



UNVEILING THE HIDDEN GEM: THE ROLE OF SUSTAINABLE DESTINATION IMAGE AND LOCAL CO-CREATION IN FOSTERING POSITIVE WORD-OF-MOUTH AT LAKE TOBA GEOPARK

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Abstract

This study aims to analyze the influence of Sustainable Destination Image and Experience Co-Creation on Positive Word-of-Mouth, with Memorable Tourism Experience as a mediating variable among tourists visiting Sibandang Island, part of the Toba Caldera UNESCO Global Geopark. The research employs a quantitative approach with a cross-sectional survey design. Data were collected from 220 tourists who have visited Sibandang Island using a purposive sampling technique and were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM). The results indicate that Sustainable Destination Image and Experience Co-Creation have a positive and significant effect on both Memorable Tourism Experience and Positive Word-of-Mouth. Furthermore, Memorable Tourism Experience positively influences Positive Word-of-Mouth and partially mediates the relationships among the variables. These findings highlight the importance of a destination's sustainability image and participatory experiences in creating memorable tourism experiences and encouraging positive tourist recommendations.

Keywords: Sustainable Destination Image, Experience Co-Creation, Memorable Tourism Experience, Positive Word-of-Mouth, Pulau Sibandang.

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INTRODUCTION

Sustainable tourism has transitioned from a niche alternative to a central paradigm in global destination management. This shift is largely driven by tourists moving away from mass tourism toward authentic, responsible travel, demonstrating a significantly higher level of environmental awareness (Hashmi & Zonah, 2024; Pratama et al., 2024; Luekveerawattana, 2025). As a result, tourists now show greater appreciation for destinations that demonstrably integrate ecological conservation with socio-economic welfare. However, the practical implementation of these sustainability principles remains highly problematic, particularly in ecologically and geologically sensitive areas such as UNESCO Global Geoparks. These destinations frequently face a critical paradox: the dual mandate to drive local economic growth through ecotourism while simultaneously preventing environmental degradation caused by over-commercialization (Özgeriş & Karahan, 2021; Suhud et al., 2025). When a destination fails to balance these aspects, tourists' perceptions of its

sustainability practices decline, directly threatening their long-term trust and sustainable loyalty (Fang et al., 2026; Osman et al., 2025). Therefore, addressing the gap between destination sustainability claims and actual ecotourism experiences is urgently needed, as it determines whether vulnerable destinations can cultivate true sustainable loyalty amidst the pressures of modern tourism.

The shift in tourist behaviour has become increasingly relevant in the development of the Lake Toba region, which is currently designated as a UNESCO Global Geopark as well as one of Indonesia's Super Priority Tourism Destinations. The Indonesian government continues to promote the development of this area through infrastructure development, improved accessibility, strengthening of tourism attractions, the advancement of the creative economy, and the empowerment of local communities. These efforts have shown positive macro-level results. Data from the Central Statistics Agency (Badan Pusat Statistik) of North Sumatra indicate that the number of international tourist arrivals to the province in 2024 reached 250,413 visits, representing an increase of 26.32% compared to 2023, which recorded 198,240 visits (BPS Provinsi Sumatera Utara, 2025). Although these figures represent the entire province rather than Lake Toba specifically, Lake Toba's status as a primary tourism magnet and Super Priority Destination serves as a significant driver for this regional growth. This provincial increase strongly reflects the growing appeal of the Lake Toba region from the perspective of both domestic and international tourists. Nevertheless, the growth of the tourism sector has not yet fully provided equitable benefits for all destinations within the Lake Toba region. Most tourism activities remain concentrated in well-established destinations such as Parapat, Balige, Tomok, and Tuk-Tuk Samosir. On the other hand, there are still several destinations with strong tourism resources that have yet to receive exposure commensurate with their potential. This condition indicates that the success of tourism development is not solely determined by the availability of tourism resources, but also by the ability of destinations to build a strong image, create memorable experiences, and encourage voluntary promotion by tourists.

