
CAN RURAL AREAS BENEFIT FROM ONLINE REVIEWS? MANAGING TOURIST SENTIMENTS IN RURAL ACCOMMODATION IN OHRID (NORTH MACEDONIA)

Cvetko Andreeski¹, Margarita Matlievska², Biljana Petrevska³

*Corresponding author E-mail: biljana.petrevska@ugd.edu.mk

ARTICLE INFO

Original Article

Received: 11 Jun 2025

Accepted: 18 August 2025

doi:10.59267/
ekoPolj25041243A

UDC 338.48-44(1-22)
(497.7 Ohrid)

Keywords:

*Rural tourism, Management,
Sentiment analysis, Rural
accommodation, Rural
development*

JEL: L83, R11, M31

ABSTRACT

This paper investigates factors influencing tourist satisfaction with rural accommodation, crucial for the sustainable development of rural areas. Recognizing that accommodations are important for rural economies, this study performs a sentiment analysis. It analyzes 4,557 online reviews from tourists visiting the rural areas of the east coast of Lake Ohrid (North Macedonia). Results reveal 15 factors grouped into four clusters: 'Facility', 'Surrounding', 'Service', and 'Site'. The 'Surrounding' cluster has the most profound impacts on tourist satisfaction, consistently generating strong positive sentiments due to the excellent natural landscape in which rural accommodations are located. The 'Facility' cluster generally impacts negative sentiments, while 'Service' displays mixed sentiments. The 'Site' cluster reveals partially positive and mixed but negative sentiments. Such variability suggests a need for further managerial analysis and targeted improvements. This research provides practical suggestions for managers of rural accommodation to understand tourist emotions, optimize service quality, and foster sustainable rural tourism development.

Introduction

In the contemporary digital landscape, planning travel often begins with seeking information on Online Travel Agencies (OTAs) such as Booking, Expedia, Airbnb, TripAdvisor, etc. These platforms offer a vast range of travel options, from

-
- 1 Cvetko Andreeski, Full Professor, Faculty of Tourism and Hospitality – Ohrid, St. Kliment Ohridski University – Bitola, 95 Key Tito Ohrid, 6000, North Macedonia, E-mail: cvetko.andreeski@uklo.edu.mk, ORCID ID (<https://orcid.org/0000-0003-2836-5426>)
 - 2 Margarita Matlievska, Full Professor, Faculty of Economics, MIT University – Skopje, bul. Treta Makedonska Brigada 66a, 1000 Skopje, North Macedonia, E-mail: mmatlievska@yahoo.com, ORCID ID (<https://orcid.org/0009-0003-4749-0668>)
 - 3 Biljana Petrevska, Full Professor, Faculty of Tourism and Business Logistics, Goce Delcev University, Krste Misirkov 10, 2000 Stip, North Macedonia, E-mail: biljana.petrevska@ugd.edu.mk, ORCID ID (<https://orcid.org/0000-0002-1238-4158>)

accommodation to various tourism activities, becoming essential tools for modern travelers who can easily book services within a single, user-friendly interface.

On the other hand, tourists post text reviews on these platforms explaining everything about their experiences, from the comfort of the beds to the friendliness of the staff. These narratives go beyond simple scores and provide valuable context shaping the decisions of future travelers. Highlighting both positive and negative memorable moments plays a significant role in creating electronic word-of-mouth (e-WOM). Online recommendations and first-hand stories often carry more weight than traditional marketing, by shaping perceptions and inspiring visits (Chevalier & Mayzlin, 2006; Duan et al., 2008; Floh et al., 2013; Song et al., 2016; Zakarija et al., 2024).

The digital revolution, led by OTAs and the widespread influence of e-WOM, has significantly transformed global tourism patterns, particularly in booking, even reaching the most remote areas. This enabled change in the landscape of rural areas which became easily accessible, empowered with trust and worthiness for visiting unique rural destinations. The authentic experiences that the rural locations offer create a dynamic relationship where OTAs and traveler narratives are essential for understanding the dynamics of modern rural tourism (Chen et al., 2013; Lee et al., 2003; Zhai & Chen, 2020).

When coping with numerous unfavorable socio-economic trends such as aging, depopulation, and abandonment, rural areas are seeking new opportunities for resilience. Often an effective solution is detected in the increasing demand for leisure and tourism (Ruiz-Real et al., 2020), serving as an effective way to revitalize from economic and socio-cultural difficulties (Tseng & Yang, 2010). Consequently, rural areas and villages are transformed into second-home tourism destinations (Terzić et al., 2024) or offer rural establishments where tourists can experience adventures while enjoying rurality (Perić et al., 2020). Tourism related activities significantly contribute to sustainable rural livelihoods, making important the maintenance and evaluation of sustainable rural tourism development (Terzić et al., 2019).

Rural tourism is a vital driver of socio-economic development (Cvijanović & Ružić, 2017) and is urged to develop through the powerfulness of e-WOM. When sharing online reviews on rural sightseeing spots and accommodation establishments, they contribute to sustainable growth. Particularly positive online narratives play a crucial role in attracting new visitors and fostering the development of rural areas. This “spill-over effect” (OECD, 2017) of tourism activities includes job creation, increased incomes, infrastructure development, knowledge diffusion, and tourism promotion (Terzić et al., 2020).

