0.0610	20	13	−7
Netherlands	2	1080.6067	0.6650	12	5	−7
Cyprus	2	3501.2707	0.1557	4	10	6
Hungary	2	759.2807	0.1294	17	11	−6
Italy	1	876.0924	−0.3950	15	21	6
Romania	2	260.9508	−0.4019	27	22	−5
Slovenia	2	1560.5780	−0.0399	10	15	5
Austria	2	2508.1353	1.0812	5	1	−4
Latvia	2	626.6569	−0.8775	21	25	4
Denmark	2	1628.5966	0.6043	9	6	−3
Greece	2	1977.4376	0.7822	7	4	−3
Bulgaria	2	592.4119	−0.3776	22	20	−2
Luxembourg	2	9273.4814	0.9770	1	3	2
Belgium	2	701.1107	−0.2304	18	19	1
Finland	2	675.5967	−0.2251	19	18	−1
Germany	1	421.0013	−0.6522	24	23	−1
Ireland	2	1324.3174	0.0998	11	12	1
Lithuania	2	550.2788	−0.8742	23	24	1
Portugal	1	2417.1262	0.3539	6	7	1
Slovakia	2	272.6389	−1.1850	26	27	1
Spain	1	1769.2495	0.1951	8	9	1
Croatia	2	3790.8081	1.0196	2	2	0
France	1	964.5678	0.0348	14	14	0

Appendix B

Table A4. Descriptive statistics of TTDI cultural resource indicators.

Country	Number of World Heritage Cultural Sites	Oral and Intangible Cultural Heritage	Number of Large Sport Stadiums	Cultural and Entertainment Tourism Digital Demand	Number of UNESCO Creative Cities
Mean	3.28 ± 1.86	3.98 ± 1.82	2.33 ± 1.85	2.65 ± 1.76	2.90 ± 1.95

Table A5. Cluster-level descriptive statistics of TTDI cultural resource indicators.

Country	Number of World Heritage Cultural Sites	Oral and Intangible Cultural Heritage	Number of Large Sport Stadiums	Cultural and Entertainment Tourism Digital Demand	Number of UNESCO Creative Cities
1	6.44 ± 1.25	5.96 ± 1.49	5.64 ± 1.74	5.81 ± 1.49	6.60 ± 0.60
2	2.56 ± 1.03	3.53 ± 1.59	1.58 ± 0.70	1.93 ± 0.69	2.06 ± 0.81

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