Harnessing Tourist Reviews of Natural Attractions to Foster Sustainable Development in Brașov, Romania

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Introduction

Tourism is one of the most dynamic economic sectors worldwide, and mountain- and nature-based destinations play an increasingly important role in attracting visitors (World Tourism Organization, 2022). Brașov County, ranked third in Romania in terms of green-space area, encompasses over 1,365 hectares of green spaces, including forests, natural parks, and protected areas, that form the main pillars of its tourist appeal.

Natural attractions are threatened by overuse and poor planning, requiring a balance between economic growth and conservation to protect ecosystems and communities (Brundtland Commission, 1987). Managing tourist activities and promoting low-impact alternatives is essential, as nature-based tourism can lead to habitat degradation, roadkill, and wildlife disturbance (Wolf et al., 2019). Highly attractive sites are especially vulnerable, with pressure reducing visitor satisfaction over time and potentially causing environmental decline (Barros et al., 2015; Wolf et al., 2019).

Harmonizing economic goals, such as increasing accommodation capacity and tourist arrivals, with resource preservation requires careful planning and participatory governance. Key elements include assessing attractions, defining protected areas, and fostering collaboration among authorities, operators, and communities (UNWTO & UNEP, 2005). At the European level, frameworks like Agenda 21 and Natura 2000 guide sustainability integration in regional development.

Nevertheless, it remains difficult to quantify how visitors' perceptions of natural attractions—as reflected in online reviews—translate into concrete

outcomes for tourism infrastructure and visitor flows. Literature in this area has not explored the relationship between review-based indicators (ratings and review frequency) and accommodation capacity or tourist arrival variations within a given geographic area.

This study investigates the relationship between online review metrics (ratings and volume) of natural attractions and their impact on accommodation development and tourist flows in Brașov County, Romania, aiming to understand how digital engagement influences sustainable tourism planning.

Objectives

The objective of this study is to analyze the extent to which the popularity of natural attractions, as reflected by online review scores and volumes, influences the scale of accommodation development and tourist flows in Brașov County.

Specific research objectives are (i) **t**o quantify the relationship between average natural attraction ratings and the number of accommodation units in the localities of Brașov County; (ii) to quantify the relationship between the number of reviews and the scale of accommodation capacity development in the localities of Brașov County; (iii) to analyse the influence of average ratings of natural attractions on the number of tourist arrivals; (iv) To determine the impact of the number of reviews of natural attractions on tourist flows and (v) to identify whether ratings or review volumes of natural attractions better predict infrastructure development and tourist flows in the localities of Brașov County.

Methodology

Twelve of Brașov County's forty-seven administrative units, accounting for 85.8 % of accommodations and 93.9 % of tourist arrivals in 2024, were selected based on having over 10,000 arrivals (National Institute of Statistics). Within these localities, nine representative natural attractions were chosen. On 25 June 2025, TripAdvisor was queried for each attraction's mean review score and review count. These metrics were

aggregated by locality and used as predictors in Pearson correlation and linear regression analyses.

All statistical analyses were performed using SPSS v.20. To evaluate the strength and direction of linear relationships among number of overnight stays, mean review score, and review count, Pearson's correlation coefficients (r) were computed. This also happened for the linear relationships among accommodation capacity, mean review score, and review count.

Subsequently, separate simple linear regression models were fitted to quantify the effect of number of overnight stays or accommodation capacities on each dependent variable (mean review score; review count). For each model, the unstandardized regression coefficient (B) and its significance ($p < 0.05$) were examined, alongside R^2 to assess the proportion of variance explained.

Results and Discussions

Figures 1–4 present choropleth maps of the four primary indicators across the twelve study localities in Brașov County. Figure 1 illustrates the spatial distribution of review volume, with darker shades indicating localities generating the highest number of online reviews of natural attractions. Figure 2 shows tourist arrivals, facilitating a direct visual comparison between areas of high review activity and actual visitor flows. Figure 3 maps accommodation capacity, revealing how lodging infrastructure clusters in response to demand signals. Figure 4 displays the average reviewer score, providing spatial context for the finding that mean ratings exhibit limited correspondence with infrastructure and visitation patterns. Together, these maps enable a side-by-side assessment of how review frequency, visitor numbers, accommodation supply, and review quality co-locate—or diverge—across the county.