In North Macedonia, rural areas have been a focus of various initiatives for introducing new innovative tourism products for their reanimation and improvement (Petrevska et al., 2021). The importance of their rural capital has been elaborated as an important precondition for developing rural tourism (Dimitrov et al., 2020). Researchers have also identified various activities to support tourism in depopulated rural areas in North Macedonia (Dimitrov & Petrevska, 2020), acknowledging numerous challenges

(Dimitrov & Petrevska, 2019) along with the importance of planning for tourism development (Petrevska & Dimitrov, 2013). Furthermore, discussions have explored rural tourism development zones in North Macedonia (Dimitrov and Petrevska, 2012).

While the importance of developing rural tourism in North Macedonia has been previously discussed (Dimitrov & Petrevska, 2012, 2019, 2020; Petrevska et al., 2021), there has been no specific research on the sentiments of tourists that visit rural areas. Online reviews contain far more reliable information than only rating on OTA websites, which cannot reflect specific characteristic dimensions that may interest potential tourists. This research aims to identify tourists' sentiments and to determine factors that affect their satisfaction with accommodation in rural areas. It carries out opinion mining on online text reviews from Booking.com from tourists who visited rural accommodation in the east coast of Lake Ohrid, a top summer tourist destination in North Macedonia. This platform was selected due to its widespread use among accommodation providers in North Macedonia, which translates to a larger volume of reviews available for analysis and a higher level of trust compared to OTAs.

Following this introduction, the paper presents an overview of relevant literature, followed by the methodology section. The next section details the results, along with a discussion of the findings. Finally, the paper concludes with the main conclusions.

Literature review

Electronic word of mouth (e-WOM) has fundamentally reshaped the way everything is promoted, allowing consumers to communicate directly and easily interact with review content. Researchers extensively acknowledge the benefits of online reviews from various platforms as an information source for both consumers and service providers (Chevalier & Mayzlin, 2006; Duan et al., 2008; Floh et al., 2013; Song et al., 2016). Generally, they all agree that online reviews represent the most intuitive, specific, and authentic consumer experience with online platforms which serve as an important distribution channel.

Chevalier and Mayzlin (2006) examine the effect of consumer reviews on relative sales of books on online platforms and confirm that this form of communication has an important impact on customer behavior. Their study evidence that e-WOM directly impacts consumer purchasing behavior and decision. Duan et al., (2008) further argue that online reviews enable potential consumers to make informed purchasing decisions and assist managers to improve the quality of products and services. They argue that the underlying e-WOM effect plays a dominant role rather than the user ratings. According to their study, while the online review sites facilitate the revelation of e-WOM, they may not play a significant role in influencing sales as commonly expected. Floh et al., (2013) investigate the effect of online reviews on shopping behavior revealing the content that most concern consumers and uses them to study the factors affecting consumer satisfaction. Their findings indicate a significant change in online shopping behavior in response to positive medium and strong reviews, but not to negative ones. Upon these findings, they suggest that managers should

encourage customers to share positive consumption-related experiences by offering strong arguments that will convince other customers. Similarly, Song et al. (2016) recognize the importance and potential benefits of customer reviews as a source of the ‘voice of customers’. They propose a framework and procedures for analyzing customer reviews, specifically tailored to diagnosing service quality. By capturing customers’ perception, they provide a diagnostic tool capable of examining service quality.

Scholars also extensively investigate tourist satisfaction based on tourists reviews since online tourism platforms have been strongly used for tourism purposes (Chen et al., 2013; Lee et al., 2003; Zakarija et al., 2024; Zhai and Chen, 2020; Wu & Yang, 2023). Zakarija et al., (2024) investigate attractions as an important aspect of destinations often requiring careful attention and investments. They develop a sentiment analysis model, demonstrating its effectiveness and applicability to other destinations to increase visitor engagement. Zhai & Chen (2020) delve into the factors affecting tourist satisfaction with rural homestay inns. They employ a sentiment analysis and construct an econometric model to interpret the relationship between rural homestay inns and tourist satisfaction. Chen et al., (2013) discuss resource allocation in developing marketing strategies for bed and breakfast capacities in rural tourism. Surprisingly, their research detects WoM publicity as the most effective promotion channel over the OTA websites and travel guidebooks. Lee et al., (2003) similarly discuss that the WoM publicity is considered the most successful marketing strategy for rural accommodation, primarily due to limited financial resources and room capacity. Yet, they note that a limitation of this type of promotion is its inability to reach a specific target market. Wu & Yang (2023) investigate insights from tourist online comments regarding rural destinations. They uncover full details on five service attributes (Nature, Price, Food, Hospitality, and Culture), and propose a methodology for developing specific sustainable strategies for understanding rural tourism.

In summary, researchers widely use analysis of online reviews to create models that extract factors that enable interpretation of the relationship between service and satisfaction. This research aligns with this state-of-the-art approach, contributing to a better understanding of rural areas and their potential for resilience and development.

