

Tourists' Perception using Sentiment Analysis at Cenang Beach

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Abstract

The increasing use of online platforms has made user-generated content vital for understanding tourist behavior. This study analyzes 460 English reviews from TripAdvisor about Cenang Beach, Langkawi, Malaysia, using thematic and sentiment analysis to identify factors influencing tourist satisfaction. Six key themes emerged: atmosphere, beach quality, activities, facilities, cleanliness, and health and safety. Positive reviews highlighted atmosphere and beach quality, while negative reviews focused on cleanliness and facilities, indicating areas for improvement. The findings offer insights for destination managers to enhance tourist experiences and maintain Langkawi's reputation as a top travel destination. Future research should include other languages and platforms.

Keywords: Tourist Sentiment; User-Generated Content; Sentiment Analysis; Thematic Analysis

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1.0 Introduction

Langkawi, a UNESCO Global Geopark and Malaysia's premier tourist destination attracts millions of visitors annually due to its natural beaches, cultural heritage, and ecotourism offerings. Cenang Beach, renowned for its pristine coastline and recreational diversity, exemplifies Langkawi's appeal, contributing significantly to the island's tourism recovery—visitor arrivals rebounded from 1.8 million (2020) to 2.8 million (2023) post-pandemic (Mehranian & Marzuki, 2018). However, sustaining this growth necessitates addressing evolving tourist expectations and environmental challenges.

The proliferation of user-generated content (UGC) on platforms like TripAdvisor offers unprecedented insights into visitor sentiments. Sentiment analysis, a natural language processing (NLP) tool, enables systematic evaluation of unstructured data to decode satisfaction drivers and pain points. While prior studies leverage sentiment analysis in tourism, gaps persist in contextualizing sustainability awareness and hyperlocal concerns at destinations like Cenang Beach.

This study bridges this gap by analyzing 460 TripAdvisor reviews (2019–2024) through integrated sentiment and thematic analysis. Three objectives guide the research: (1) mapping dominant sentiments (positive, neutral, negative) across themes like beach quality and cleanliness; (2) evaluating tourists' awareness of environmental conservation efforts; and (3) identifying concerns about overcrowding and safety of Cenang Beach.

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By combining NLP-driven UGC analysis with sustainability discourse, this research advances tourism marketing scholarship. It equips destination managers with actionable insights to enhance service delivery, prioritize sustainability communication, and mitigate overcrowding (Viñán-Ludeña & De Campos, 2024). The study underscores the value of data-driven strategies in fostering visitor-centric destination management, ensuring Cenang Beach's long-term competitiveness in global tourism.

2.0 Literature Review

Tourism research increasingly leverages sentiment analysis and user-generated content (UGC) to decode visitor perceptions, yet gaps persist in contextualizing these methods for hyperlocal destinations like Langkawi's Cenang Beach. This review synthesizes advancements in consumer behavior theory, AI-driven analytics, and sustainability discourse to frame the study's methodological and theoretical contributions.

2.1 Sentiment Analysis in Tourism

Sentiment analysis, a natural language processing (NLP) technique, classifies textual data into positive, neutral, or negative sentiments to gauge consumer attitudes (Gudankwar et al., 2024). Lexicon-based methods, such as VADER, excel in analyzing short texts like TripAdvisor reviews by quantifying sentiment intensity through context-specific lexicons (Marutho et al., 2022). While effective for structured feedback, these methods struggle with sarcasm and nuanced expressions, necessitating complementary thematic analysis (Saraswati et al., 2024). In tourism, sentiment analysis identifies satisfaction drivers—such as service quality and recreational diversity—and pain points like overcrowding and environmental neglect. For instance, Gupta and Kumar (2024) demonstrated its utility in optimizing green tourism strategies by evaluating feedback on biodiversity conservation.

2.2 User-Generated Content (UGC) as a Data Source

UGC—reviews, social media posts, and visual content—provides authentic, consumer-centric insights into destination experiences (Dhote et al., 2024). Platforms like TripAdvisor and Instagram shape tourist decision-making through perceived novelty and value, with positive UGC enhancing destination reputation and negative reviews highlighting areas for improvement (Das et al., 2024). UGC also fosters community engagement, transforming passive tourists into active contributors to destination narratives (Han et al., 2024). For heritage sites, authentic UGC promotes cultural preservation by documenting visitor interactions with local traditions (Hua et al., 2024). At Petra, Alazaizeh (2024) illustrated how UGC integration improved visitor management through real-time feedback on amenities and crowd control.