Serving as a prime empirical context for investigating these sustainability dynamics is Sibandang Island, one of the sixteen prioritized geosites within the Toba Caldera UNESCO Global Geopark. The island possesses a unique amalgamation of geological landscapes, preserved Batak culture, and a community-based local economy centered on MSMEs, including the production of the endemic mangga udang (Kementerian Pariwisata dan Ekonomi Kreatif, 2024). From a consumer behavior perspective, these intrinsic characteristics do more than merely fulfill the holistic UGGp framework of conservation and empowerment (Farsani et al., 2011; UNESCO, 2015); they act as vital antecedents that shape a strong sustainable destination image (Almeida-Santana & Moreno-Gil, 2019; Šerić et al., 2024). Furthermore, Sibandang Island serves as a living landscape where local communities actively engage with visitors through tourism-based micro-enterprises. This direct interaction facilitates experience co-creation, a participatory process where tourists and residents collaboratively shape the value of the visit (Campos et al., 2018). When tourists perceive a robust sustainable image and actively participate in co-creating their journey, it significantly elevates their visit from a standard trip into a highly memorable tourism experience (Kim et al., 2012). Ultimately, analyzing Sibandang Island provides an ideal setting to examine how these interrelated experiential and perceptual factors intersect to foster positive word-of-mouth (Rather, 2020), a critical outcome for the long-term viability of the geopark.

This potential gained national recognition when the Sibandang Island Tourism Village Area was successfully included in the Top 50 of the Anugerah Desa Wisata Indonesia (ADWI) 2024, organized by the Ministry of Tourism and Creative Economy. This achievement is particularly significant as Sibandang Island is the only representative from North Sumatra Province to be included in the Top 50 out of more than 6,000 tourism villages participating in the national selection (BPODT, 2024). This recognition indicates that Sibandang Island possesses a competitive level of destination quality and has strong potential to develop as a community-based and sustainable tourism destination. Nevertheless, such national recognition has not yet been fully followed by an increase in the destination's popularity at both the national and international levels. This condition reflects a gap between the quality of tourism resources available and the relatively low level of destination visibility.

In other words, Sibandang Island can still be categorized as a hidden destination, with significant potential that has not yet attracted optimal attention from tourists. Recent tourism literature highlights that 'hidden' or 'emerging destinations' often possess highly authentic and pristine resources but struggle with low visibility compared to well-established tourism hubs (Duxbury et al., 2021; Hassan & Sharma, 2022). For such emerging destinations, overcoming the visibility gap requires more than formal promotional campaigns by destination managers. Their success heavily relies on creating profound, memorable tourism experiences that stimulate organic, voluntary word-of-mouth (WOM) recommendations. In the context of hidden destinations, positive WOM is empirically proven to be highly effective in building destination trust and influencing travel intentions

among prospective tourists (Jalilvand & Samiei, 2012; Abubakar & Ilkan, 2016). The presence of various local products, such as mangga udang and community handicrafts, reflects the potential of the creative economy that can be further developed through such tourism activities. However, compared to the main destinations in the Lake Toba region, Sibandang Island's exposure remains limited, meaning that opportunities for community-based tourism development have not yet been fully optimized.

Although studies on Lake Toba have developed in recent years, most research still focuses on the relationship between destination image, tourist satisfaction, tourist loyalty, and sustainable tourism development (Arif et al., 2024; Marpaung et al., 2024; Sinulingga et al., 2024). These studies have successfully demonstrated the importance of destination image in shaping tourist evaluations and responses; however, they generally still adopt a conventional destination image approach that places greater emphasis on physical attractions, facilities, and service quality. In contrast, recent developments in the literature indicate that tourists are increasingly considering environmental, cultural, social, and economic sustainability aspects when evaluating a destination. Therefore, the concept of sustainable destination image has become increasingly relevant in explaining tourist behaviour in sustainability-based destinations (Almeida-Santana & Moreno-Gil, 2019; de Araújo et al., 2022; Conti et al., 2023; Šerić et al., 2024; Cavalcante et al., 2025). In addition, recent studies also emphasize that authentically implemented sustainable place branding can strengthen a destination's image while simultaneously shaping tourist perceptions of a destination's commitment to sustainability (Garanti et al., 2024). Thus, there remains a literature gap concerning the limited number of studies that explicitly adopt the perspective of sustainable destination image, particularly in the context of geopark tourism and hidden destinations within the Lake Toba region.