Methodology

The research analyzes online reviews from Booking.com for accommodation in rural areas located on the east coast of Lake Ohrid. It aims to identify the factors that affect tourists’ satisfaction, quantify their impact and, provide a theoretical foundation and practical framework for rural accommodation to improve tourists’ satisfaction.

More precisely, the study addresses the following research questions (RQs):

RQ₁: Which factors affect tourist satisfaction with accommodation in rural areas?

RQ₂: Which emotions reveal the relationship between accommodation feature evaluation and tourist satisfaction in rural areas?

To meet these questions, a combined multi-stage methodological approach is employed. Stage 1 involves desk research, a scholarly approach (Van de Ven, 2007), which includes literature review.

Stage 2 involves collecting data from Booking.com, one of the world's leading OTAs. The sample comprises five villages (Dolno Konjsko, Elshani, Peshtani, Trpejca, Ljubanishta) and two tourist settlements (Eleshec, St. Naum), all located on the east coast of Lake Ohrid (Fig 1). These locations are selected for their specific geographic location within this significant region. They represent a diverse range of tourism activities and accommodation options typical of the area's rural tourism sector, enabling an examination of the various factors influencing their development.

Figure 1. Locaton of sampled rural areas, east coast of Lake Ohrid (North Macedonia)



Description: 1- Dolno Konjsko, 2- Eleshec, 3-Elshani, 4-Peshtani, 5-Trpejca, 6-Ljubanishta, 7-St. Naum

Source: Authors

The sampled locations include 79 accommodation facilities, such as private apartments and villas. These are registered on Booking.com and have 4,557 text reviews written between January 1, 2023, and December 31, 2024 (Table 1).

Table 1. Sampling details

Village / Tourist settlement	Number of accommodations	Number of reviews	Average grade	Standard deviation
Dolno Konjsko	13	992	8.8	0.70
Eleshec	4	83	9.5	0.49
Elshani	8	1,122	9.5	0.37
Peshtani	21	622	9.1	0.72
Trpejca	22	1216	9.2	0.88
Ljubanishta	9	126	9.7	0.50
St. Naum	2	396	8.7	0.21
Total	79	4,557	9.2	0.74

Source: Booking.com and authors' calculations

Stage 3 involves data preprocessing and filtering. The raw review text is organized before the analysis (Haddi et al., 2013) and transformed into meaningful features that the model can understand. This enables the model to perform accurate sentiment classification (Kosala & Nirmalrani, 2025). Specifically, a Support Vector Machine (SVM) algorithm is employed. Out of 4,557 total reviews, only 3,460 are analyzed. The remaining text is removed as noise – elements such as emoticons, special characters, symbols, repetitive punctuation (e.g. three dots in a series), HTML tags, URLs, excessive whitespace, and similar. These noisy elements are removed since they can confuse the model. Also, all numbers were removed and, if relevant, were replaced by appropriate words. Non-English reviews were translated in English. The reviews were already bi-polarly classified (79% positive and 21% negative), because guests were first prompted to write about positive aspects, followed by negative ones. Yet, in many instances, in the section for negative aspects guests wrote phrases like “Nothing to dislike” or “Everything was good”. These sentences were not included into consideration for further analysis.

Stage 4 is data processing. To identify different factors, aspects of the classified factors, and key notes about tourist satisfaction with accommodation, factor sentiment analysis (FSA) is applied with Google Colab. This process includes several iterations of text analysis, combining with Natural Language Processing (NLP), Lexicon-based sentiment analysis, pattern recognition, contextual and human understanding. The results are presented as a dendrogram of review clusters (Fig 2) and a factor sentiment heatmap (Fig 3). Summarized sentiments are presented in Table 2.

Stage 5 is calculating evaluation metrics. Precision (P), Recall (R) and F-value (F) as standard parameters are calculated using both the SVM algorithm and the overall NLP process (Table 3). P measures the number of positive class predictions that belong to the positive class, R calculates the number of positive reviews out of all positive examples in the dataset, while the F balances the concerns of both P and R into a single metric.

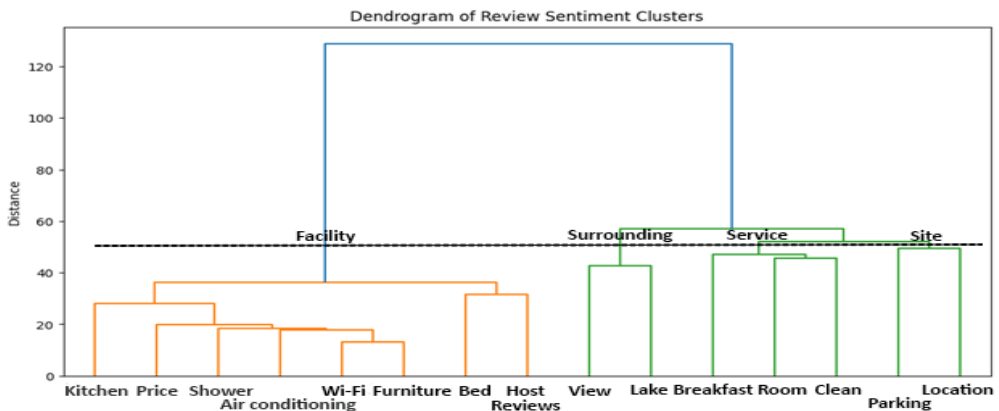
Stage 6 involves reporting, which includes a qualitative data evaluation (Hora, 2014).