2.3 AI Tools in Tourism Analytics

AI tools like Orange and ChatGPT enhance the scalability and precision of tourism research. Orange employs VADER for rapid sentiment classification, enabling efficient analysis of large datasets (Akdogan & Durmaz, 2024). ChatGPT aids thematic analysis by identifying patterns in unstructured data, though outputs require validation to ensure contextual accuracy (Sharma, 2024). These tools reduce human error in repetitive tasks, yet ethical concerns—such as algorithmic bias and data privacy—demand rigorous oversight (Loureiro et al., 2024). Their integration offers a paradigm shift in tourism marketing, enabling predictive analytics for personalized service delivery and sustainable resource management.

2.4 Tourist Satisfaction and Environmental Awareness

Tourist satisfaction hinges on aligning destination offerings with expectations influenced by service quality, amenities, and environmental stewardship. Modern tourists prioritize eco-conscious practices, with 68% willing to pay premium rates for sustainable accommodations (Daneshwar & Revaty, 2024). Ecotourism frameworks emphasize low-impact travel and community engagement, balancing economic gains with habitat preservation (Doronkina et al., 2014).

2.5 Research Gaps and Theoretical Contributions

Despite methodological advancements in tourism research, critical gaps persist in three key areas. First, studies predominantly focus on broad industry trends while neglecting hyperlocal contextualization, resulting in a paucity of destination-specific analyses that account for unique cultural and environmental factors at sites like Cenang Beach. Second, the integration of sentiment analysis with quantifiable sustainability metrics remains underexplored, constraining actionable insights for green tourism strategies despite growing environmental consciousness among travelers (Viñán-Ludeña & De Campos, 2024). Third, overreliance on AI tools risks oversimplifying cultural nuances embedded in user-generated content (UGC), necessitating hybrid methodologies that balance algorithmic efficiency with human interpretive validation (Sharma, 2024). This study bridges these gaps through a dual-method approach combining VADER-driven sentiment analysis and manual thematic coding of 460 TripAdvisor reviews anchored in consumer behavior theory. By examining the interplay between external destination attributes (e.g., beach infrastructure quality) and internal tourist perceptions (e.g., awareness of conservation initiatives), the research advances tourism marketing scholarship. The findings demonstrate how NLP-powered UGC analysis can operationalize sustainability metrics, inform crowd management strategies, and enhance cultural sensitivity in destination governance—critical factors for maintaining Langkawi's competitive edge in an era of evolving tourist expectations and environmental imperatives.

3.0 Methodology

This chapter details the methodology used to analyze tourist sentiment and themes in user-generated content (UGC) from TripAdvisor reviews about Langkawi's Cenang Beach. A mixed-methods approach was adopted, integrating quantitative sentiment analysis with qualitative thematic analysis. Sentiment analysis categorizes reviews into positive, neutral, or negative sentiments, while thematic analysis identifies recurring themes within each sentiment group. ChatGPT assisted in generating initial themes and categorizing reviews, ensuring a structured analysis process. The following sections outline the research design, data collection methods, tools, analysis procedures, and ethical considerations.

3.1 Research Design

This study employs a mixed-methods descriptive approach to gain a comprehensive understanding of tourist feedback. Mixed-methods research combines quantitative and qualitative techniques, enabling a broader analysis of UGC in tourism. The quantitative component involves sentiment analysis using the VADER model, which provides a structured numerical assessment of tourist experiences (Grace et al., 2023). The qualitative component applies thematic analysis to identify key themes from the reviews, offering insights into specific tourist concerns and preferences. Integrating both methods bridges the gap between numerical sentiment classifications and qualitative insights, allowing for a holistic interpretation of tourist experiences (Rose et al., 2023).

3.2 Population and Sampling

The population consists of tourists who visited Langkawi's Cenang Beach and shared their experiences on TripAdvisor. Given the vast number of reviews (4,583), a purposive sampling method was employed to select a representative subset of 460 reviews that aligned with the study's objectives. Three criteria guided the selection:

- (1) reviews from 2019 to 2024 to ensure relevance;
- (2) English-language reviews to maintain consistency and accuracy; and
- (3) reviews specifically addressing Cenang Beach.

Purposive sampling ensures that the selected dataset is relevant and contextual, allowing for a deeper understanding of tourist impressions. A sample size of 200-500 reviews is deemed suitable for identifying major trends in sentiment analysis (Xiang et al., 2017).

3.3 Research Instruments

3.3.1 Web Scraping

Apify, a web scraping platform, was utilized to extract UGC from TripAdvisor. This automated technique allows for efficient data collection while minimizing human error. Apify was configured to scrape publicly available reviews of Cenang Beach, focusing on review text, dates, and ratings.