On the other hand, studies on experience co-creation indicate that the active involvement of tourists in local activities can enhance the quality of the tourism experience (Liang, 2022; Adie et al., 2023; Juliana et al., 2025). Sustainable tourism practices have even been identified as an important driver in creating differentiated tourism experiences. However, empirical findings regarding the direct effect of sustainability perceptions and tourist engagement on voluntary promotional behaviour remain highly inconsistent. On one hand, several studies confirm a significant and direct positive relationship, establishing that a strong sustainable destination image (Garanti et al., 2024; Šerić et al., 2024; Mathew et al., 2024) and active experience co-creation (Liang, 2022; Juliana et al., 2025) directly enhance positive word-of-mouth. On the other hand, a contrasting stream of literature reports non-significant or weak direct effects. For instance, Lee and Xue (2020) found that in the context of sustainable tourism, specific dimensions of destination image do not directly drive behavioral intentions; rather, the relationship is fully mediated, indicating that cognitive perceptions alone are insufficient to trigger advocacy. Similarly, Buonincontri et al. (2017) demonstrated that functional participation in co-creation activities does not automatically translate into positive behavioral intentions like word-of-mouth; it strictly requires the mediating role of a profoundly evaluated tourism experience. This inconsistency can primarily be attributed to two factors: first, the differences in destination maturity, where established destinations rely on strong corporate branding while hidden destinations rely on authentic interpersonal engagement; and second, the varying intensities of affective arousal experienced by tourists, which dictate whether a cognitive stimulus successfully transitions into a behavioral response. This theoretical contradiction highlights a critical mechanism gap in the literature.

To address this gap, this study draws upon the Stimulus-Organism-Response (SOR) framework to theoretically justify the mediating role of Memorable Tourism Experience (MTE). Within the SOR paradigm, Sustainable Destination Image and Experience Co-creation serve as external and interactive stimuli (S) encountered by tourists. Rather than directly resulting in a behavioral response, these stimuli must first be internalized through the organism's cognitive and affective evaluation (O), represented by MTE. Therefore, MTE is theorized not merely as a byproduct, but as a vital psychological bridge that translates destination stimuli into a behavioral response (R), namely Positive Word-of-Mouth (Sthapit et al., 2024; Cavalcante et al., 2025).

The next gap lies in the theoretical boundaries between perceptions of destination sustainability and tourists' post-visit behaviour. The literature shows that positive perceptions of a sustainable destination image—encompassing environmental protection, cultural pride, and socio-economic well-being—exert a consistent effect on post-visit experiences (Kim et al., 2025). Nevertheless, these relationships remain inconclusive when applied to the context of hidden destinations within geopark tourism. Previous conclusions have predominantly been drawn from well-established destinations with mature sustainability infrastructures. It is theoretically debatable whether a sustainable image operates with the same predictive power in hidden destinations, where formal branding is minimal and tourism relies heavily on unstructured authentic experiences and community social interactions.

Furthermore, there is a pronounced context gap, as most studies on Lake Toba still focus on well-developed main destinations such as Parapat, Balige, and Samosir (Arif et al., 2024; Marpaung et al., 2024; Sinulingga et al., 2024). In contrast, hidden destinations such as Sibandang Island have rarely been the subject of empirical research, despite possessing distinctive characteristics through the integration of geotourism, local culture, community involvement, and MSME activities within a single destination setting. These characteristics position Sibandang Island as a highly relevant context to validate the proposed SOR mechanism and examine how sustainable destination image and experience co-creation shape memorable tourism experiences to drive positive word-of-mouth.