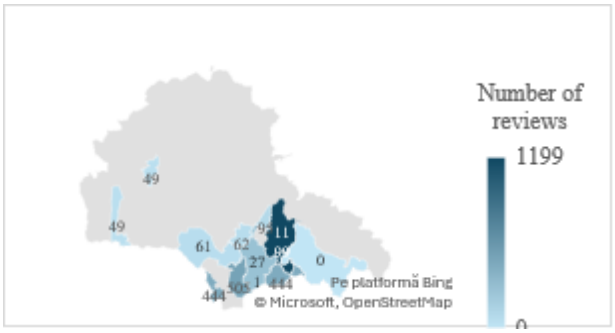

Figure 1: Number of Reviews of Natural Attractions in Brașov County

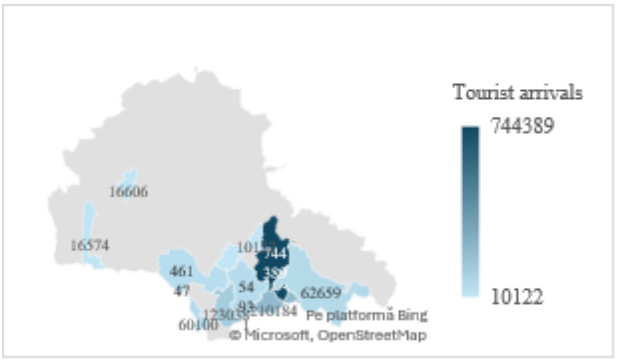

Figure 2: Tourist Arrivals in Selected Localities of Brasov County

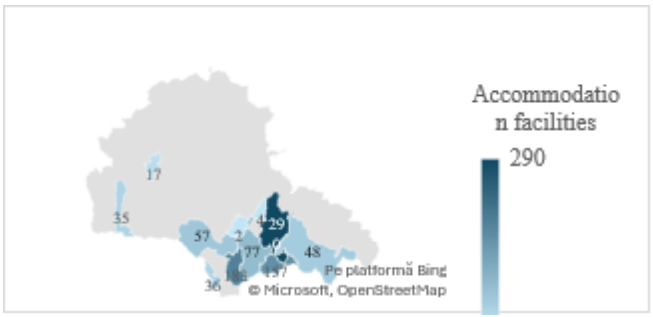

Figure 3: Accommodation Capacity in Selected Localities of Brașov County

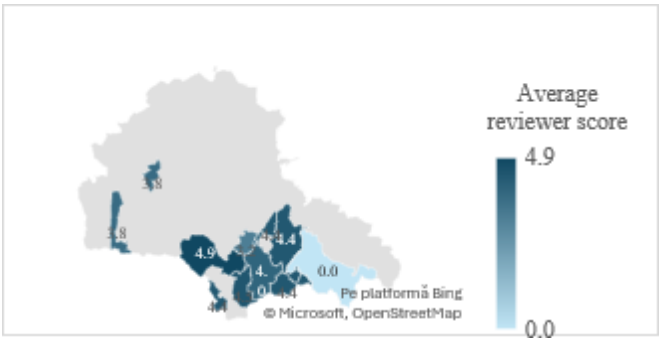

Figure 4: Average Review Score of Natural Attractions in Selected Localities of Brașov County

The Pearson correlation analysis indicated that review volume is strongly and positively associated with both accommodation capacity ($r = 0.730$, $p = 0.007$) and tourist arrivals ($r = 0.916$, $p < 0.001$). In contrast, average reviewer score showed weak, non-significant correlations with accommodation units ($r = 0.299$, $p = 0.345$) and tourist arrivals ($r = 0.175$, $p = 0.586$). These patterns suggest that the number of reviews left by visitors, rather than their mean rating, more closely tracks real-world outcomes in local tourism infrastructure and visitor flows.

To quantify these relationships, two separate linear regressions were conducted. The key regressions results are presented in Table 1.