3.3.2 Preprocessing Tool

Data preprocessing was conducted using Orange software, employing techniques such as lowercasing, stopword removal, and tokenization to refine the text. This aligns with previous studies demonstrating the effectiveness of Orange in preparing textual data for sentiment analysis.

3.3.3 Sentiment Analysis Tool

Sentiment analysis was performed in Orange using the VADER method, which quantitatively classifies reviews based on sentiment polarity. This classification addressed the research question regarding dominant tourist sentiments at Cenang Beach.

3.3.4 Thematic Analysis Process

ChatGPT assisted in thematic analysis by generating broad themes such as beach quality, cleanliness, activities, atmosphere, facilities, and health and safety. The researcher manually validated these themes to ensure contextual accuracy.

3.4 Data Collection Procedure

Data was collected from TripAdvisor using Apify and documented in Microsoft Excel. The selection of TripAdvisor was based on its extensive UGC database and global accessibility. The scraping process focused on reviews published between January 1, 2019, and October 10, 2024, ensuring recency and relevance. Reviews were categorized into six themes based on specific keywords.

3.6 Data Analysis Procedure

The analysis involved sentiment and thematic analysis—the VADER approach quantitatively classified reviews, directly addressing tourist sentiments. Thematic analysis was conducted in two steps: initial theme discovery using ChatGPT and systematic categorization of reviews within sentiment categories.

3.7 Ethical Considerations

The study adhered to ethical guidelines, ensuring transparency and reliability. Only publicly available reviews were analyzed, and no personal information was included. The researcher retained oversight throughout the analysis process, validating ChatGPT-generated themes.

4.0 Findings

This section presents the findings from the sentiment and thematic analyses of 460 online reviews of Langkawi's Cenang Beach. The primary focus is on understanding tourist sentiments, identifying key themes, and exploring factors influencing satisfaction. The findings are structured to align with the study's objectives: evaluating overall sentiments, assessing environmental awareness, and highlighting specific tourist concerns.

4.1 Overview of Dataset

The dataset comprised 460 user-generated reviews collected from TripAdvisor, covering the period from January 1, 2019, to October 10, 2024. Only English-language reviews were included to ensure consistency. Table 1 displays the ratings given by reviewers on Cenang Beach. The sentiment analysis categorized the reviews as below in Table 2:

Table 1. Ratings of Cenang Beach

Rating	Count	Percentage (%)
1-star	19	4
2-star	18	4
3-star	58	13
4-star	155	34
5-star	210	46

Source: *Khairul Azman et al. (2025)*

Table 2. Results of Sentiment Analysis

Sentiment	Count	Percentage (%)
Positive	401	87
Neutral	18	4
Negative	40	9

Source: *Khairul Azman et al. (2025)*

The analysis revealed that 87% of the reviews were positive, indicating a generally favourable perception of Cenang Beach. Negative sentiments accounted for 9%, while neutral reviews made up 4%. This distribution suggests that most tourists had a positive experience at the beach. The reviews included textual descriptions, which underwent preprocessing in Orange software. This process involved tokenization, lowercasing, and stopword removal to standardize the text for accurate sentiment and thematic analysis.

4.2 Overall Sentiment Distribution

The sentiment analysis revealed a strong positive inclination among tourists. Positive reviews frequently highlighted aspects such as cleanliness, aesthetic appeal, and overall experience. Commonly mentioned words included "nice" (126 mentions), "clean" (106 mentions), and "beautiful" (88 mentions). For instance, one reviewer noted, "Really pretty beach, a lot of activities... reasonable rates."

Neutral reviews, characterized by terms like "worth" and "prefer," indicated evaluative feedback without strong emotional tones. In contrast, negative reviews often cited "rubbish" and "dirty" (7 mentions each), reflecting concerns about cleanliness. One reviewer remarked, "The shoreline is dirty and broken rubbish bins with uncollected rubbish." The thematic analysis further illuminated sentiment distribution, with clustered column charts illustrating the prevalence of themes across sentiment categories.