Based on the above discussion, this study identifies three interrelated gaps. First, a theoretical gap regarding the inconclusive role of sustainable destination image in driving post-visit behaviour within the context of unstructured, hidden geopark destinations. Second, a mechanism gap characterized by inconsistent findings regarding the direct effect of destination image and co-creation on word-of-mouth, which requires the application of the SOR framework to establish MTE as a critical mediating variable. Third, a contextual gap regarding the lack of empirical insight into tourist behavior within hidden destinations in the Lake Toba region, particularly Sibandang Island.

This study offers novelty in three main aspects. First, it tests the theoretical boundaries of sustainable destination image by measuring environmental, cultural, social, and economic dimensions tailored specifically to the characteristics of hidden geopark tourism. Second, this study applies the SOR framework to elucidate the unresolved mediating mechanism of memorable tourism experience, providing a stronger theoretical basis for how destination stimuli (image and co-creation) translate into advocacy (positive word-of-mouth). Third, by selecting Sibandang Island as the empirical setting, this study enriches the literature on sustainable tourism and tourist behaviour in emerging destinations that rely on authenticity rather than mass commercialization.

Theoretically, this study is expected to extend the literature by integrating sustainable destination image, experience co-creation, memorable tourism experience, and positive word-of-mouth into a comprehensive conceptual model grounded in the SOR framework. Practically, the findings are expected to provide insights for destination managers, MSME actors, and local governments in designing strategies to strengthen a sustainable destination image, enhance tourist participation, and encourage organic promotion based on profound tourist experiences.

Therefore, this study aims to examine the effects of sustainable destination image and experience co-creation on memorable tourism experience and positive word-of-mouth, as well as to evaluate the mediating role of memorable tourism experience among tourists visiting Sibandang Island, Lake Toba Geopark.

METHOD

This study employs a quantitative approach with an explanatory research design to examine the relationships among Sustainable Destination Image, Experience Co-Creation, Memorable Tourism Experience, and Positive Word-of-Mouth among tourists visiting Sibandang Island, Lake Toba Geopark. A cross-sectional survey design is used, as this study aims to capture tourists' perceptions at a specific point in time while enabling the simultaneous testing of relationships among variables (Sekaran & Bougie, 2020). The use of a questionnaire is chosen because the variables under study are latent constructs that require standardized measurement, thereby allowing for statistical analysis of the relationships among variables (Hair et al., 2022).

Primary data in this study were obtained directly from tourists who have visited Sibandang Island. Data collection was conducted using a structured questionnaire developed based on concepts and findings from previous studies on sustainable destination image (Almeida-Santana & Moreno-Gil, 2019; Šerić et al., 2024), experience co-creation (Liang, 2022; Adie et al., 2023), memorable tourism experience (Sthapit et al., 2024), and positive word-of-mouth in the tourism context. All measurement indicators were then adapted to reflect the characteristics of Sibandang Island as a sustainable tourism destination within the Toba Caldera UNESCO Global Geopark. The use of primary data enables the researcher to obtain direct insights into tourists' perceptions of the destination's sustainability image, their involvement in local activities, their memorable tourism experiences, and their propensity to provide positive recommendations to others.

Secondary data were obtained from various credible sources, including publications from Statistics Indonesia (BPS), reports from the Lake Toba Authority Implementing Agency (BPODT), documents from the Ministry of Tourism and Creative Economy of the Republic of Indonesia, as well as previous studies related to sustainable tourism, geopark tourism, and tourist behaviour. These secondary data were used to provide contextual insights into the development of tourism in the Lake Toba region and Sibandang Island, as well as to strengthen the interpretation of the research findings.

The population in this study consists of all tourists who have visited Sibandang Island, North Tapanuli Regency, North Sumatra. This study employs a non-probability sampling technique using a purposive sampling approach since the exact population size is unknown. This technique is selected because not all individuals have relevant experience to evaluate the variables under investigation (Sekaran & Bougie, 2020). Therefore, respondents are required to meet several criteria: (1) at least 17 years old; (2) have visited Sibandang Island within the last two years; and (3) are willing to complete the questionnaire voluntarily.