Results

The sentiment analysis covers all sampled locations, not individual sites like villages or tourist settlements in rural areas. Table 1 (sampling details) shows a high average rating (9.2) and standard deviation (0.74) for the analyzed facilities. This is likely because most accommodations are private apartments and villas that offer quality service at low prices. The lowest rating (8.7) stands for the tourist settlement St. Naum. Yet, since one out of two accommodation units there is a hotel, this rating may not accurately reflect the overall quality of accommodation. The second-lowest rating (8.8) is for the accommodation in the village of Dolno Konjsko offering higher prices and lower quality service. Regarding consistency of the ratings, the smallest standard deviation (0.21) is for St. Naum, followed closely by Elshani (0.37). The highest standard deviation (0.88) is observed for the village of Trpejca, followed by the villages of Dolno Konjsko (0.7) and Peshtani (0.72).

Out of 3,460 applicable reviews, 79% are positive and 21% are negative. There is a significant difference in the average sentiment values for positive reviews (0.994) and negative (0.0188). This notable difference is due to the review system of Booking.com which has separate sections for positive and negative sentiments.

Figure 2. Dendrogram of review sentiment clusters



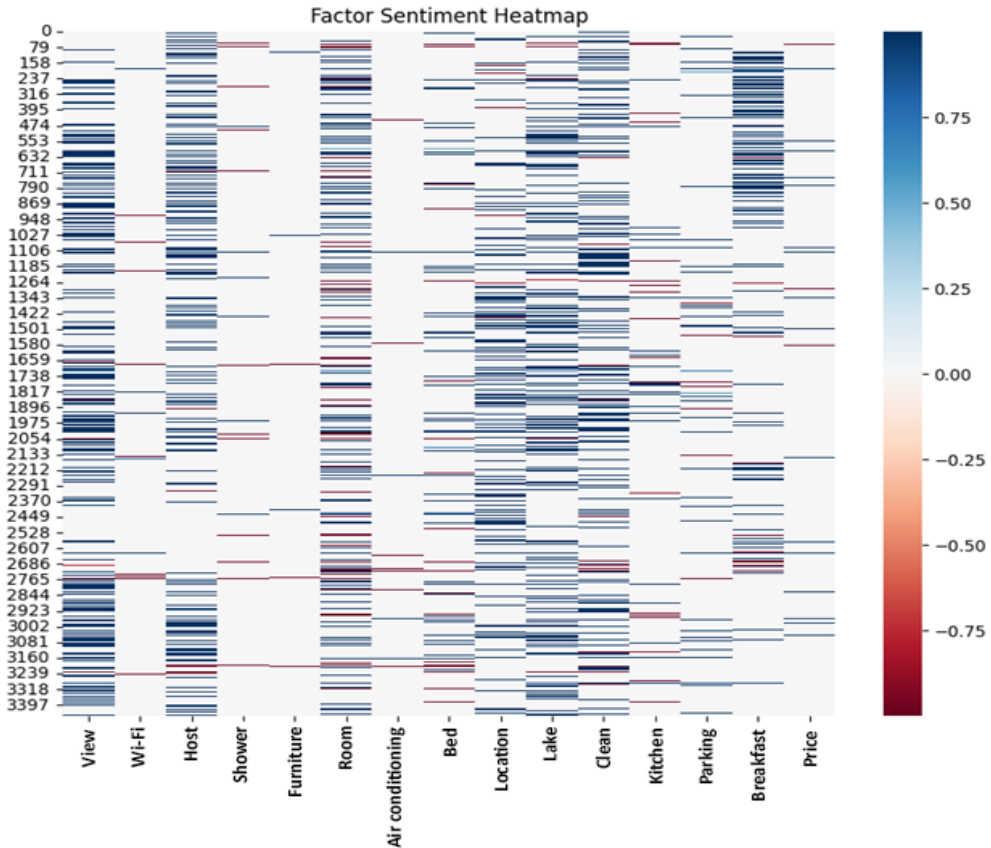
Source: Authors

Figure 2 displays a dendrogram of clusters derived from 104,253 words within reviews. These words were vectorized as nouns and grouped using K-means clustering, identifying 15 key factors. Following hierarchical clustering, these factors were further organized into four broader categories:

- Factor 1: 'Facility' – This is a broader category encompassing 'Kitchen', 'Price', 'Shower', 'Air conditioning', 'Wi-Fi', 'Furniture', 'Bed', and 'Host reviews'.
- Factor 2: 'Surrounding' – This includes 'View' and 'Lake'.

- Factor 3: ‘Service’ – This category includes ‘Breakfast’, ‘Room’, and ‘Clean’.
- Factor 4: ‘Site’ – This consists of ‘Parking’ and ‘Location’.