4.3 Key Themes Across Sentiments

Thematic analysis identified six key themes: beach quality, cleanliness, activities, atmosphere, facilities, and health and safety across positive, neutral, and negative sentiments. Beach quality emerged as a prominent theme, especially in positive reviews, with 269 mentions. Tourists praised the beach's natural beauty and serene qualities. For example, one review stated, "A beautiful quant beach with lots of adventure activities." Cleanliness was another significant factor, mentioned 78 times in positive reviews, where tourists appreciated the well-maintained environment. However, negative reviews highlighted cleanliness issues, with 12 mentions of trash or dirty facilities. Activities were frequently referenced in positive reviews (235 mentions), showcasing the variety of recreational options available. Tourists enjoyed water sports and sunset watching, as indicated by comments like "Many tourists were having fun." Atmosphere was the most cited theme in positive reviews (273 mentions), with descriptions of the beach as "peaceful" and "amazing." However, negative reviews noted overcrowding and noise as detractors. Facilities were a common theme across all sentiment categories. Tourists appreciated the availability of amenities, but negative reviews (18 mentions) highlighted issues with broken or insufficient facilities. One reviewer expressed frustration over parking difficulties, stating, "I drove all the way trying to figure out where to park." Health and safety, while less frequently mentioned, remained a significant consideration. Positive reviews emphasized safety measures, while negative reviews raised concerns about inadequate safety protocols.

4.4 Themes Emerging Within Positive Reviews

The thematic analysis revealed five factors emerging from the positive reviews of Cenang Beach. The emerging factors are atmosphere, beach quality, activities, facilities, and cleanliness. The atmosphere was highlighted as a key factor, with tourists describing it as "peaceful" and "relaxing" (273 mentions). This underscores the need to preserve the beach's tranquility while addressing potential disruptors like overcrowding. Beach quality was also crucial, with tourists praising its natural beauty and clean sand (269 mentions). Regular maintenance and waste management are essential to maintaining this positive perception. Activities, mentioned 235 times in positive reviews, reflect the popularity of recreational options at the beach. Continued investment in diverse offerings is necessary to enhance tourist experiences. Facilities received 198 mentions, emphasizing their importance in meeting tourists' needs. However, consistent maintenance is critical to sustaining high satisfaction levels. Cleanliness, though less frequently highlighted than other themes, was mentioned 78 times. Tourists appreciated the beach's tidy environment, with comments like "nice clean beach near white sand tide not very high so you can swim in the ocean." Ongoing cleanliness efforts, including public awareness campaigns and sufficient waste disposal facilities, are essential for sustaining this positive perception. Table 3 below displays the counts of factors emerged.

In short, the primary factors influencing tourist satisfaction are atmosphere, beach quality, and activities, with facilities and cleanliness playing supportive roles. Targeted actions, such as reducing overcrowding and maintaining cleanliness, can significantly enhance tourist satisfaction and the long-term appeal of Cenang Beach.

Table 3: Counts of Factors Emerged

Factor	Count
Atmosphere	273
Beach Quality	269
Activities	235
Facilities	198
Cleanliness	78

Source: Khairul Azman et al. (2025)

The analysis revealed several key insights:

- A significant majority of tourists (87%) expressed high satisfaction levels, underscoring the beach's appeal.
- Factors influencing satisfaction included atmosphere, beach quality, activities, and cleanliness, all of which were frequently mentioned in positive reviews.
- The dominant themes in tourists' memories were atmosphere and beach quality, reflecting their importance across all sentiments.
- There was a notable lack of references to sustainability-related issues, suggesting either a lack of awareness among tourists or that sustainability is not a priority in their experiences. This indicates a gap in tourist engagement with environmental conservation initiatives at Cenang Beach.

5.0 Discussion

5.1 Dominant sentiments

The sentiment analysis indicated that 87% of tourists expressed positive sentiments about their experiences at Cenang Beach. Key drivers of this positivity included atmosphere (273 mentions), beach quality (269 mentions), and activities (235 mentions). Reviewers often described the beach as "peaceful" and "beautiful," emphasizing the significance of natural ambience and recreational diversity in enhancing tourist experiences.

Conversely, neutral sentiments (9%) reflected balanced feedback, where tourists identified both strengths and weaknesses. For instance, a reviewer noted, "Beach is lovely, but there are just a few places to sit down," indicating mixed feelings about the experience. This resonates with Ishanka and Yukawa (2018), who suggest that neutral sentiments often stem from uncertainty when recommending a destination.

Negative sentiments (4%) highlighted areas for improvement, particularly regarding facilities (18 mentions) and cleanliness (12 mentions). Comments about overcrowding and insufficient amenities suggest that while Cenang Beach has many strengths, addressing these weaknesses could enhance overall tourist satisfaction. This aligns with carrying capacity theories in tourism, which advocate for sustainable management practices to prevent degradation of the tourist experience (Darwis et al., 2024).

Overall, the predominance of positive sentiments illustrates Cenang Beach's popularity. However, the presence of neutral and negative reviews emphasizes the need for continuous improvement in infrastructure and maintenance, in line with sustainable tourism principles (Scherbina, 2022).