The use of purposive sampling is considered appropriate because the variables of Experience Co-Creation and Memorable Tourism Experience can only be accurately evaluated by tourists who have direct experience during their visit to the destination (Liang, 2022; Sthapit et al., 2024). Tourists who have never visited or whose visiting experience is already too distant in time may provide less accurate assessments of the destination's characteristics and the tourism experiences under study. However, it is acknowledged that the utilization of a non-probability purposive sampling approach inherently limits the statistical generalizability of the findings. Consequently, the results of this study specifically reflect the perceptions of the sampled tourists visiting Sibandang Island and cannot be universally generalized to the broader population of tourists visiting the entire Lake Toba region. This constraint forms a boundary condition for interpreting the empirical results.

The determination of the sample size in this study refers to the recommendations of Hair et al. (2022) in Partial Least Squares Structural Equation Modelling (PLS-SEM) analysis. With a total of 14 indicators representing four latent constructs, the minimum recommended sample size is ten times the number of indicators, resulting in 140 respondents. This study utilizes 220 respondents who meet the specified research criteria to enhance statistical power and model stability.

The research instrument consists of four latent constructs. The Sustainable Destination Image variable is measured using four indicators representing environmental sustainability, cultural preservation, social impact, and economic sustainability, developed based on the concept of sustainable destination image (Almeida-Santana & Moreno-Gil, 2019; Šerić et al., 2024). The Experience Co-Creation variable is measured using four indicators that reflect tourists' involvement in interactions and local activities during their visit (Liang, 2022; Adie et al., 2023). The Memorable Tourism Experience variable is measured using three indicators that capture the level of memorability perceived by tourists (Sthapit et al., 2024). Meanwhile, the Positive Word-of-Mouth variable is measured using three indicators that represent tourists' tendency to recommend and promote the destination to others (Arif et al., 2024; Quynh et al., 2020). All items are measured using a five-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree).

The research instrument was first evaluated through expert judgment to ensure content validity, clarity of language, and the relevance of the indicators to the research context before distributing the questionnaire broadly (Boateng et al., 2018). Subsequently, the questionnaire was distributed to respondents who met the research criteria, both through direct administration and online platforms.

Data analysis in this study was conducted using the Partial Least Squares Structural Equation Modelling (PLS-SEM) approach with the assistance of SmartPLS 4 software. The PLS-SEM method was selected because it is capable of analysing simultaneous relationships among latent constructs, supports predictive-oriented research models, and is suitable for studies that aim to develop new conceptual models (Hair et al., 2022). The analysis was carried out in two stages, namely the evaluation of the measurement model and the evaluation of the structural model. The measurement model evaluation includes testing convergent validity, discriminant validity, and construct reliability through outer loading values, Average Variance Extracted (AVE), Composite Reliability, and Cronbach's Alpha. Subsequently, the structural model evaluation was conducted by assessing the coefficient of determination (R^2), effect size (f^2), predictive relevance (Q^2), and hypothesis testing using the bootstrapping procedure (Hair et al., 2022). In addition, the mediating role of Memorable Tourism Experience was analysed through the testing of indirect effects within the structural model.

In addition, the mediating role of Memorable Tourism Experience was analysed through a rigorous evaluation of specific indirect effects within the structural model. Following contemporary mediation analysis guidelines in PLS-SEM (Hair et al., 2022; Nitzl et al., 2016), a bootstrapping procedure with 5,000 subsamples was employed to generate bias-corrected and accelerated (BCa) confidence intervals at the 95% significance level. A mediation effect is confirmed if the confidence interval for the indirect effect does not include zero. Furthermore, the Variance Accounted For (VAF) index was calculated to determine the strength and type of mediation. The VAF represents the proportion of the mediated effect relative to the total effect, thereby providing a robust statistical justification for whether MTE acts as a partial or full mediator in the relationships under investigation.