Figure 3. Factor sentiment heatmap



Source: Authors

Further, the clustering quality is determined by the closeness of clusters with 128 levels in distance axis presented in Figure 3 as a factor sentiment heatmap. This map visually represents the scores, and distribution of both positive and negative sentiments associated with the key factors identified from tourist reviews. Moreover, the heat map enables discussion of the granular understanding of how tourists perceive specific aspects of the service of rural accommodation, allowing for targeted improvements. Sentiments for each identified factor range from deep red (representing strong negative sentiment) to deep blue (representing strong positive sentiment). The more prevalent a sentiment, the greater the influence of that factor. This visualization is particularly important for addressing negative factors enabling targeted improvements to enhance overall tourist satisfaction.

Table 2 summarizes the most significant factors influencing overall customer satisfaction and dissatisfaction. Sentiments are categorized as positive (from generally positive (+) to strongly positive (+++)), negative (from generally negative (-) to strongly negative (---)), and mixed (indicating different variations).

Table 2. Summarized sentiments

Factor class	Positive sentiment	Negative sentiment	Mixed sentiment
Facility	'Host reviews' (+) 'Kitchen' (+)	'Shower' (-) 'Air conditioning' (---) 'Wi-Fi' (-) 'Furniture' (-)	'Price' (+) 'Bed' (-)
Surrounding	'View' (+++) 'Lake' (+++)		
Service			'Breakfast' (+) 'Room' (+-) 'Clean' (+)
Site	'Location' (++)		'Parking' (-)

Source: Authors

The model's performance is evaluated using standard parameters. As shown in Table 3, the model achieves high Precision of 91.2%, a high Recall of 92.7%, and a desirable F-value of 0.919. These metrics collectively indicate a good fit for the algorithm.

Table 3. Evaluation metrics

Precision (%)	Recall (%)	F-value
91.2	92.7	0.919

Source: Authors

Discussions and findings

This section discusses the factors and effects (positive, negative and mixed) of online reviews on tourist satisfaction with accommodation in rural areas. It is important to understand that numerical ratings of online reviews alone are insufficient for a comprehensive evaluation. They cannot lead to thorough and accurate evaluation of the tourist product due to its multi-dimensional attributes. Besides rating, writing comments on the experience on the OTA website immediately after leaving the accommodation provides valuable insights that determines the reputation of the accommodation unit and affects the choices of other consumers.

The research identified 15 factors, clustered into four main categories: 'Facility', 'Surrounding', 'Service', and 'Site'.

The 'Surrounding' category elicited the strongest positive emotions, with the natural environment being the most significant trigger for satisfaction. This finding aligns with the research by Wu and Yang (2023) and Zhou (2014), which highlights nature as a powerful source of experiencing authentic satisfaction and aesthetic pleasure.

‘Facility’ emerged as the second strongest emotion, consistent with the findings of Zhai & Chen (2020). However, the results revealed negative sentiments and frustrations, echoing discussions by Xu & Li (2016). Specific facility elements such as shower, air conditioning, wi-fi connectivity, and furniture equipment were identified as sources of dissatisfaction, despite their recognized importance in influencing overall tourist satisfaction (Gu & Ryan, 2008).

Opposite to Zhai & Chen (2020), who identified the strongest emotion in the ‘Service’ dimension, this research ranked this factor to be the third most impactful. The elements that determine this clustered factor displayed mixed sentiments, ranging from positive to neutral and negative. Such variability in emotions suggests a need for improvements and more consistent standards in providing service.

Finally, the ‘Site’ factor revealed positive sentiments in ‘Location’ consistent with other studies that confirm that a favorable location contributes to positive sentiment (Gu & Ryan, 2008). Conversely, ‘Parking’ was perceived with mixed but generally negative connotations, a finding also supported by research indicating parking as a determinant of customer dissatisfaction (Xu & Li, 2016).

Besides general factors, the research further examined how online reviews of rural accommodations affect tourist satisfaction.

Tourists generally express positive sentiments towards ‘Host reviews’ and the ‘Kitchen’ (‘Facility’) factors. Rural accommodations are usually family-run, offering a friendly atmosphere where owners put significant effort into enabling pleasant stays and helping tourists connect with the local environment (Nuntsu et al., 2004). The positive sentiment on host interactions significantly contributes to overall satisfaction, highlighting the importance of hospitality (Wu & Yang, 2023). This welcoming approach, combined with local culture, ecology, and natural beauty, creates a unique leisure experience (Wu & Jang, 2010). Similarly, the ‘Kitchen’ factor appeared in 61 reviews, with 37 expressing positive sentiment, indicating that guests are provided with functional and operational kitchenettes. Yet, the presence of variability in these elements suggests inconsistencies in facility services which may be a starting point for further improvement. On the other hand, the ‘View’ (‘Surrounding’) factor consistently received strong positive sentiment across all reviews, confirming its importance to tourist satisfaction. In this line are also the reviews for the ‘Lake’ factor that showed overwhelmingly positive sentiment. All sampled rural accommodation units have views of Lake Ohrid, so it is expected to have such strong sentiment. To this, the ‘Location’ (‘Site’) factor was noted in many reviews with strictly positive sentiment which is also anticipated since all sampled accommodations are located on the aesthetically pleasant east coast of Lake Ohrid. Good and favorable geographical location is critical for a positive sentiment (Gu & Ryan, 2008). Only seven reviews rated location negatively, mostly due to infrastructure concerns. This finding suggests that the natural landscape of rural areas provokes overwhelming positive emotions. So, Lake Ohrid, along with the panoramic view that rural establishments provide, are the most powerful and attractive elements of rural

tourism product that managers should have in mind when creating marketing strategies. The natural environmental surrounding of rural areas is frequently packaged to attract tourists, allowing them to experience the nature (Wu & Yang, 2023; Zhou, 2014).