5.2 Awareness of Environmental Conservation Efforts

The analysis revealed few mentions of environmental conservation efforts, indicating a potential awareness gap among tourists. While some positive reviews acknowledged the beach's cleanliness, discussions about sustainability practices, such as waste management initiatives, were notably absent. This observation is consistent with Bruno (2024), who highlights the importance of effectively communicating sustainability measures to engage tourists in environmental conservation.

To raise awareness, destination managers could implement visible strategies like eco-friendly signage and educational programs. Research indicates that such initiatives can enhance tourist involvement in sustainable practices and foster a sense of responsibility (Aziz et al., 2023).

5.3 Concerns About Environmental Protection and Safety

Negative reviews highlighted persistent issues, including inadequate safety precautions, overcrowding, and cleanliness. Complaints about garbage and filthy facilities detracted from the overall experience, with one reviewer stating, "Not very clean; water was not clean." Overcrowding emerged as a significant concern, particularly during peak hours, negatively impacting the beach's relaxing atmosphere. This aligns with research on overtourism, which shows that high visitor volumes can diminish tourist experiences (Vourdoubas, 2024).

Health and safety concerns, while less frequently mentioned (10 negative mentions), remain significant. Reviews pointed to inadequate lifeguards and unsafe conditions, emphasizing the need for improved safety measures. One tourist remarked on vehicles operating near children, highlighting safety risks. Addressing these issues requires targeted strategies such as expanding waste disposal options and implementing crowd control measures. Proactive management can significantly reduce negative feedback and enhance the tourist experience.

5.4 Implications

This study offers valuable insights into the factors influencing tourist satisfaction at Cenang Beach. By analyzing tourist reviews, stakeholders can identify aspects that contribute to satisfaction, such as atmosphere and beach quality. These insights can inform destination management organizations (DMOs) and local businesses in developing improvements that align with tourist expectations.

Moreover, the findings underscore the importance of enhancing environmental awareness and management practices. Promoting sustainable initiatives will not only enrich the tourist experience but also help preserve Langkawi's natural beauty for future generations.

6.0 Conclusion and Recommendations

This research has several limitations, which lead to important recommendations for future studies. While this study concentrated on Langkawi's Cenang Beach, it would be beneficial for future research to explore other beaches in the area, such as Tanjung Rhu or Pantai Tengah. A comparative approach could yield valuable insights into tourist satisfaction across different destinations. Additionally, incorporating demographic data and seasonal trends could enhance the understanding of tourist behaviour, offering a more complex understanding of the factors influencing satisfaction.

The current study focused exclusively on English reviews, which suggests a need for future research to expand the analysis to include reviews in other languages, such as Malay. This would capture perspectives from a broader range of tourists. Furthermore, the use of purposive sampling in this research may introduce bias; therefore, employing random or stratified sampling methods in future studies could improve generalizability.

While existing sentiment and thematic analysis tools were utilized, future research could benefit from exploring alternative or hybrid methodologies, such as manual coding or advanced AI models, to enrich the analysis process (Saraswati et al., 2024). Combining sentiment and thematic analysis with qualitative methods like interviews or surveys could provide a more comprehensive understanding of tourist experiences.

In conclusion, this research underscores the importance of maintaining high tourist satisfaction at Langkawi's Cenang Beach to ensure its continued popularity as a destination. The findings indicate that most tourists expressed positive sentiments, with atmosphere, beach quality, and activities identified as key contributors to satisfaction. However, despite the overall positivity, areas such as facilities and cleanliness require attention to address the concerns of dissatisfied tourists. The study emphasizes the significance of preserving the beach's natural beauty and fostering a peaceful atmosphere while offering diverse recreational opportunities. By focusing on these aspects, stakeholders can enhance the tourist experience and support the long-term viability of Cenang Beach as a premier tourist destination.

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Paper Contribution to Related Field of Study

This research contributes significantly to the fields of tourism management and environmental sustainability by providing a comprehensive analysis of tourist sentiments and thematic perceptions regarding Cenang Beach in Langkawi. By utilizing sentiment and thematic analysis of 460 online reviews, the study highlights the themes within tourists' positive reviews, such as atmosphere, beach quality, and activities, while also identifying areas needing improvement, like facilities and cleanliness. The findings reveal a gap in awareness regarding environmental conservation efforts, suggesting opportunities for destination managers to enhance engagement with sustainable practices. This work not only enriches the understanding of tourist experiences in coastal destinations but also offers actionable insights for stakeholders aiming to improve tourist satisfaction and promote sustainable tourism initiatives.

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