RESULTS

The evaluation of the measurement model was conducted to ensure that all research constructs met the criteria of validity and reliability. The assessment includes convergent validity, construct reliability, and discriminant validity.

Convergent validity is evaluated through outer loading values and Average Variance Extracted (AVE). According to Hair et al. (2022), an indicator is considered valid if it has an outer loading value above 0.70, and a construct is considered to have good convergent validity if the AVE value exceeds 0.50. Construct reliability is assessed using Cronbach's Alpha and Composite Reliability, with the recommended minimum threshold of 0.70.

Table 1. Construct Reliability and Validity

Construct	Cronbach's Alpha	Composite Reliability (ρ_a)	Composite Reliability (ρ_c)	AVE
Experience Co-Creation (ECC)	0.922	0.923	0.945	0.811
Memorable Tourism Experience (MTE)	0.889	0.890	0.931	0.819
Sustainable Destination Image (SDI)	0.958	0.958	0.969	0.887
Positive Word-of-Mouth (WOM)	0.891	0.891	0.932	0.821

Based on the structural evaluation detailed in Table 1, the measurement model demonstrates excellent internal consistency and highly robust convergent validity across all variables. Specifically, all constructs exhibit Cronbach's Alpha and Composite Reliability (ρ_a and ρ_c) values that substantially exceed the recommended threshold of 0.70. Among the variables, Sustainable Destination Image (SDI) notably records the highest internal consistency (Cronbach's Alpha = 0.958; CR ρ_c = 0.969), indicating an exceptionally reliable measurement of this construct. Furthermore, the Average Variance Extracted (AVE) for all constructs significantly surpasses the 0.50 minimum requirement, ranging from 0.811 (ECC) to 0.887 (SDI). These notably high AVE values indicate that, on average, more than 80% of the variance in the indicators is effectively explained by their respective constructs, thereby confirming a rigorous level of convergent validity for the overall model.

Outer loading testing is conducted to assess the contribution of each indicator in representing the measured construct.

Table 2. Outer Loading

Construct	Indicator	Outer Loading
Experience Co-Creation	ECC1	0.926
	ECC2	0.890
	ECC3	0.890
	ECC4	0.896
Memorable Tourism Experience	MTE1	0.902
	MTE2	0.909
	MTE3	0.903
Sustainable Destination Image	SDI1	0.937
	SDI2	0.938
	SDI3	0.949
	SDI4	0.943
Positive Word-of-Mouth	WOM1	0.914
	WOM2	0.905
	WOM3	0.899

The results in Table 2 indicate that all indicators have outer loading values above 0.70. The highest value is observed for indicator SDI3 at 0.949, while the lowest values are found for indicators ECC2 and ECC3 at 0.890. Therefore, all indicators are considered valid and are able to adequately represent their respective constructs.

Discriminant validity is evaluated using the Heterotrait-Monotrait Ratio (HTMT) approach. According to Hair et al. (2022), discriminant validity is established when HTMT values are below 0.90.

Table 3. Discriminant Validity Test Results (HTMT)

Construct	ECC	MTE	SDI	WOM
ECC	-			
MTE	0.859	-		
SDI	0.753	0.816	-	
WOM	0.838	0.892	0.876	-

Based on Table 3, all HTMT values are below the maximum threshold of 0.90. The highest HTMT value is found in the relationship between Memorable Tourism Experience and Positive Word-of-Mouth at 0.892, while the lowest value is observed in the relationship between Experience Co-Creation and Sustainable Destination Image at 0.753. These results indicate that each construct demonstrates adequate discriminant validity, confirming that the constructs are empirically distinct. Overall, the results of the measurement model evaluation show that all research constructs meet the criteria for convergent validity, construct reliability, and discriminant validity. Therefore, the analysis can proceed to the structural model evaluation stage to examine the relationships among constructs in the research model.