Negative sentiment is detected only within the 'Facility' factor, specifically concerning 'Shower', 'Wi-Fi', 'Furniture' and 'Air conditioning'. It is very important for tourists to have a comfortable and cozy stay, so they pay great attention to many aspects of an accommodation facility (Zhai & Chen, 2020). Yet, findings suggest that tourists exhibit predominantly dissatisfaction and negative sentiment with insufficient hot water for showering, poor wi-fi connectivity, outdated furniture inadequate to meet room-star typology and categorization standards. The 'Shower' factor appeared in 32 reviews, and in most cases (22) guests highlighted issues related to water difficulties. Dissatisfaction with the water heating system, water flow and the absence of shower cabins, is often mentioned as a negative sentiment (Foris et al., 2020). Similarly, slow internet connection and weak wi-fi signal often provokes frustrations and negative feedback (Xu & Li, 2016). The need for urgent improvements in this area is further emphasized by the strong negative sentiment detected at 'Air conditioning'. Tourists noted the absence of AC devices in some accommodations. Having in mind that Ohrid is a popular summer destination with high temperatures, tourists expect to be accommodated in air-conditioned rooms. Generally, the air conditioning systems in rooms are highly valued by tourists (Foris et al., 2020).

Tourist satisfaction shows mixed sentiments across several key areas. These include 'Breakfast', 'Room,' and 'Cleanliness' under the 'Service' factor; 'Parking' as a 'Site' factor; and 'Price' and 'Bed' as 'Facility' factors. Finding positive, neutral and negative feedback in three out of four main clustered factors provides a good starting point for deeper managerial analysis. 'Breakfast' ('Service') factor is identified as very important since it appears in 146 reviews with 124 of those expressing positive sentiments. Generally, when guests are accommodated in urban areas (like Ohrid for example) they have many options for breakfast and other meals. This is not usually the case in rural areas, where guests often must search for restaurants or small grocery shops that might be far from their accommodation. In most of the sampled units, hosts live alongside tourists and offer a homemade breakfast from local ingredients, which is included in the accommodation price. For other elements comprising the 'Service' factor, tourists also show mixed sentiments. "Room' comfort is perceived with both positive and negative emotions, while generally positive, variations in the 'Clean' factor indicate a need for improvements and more consistent standards for service in rural accommodations. The mixed sentiment on the 'Parking' ('Site) factor may be attributed to limited parking capacity at specific facilities and the need for coordination among guests. Generally, issues like room cleanliness and parking are known to cause customer dissatisfaction (Xu & Li, 2016). Similar stands for the 'Bed' ('Facility') factor which appears in 104, with 32 expressing negative feedback. Bed conditions, particularly size, comfort and linens, are important attributes for customer satisfaction (Gu & Ryan, 2008; Jang et al., 2018). The 'Price' ('Facility') factor also has mixed sentiment, though it is generally

positive given the specific location and accommodation. It appears in 36 reviews, with only six guests expressing dissatisfaction. Generally, prices for accommodation in rural areas are typically lower compared to the urban Ohrid area. Price is often a key driver that guides tourists when choosing rural accommodation affecting their satisfaction (Fanelli, 2020; Wu & Yang, 2023).

Such varied findings of positive, negative, and mixed sentiments regarding tourist satisfaction offer valuable insights for focused managerial efforts to enhance overall guest satisfaction.

Conclusion

Accommodation units in rural areas are important for stimulating local economic dynamics, especially in smaller communities where hotels are limited and smaller facilities are often key to handling tourism activities. A leisure-based economy is particularly important for managing sustainable and resilient development in rural areas, offering an opportunity for regeneration and extending their lifecycle. Yet, rural areas frequently face resource-based marketing and management obstacles, like lack of essential skills and knowledge, as well as delay in seeing immediate financial returns. Therefore, identifying and implementing effective management practices is crucial for supporting tourism development in these areas.

To address these challenges, research was conducted involving an in-depth analysis of text data from online tourist reviews. The reviews focused on accommodations in rural areas along the east coast of Lake Ohrid (North Macedonia). Using sentiment analysis, the study identified four clustered factors: 'Facility', 'Surrounding', 'Service', and 'Site'. Each of these groups comprised various factors that were evaluated as having either a positive, negative, or mixed sentiment based on the tourists' feedback.