Table 1: Key Regression Results

Dependent Variable	R^2	Predictor	B	SE B	β	p
Accommodation Facilities	0.537	Number of reviews	0.201	0.068	0.710	0.016
		Average reviewer score	4.561	18.082	0.061	0.807
Tourist Arrivals	0.860	Number of reviews	577.337	79.140	0.967	< 0.001
		Average reviewer score	–23,646.932	20,934.09	–0.150	0.288

In the model predicting accommodation capacity, review count was a significant positive predictor ($B = 0.201$, $SE = 0.068$, $\beta = 0.710$, $p = 0.016$), whereas average reviewer score exerted no meaningful effect ($B = 4.561$, $SE = 18.082$, $\beta = 0.061$, $p = 0.807$). Collectively, these two predictors explained 53.7% of the variance in accommodation units ($R^2 = 0.537$, Adjusted $R^2 =$

0.434; $F(2,9) = 5.214$, $p = 0.031$). The significant β for review count confirms that each additional online review corresponds to a measurable expansion in lodging infrastructure, supporting the notion that providers respond dynamically to perceived demand signals.

In the tourist arrivals model, review count again emerged as a powerful driver ($B = 577.337$, $SE = 79.140$, $\beta = 0.967$, $p < 0.001$), while average reviewer score remained non-significant ($B = –23{,}646.932$, $SE = 20{,}934.087$, $\beta = –0.150$, $p = 0.288$). This model accounted for 86.0% of the variance in visitor numbers ($R^2 = 0.860$, Adjusted $R^2 = 0.829$; $F(2,9) = 27.593$, $p < 0.001$), underscoring that review volume alone captures most of the variation in tourism flow. The negligible role of mean ratings suggests that beyond basic quality thresholds, the sheer presence of user engagement drives destination choice and visitation intensity.

These results show that review volume is a strong predictor of infrastructure growth and tourist influx, while average ratings add little once volume is considered. Monitoring review spikes can serve as an early warning for pressure on natural assets. This study uniquely quantifies how online reviews, specifically volume and ratings, predict accommodation and tourist flow, providing key insights for sustainable tourism management in Brașov County.

Destination managers and planners can leverage this metric to trigger targeted conservation interventions—such as visitor quotas or enhanced trail maintenance—before overuse degrades the very resources that attract visitors. Future research should examine the temporal sequence of reviews and arrivals to clarify causality and incorporate control variables (e.g., accessibility, seasonality) to further validate these findings.

Conclusion and Policy Recommendations

This study shows that online review volume strongly predicts accommodation capacity (53.7%) and tourist arrivals (86.0%) in Brașov County, while average scores add little explanatory power. Using review frequency as a proxy for demand helps policymakers anticipate infrastructure needs and apply targeted conservation measures, such as quotas or trail management, within a sustainable development framework.

A limitation of the study is that while review volume predicts accommodation and tourist arrivals, spikes may be influenced by temporary factors like marketing or events. Therefore, review volume should be considered with other data for a more comprehensive approach to sustainable tourism.

Future research should explore reviewer demographics (e.g., frequent vs. first-time visitors) and temporal factors (e.g., seasonality) to better understand their influence on tourism. It should also examine review trends over time and investigate how inclusive governance can support sustainable tourism growth in Brașov.

References

Barros, A., Monz, C., and Pickering, C. (2015), Is Tourism Damaging Ecosystems in the Andes? Current Knowledge and an Agenda for Future Research, *Ambio*, 44, pp. 82-98.

Bruntland, G. (1987), Our Common Future, *The World Commission on Environment 1 and Development*, pp. 45-65.

Newsome, D., Dowling, R. K., and Moore, S. A. (2005), Wildlife Tourism (Vol. 24), Channel View Publications.

UNWTO & UNEP. (2005), Making Tourism More Sustainable: A Guide for Policy Makers. United Nations Environment Programme.

Wolf, I. D., Croft, D. B. and Green, R. J. (2019), Nature Conservation and Nature-Based Tourism: A Paradox? *Environments*, 6 (9), p 104.

World Tourism Organization. (2022), Ecotourism and Protected Areas: Guidance for Sustainable Tourism Development, WTO.