Research shows the 'Surrounding' factor most significantly impacts tourist satisfaction. Tourists consistently express strong positive sentiments, indicating that the environment greatly enhances their stay. This means the setting where rural accommodations are located profoundly influences a tourist's overall satisfaction. The uniqueness of the view on Lake Ohrid creates memorable experiences that rural destinations may offer as part of value-added packages. By combining this esthetic appeal with cultural activities, it can significantly boost tourism in rural areas. As such, managers of rural accommodations should use this factor as a base when creating their marketing campaigns and developing sustainable management practices. Regarding the 'Facility' factor, tourists generally expressed negative sentiments along with slightly positive, and mixed sentiments. This suggests that managers should conduct a more profound analysis on the poor logging experience as a critical point for improvement since the comfort and coziness of a stay is highly important for guests' satisfaction and positive reviews. Similarly, the 'Service' factor constantly revealed only mixed sentiments, pointing to an urgent need for rural accommodations to elevate service standards. Finally, the 'Site' factor received strong positive reviews for its location element, which acts as a trigger for attracting visitors

and adds value to the beautiful natural environment in which rural establishments are embedded. However, the mixed sentiments with negative connotations with regards to the 'Parking', indicates an issue which requires further discussion and improvement.

This research contributes to raising awareness about the importance of online reviews in identifying tourists' sentiments regarding their satisfaction and dissatisfaction after their stay in rural areas. Rural areas can benefit significantly from online reviews, as sentiment analysis of these reviews provides valuable insights beyond positive feedback. It highlights specific challenges commonly faced in rural destinations, such as transportation difficulties, maintenance issues, limited parking, poor connectivity, and infrastructure gaps. By identifying these problems through the analysis of visitor sentiments, stakeholders in rural areas can develop targeted strategies to address and mitigate these issues. This not only enhances the overall visitor experience but also supports the sustainable development and management of rural tourism destinations.

By analyzing these reviews, managers of rural accommodations can identify key areas for improvement, ultimately optimizing their service quality and contributing to sustainable rural tourism development. Understanding the reputation gained from factors influencing tourist satisfaction empowers managers and owners to develop effective marketing strategies and management practices. Providing friendly, personalized service can generate both new and repeat business. By acknowledging the findings of this study, managers of rural accommodations may improve their services and help create resilient rural tourist destinations.

The research had several shortages that may be overcome in future research. These include using a single review platform, small sample size, limited timeframe for displaying reviews according to Booking.com's policy, reviews referring only to the rural areas on the east coast of Lake Ohrid and identifying somewhat narrow interests of tourists. Despite these limitations, the study offers valuable insights for managing future rural tourism development.

Conflict of interests

The authors declare no conflict of interest.

Acknowledgement

This research is part of the scientific research project "Application of predictive analytics and artificial intelligence for the advancement of tourism in North Macedonia," funded by the Ministry of Education and Science of the Republic of North Macedonia, under number 15-6171/19 dated August 7, 2025.

References

1. Chen, L. C., Lin, S. P., & Kuo, C. M. (2013). Rural tourism: Marketing strategies for the bed and breakfast industry in Taiwan. *International Journal of Hospitality Management*, 32, 278-286. <https://doi.org/10.1016/j.ijhm.2012.07.005>
2. Chevalier, J. A., & Mayzlin, D. (2006). The effect of word of mouth on sales: Online book reviews. *Journal of Marketing Research*, 43(3), 345-354. <https://doi.org/10.1509/jmkr.43.3.345>
3. Cvijanović, D., & Ružić, P. (2017). *Rural Tourism*. Faculty for Hotel and Tourism Management in Vrnjačka Banja, University in Kragujevac, Vrnjačka Banja [In Serbian: Цвијановић, Д., & Ружић, П. (2017), Ruralni turizam]
4. Dimitrov, N. & Petrevska, B. (2012). Rural tourism development zones: the case of Macedonia. *Researches review of the Department of geography, tourism and hotel management*, 41, 152-162.
5. Dimitrov, N. & Petrevska, B. (2019). Challenges for rural tourism development in North Macedonia. *Journal of Applied Economics and Business*, 7(4), 42-50.
6. Dimitrov, N. & Petrevska, B. (2020). Tourism activities in the depopulated rural areas: Assessment of selected villages in North Macedonia, Conference Proceedings "INSCOSSES 2020", Ohrid, North Macedonia, 11.09.2020 (pp. 44-50).
7. Dimitrov, N., Terzić, A., & Petrevska, B. (2020). Rural capital in small villages: An analysis of selected rural areas in Eastern Serbia and North Macedonia. *Journal of Applied Economics and Business*, 8(1), 18-26.
8. Duan, W., Gu, B., & Whinston, A. B. (2008). Do online reviews matter? An empirical investigation of panel data. *Decision Support Systems*, 45(4), 1007-1016 <https://doi.org/10.1016/j.dss.2008.04.001>
9. Fanelli, R. M. (2020). Examining the relationship between the price, the characteristics and the visitor evaluation of attributes of Italian farmhouses with an educational farm. *Tourism Review*, 75(5), 827-839.
10. Foris, D., Crihalmean, N., & Foris, T. (2020). Exploring the environmental practices in hospitality through booking websites and online tourist reviews. *Sustainability*, 12(24), 10282.
11. Floh, A., Koller, M., Zauner, A. (2013). Taking a deeper look at online reviews: The asymmetric effect of valence intensity on shopping behaviour. *Journal of Marketing Management*, 29(5-6), 646-670 <https://doi.org/10.1080/0267257X.2013.776620>
12. Gu, H., & Ryan, C. (2008). Chinese clientele at Chinese hotels - Preferences and satisfaction. *International Journal of Hospitality Management*, 27(3), 337-345.
13. Haddi, E., Liu, X., & Shi, Y. (2013). The role of text pre-processing in sentiment analysis. *Procedia Computer Science*, 17, 26-32.
14. Hora, S. C. (2014). *Expert judgment*. Wiley StatsRef: Statistics Reference Online.

15. Jang, S., Liu, T., Kang, J. H., & Yang, H. (2018). Understanding important hotel attributes from the consumer perspective over time. *Australasian Marketing Journal*, 26(1), 23-30.
16. Kosala, N., & Nirmalrani, V. (2025). Influence of pre-processing strategies on sentiment analysis performance: Leveraging Bert, TF-IDF and Glove Features. *Journal of Machine and Computing*, 5(1), 464-473 <https://doi.org/10.53759/7669/jmc202505036>
17. Lee, S. Y., Reynolds, J. S., & Kennon, L. R. (2003). Bed and breakfast industries: Successful marketing strategies. *Journal of Travel & Tourism Marketing*, 14(1), 37-53 https://doi.org/10.1300/J073v14n01_03
18. Nuntsu, N., Tassiopoulos, D., & Haydam, N. (2004). The bed and breakfast market of Buffalo City (BC) South Africa: present status, constraints and success factors. *Tourism Management*, 25(4), 515–522.
19. OECD (Organization for Economic Co-operation and Development). (2017). *Rural development: Policy insights and experiences*. OECD Publishing.
20. Perić, G., Dramićanin, S., & Gašić, M. (2020). Impact of service quality on satisfaction and loyalty of tourists in rural tourism of Šumadija and Western Serbia. *Economics of Agriculture*, 67(4), 1071-1086.
21. Petrevska, B. & Dimitrov, N. (2013). Planning rural tourism development in Macedonia, *Journal of Process Management – New Technologies*, 1(3), 63-68.
22. Petrevska, B., Popovski, R., & Chingoski, V. (2021). New innovative tourism product for reanimating rural areas, Conference proceedings from the first international conference “ETIMA 2021”, 19-20.10.2021, online via Zoom, 115-122.
23. Ruiz-Real, J. L., Uribe-Toril, J., de Pablo Valenciano, J., & Gázquez-Abad, J.C. (2020). Rural tourism and development: Evolution in Scientific Literature and Trends. *Journal of Hospitality & Tourism Research*, 46(7), 1322-1346.
24. Song, B., Lee, C., Yoon, B., & Park, Y. (2016). Diagnosing service quality using customer reviews: An index approach based on sentiment and gap analyses. *Service Business*, 10, 775-798 <https://doi.org/10.1007/s11628-015-0290-1>
25. Terzić, A., Jovičić Vuković, A., & Petrevska, B. (2024). Seasonality and rurality – Second homes and tourism in rural areas of Serbia. *Economics of Agriculture*, 71(4), 1191–1207.
26. Terzić, A., Petrevska, B., & Petrović, M. (2019). Evaluation methods for sustainable rural tourism development: Issues to be addressed. *Agrieconomica*, 48(84), 55-64.
27. Terzić, A., Drobnjaković, M., & Petrevska, B. (2020). Traditional Serbian countryside and second-home tourism perspectives. *European Countryside*, 12(3), 312-332.
28. Tseng, H. P., & Yang, M. C. (2010). Establishment of bed and breakfast destination image scale and destination brand. *Journal of Tourism and Leisure Studies*, 16(3), 211–233.

29. Van de Ven, A. H. (2007). *Engaged scholarship: A guide for organizational and social research*. Oxford University Press, USA.
30. Wu, W. C., & Yang, C. Y. (2010). An empirical study on the impact of differences in bed and breakfast service quality attributes on customers' revisiting desires. *International Journal of Organizational Innovation*, 2(4), 223– 240.
31. Wu, J., & Yang, T. (2023). Service attributes for sustainable rural tourism from online comments: Tourist satisfaction perspective. *Journal of Destination Marketing & Management*, 30, 100822.
32. Xu, X., & Li, Y. (2016). The antecedents of customer satisfaction and dissatisfaction toward various types of hotels: A text mining approach. *International journal of hospitality management*, 55, 57-69.
33. Zakarija, I., Škopljanac-Maćina, F., Marušić, H., & Blašković, B. (2024). A sentiment analysis model based on user experiences of Dubrovnik on the Tripadvisor platform. *Applied Sciences*, 14(19), 8304.
34. Zhai, Y., & Chen, P. (2020). Sentiment analysis on tourist satisfaction with rural homestay inns based on reviews from the website of online travel agency. *International Journal of Sustainable Development and Planning*, 15(5), 705-712.
35. Zhou, L. (2014). Online rural destination images: Tourism and rurality. *Journal of Destination Marketing & Management*, 3(4), 227-240.