After the measurement model meets the criteria for validity and reliability, the next step is to evaluate the structural model in order to examine the model's ability to explain the relationships among the research constructs. Structural model evaluation is conducted by assessing the coefficient of determination (R^2), effect size (f^2), direct hypothesis testing, and mediation effect testing.

The coefficient of determination (R^2) is used to measure the ability of exogenous variables to explain the variance of endogenous variables. According to Hair et al. (2022), an R^2 value of 0.75 can be categorized as substantial, 0.50 as moderate, and 0.25 as weak.

Table 4. R-Square Test Results

Endogenous Variables	R^2	R^2 Adjusted
Memorable Tourism Experience (MTE)	0.689	0.686
Positive Word-of-Mouth (WOM)	0.753	0.749

Based on Table 4, the structural model demonstrates a high level of predictive accuracy. The endogenous variable Positive Word-of-Mouth yields an R^2 value of 0.753. According to the criteria by Hair et al. (2022), this indicates a substantial explanatory power, meaning that Sustainable Destination Image, Experience Co-Creation, and Memorable Tourism Experience collectively explain 75.3% of the variance in tourists' advocacy behavior. Furthermore, Memorable Tourism Experience yields an R^2 value of 0.689, which falls into the moderate to substantial category, successfully explaining 68.9% of the variance.

Beyond statistical percentages, these values carry critical practical implications. The substantial R^2 value for Positive Word-of-Mouth (0.753) implies that the proposed framework captures the absolute core drivers of tourist advocacy. From a managerial perspective, this indicates that if local stakeholders on Sibandang Island focus their resources primarily on enhancing holistic sustainability practices and community co-creation, it will yield a highly predictable and significant return in organic promotion. Similarly, the moderate-to-substantial R^2 for Memorable Tourism Experience (0.689) practically implies that while external factors (such as personal travel logistics or weather conditions) contribute to the remaining 31.1% variance, the fundamental foundation of a memorable geopark visit is successfully controlled and shaped by the destination's sustainable image and the authenticity of participatory activities.

The effect size (f^2) test is conducted to determine the magnitude of the contribution of each exogenous variable to the endogenous variables. According to Hair et al. (2022), an f^2 value of 0.02 indicates a small effect, 0.15 indicates a medium effect, and 0.35 indicates a large effect.

Table 5. Effect Size (f^2) Test Results

Relationship between Variables	f^2	Interpretation
ECC → MTE	0.388	Large
SDI → MTE	0.263	Medium
ECC → WOM	0.077	Small
SDI → WOM	0.286	Medium
MTE → WOM	0.110	Small

Based on Table 5, Experience Co-Creation demonstrates the strongest influence on Memorable Tourism Experience, with an f^2 value of 0.388, which falls into the large category. Meanwhile, Sustainable Destination Image exerts a medium effect on both Memorable Tourism Experience ($f^2 = 0.263$) and Positive Word-of-Mouth ($f^2 = 0.286$). In contrast, the effect of Experience Co-Creation on Positive Word-of-Mouth ($f^2 = 0.077$), as well as the effect of Memorable Tourism Experience on Positive Word-of-Mouth ($f^2 = 0.110$), are categorized as small.

Hypothesis testing is conducted using the bootstrapping procedure. A hypothesis is considered supported when the t-statistics value exceeds 1.96 and the p-value is less than 0.05.

Table 6. Direct Hypothesis Testing Results

Hypothesis	Relationship	Path Coefficients (β)	t-statistics	p-value	Decision
H1	SDI $\rightarrow$ MTE	0.405	8.689	0.000	Supported
H2	SDI $\rightarrow$ WOM	0.423	7.512	0.000	Supported
H3	ECC $\rightarrow$ MTE	0.492	10.243	0.000	Supported
H4	ECC $\rightarrow$ WOM	0.231	4.455	0.000	Supported
H5	MTE $\rightarrow$ WOM	0.296	5.203	0.000	Supported

Based on Table 6, all relationships among variables show t-statistics values greater than 1.96 and p-values lower than 0.05. Therefore, all research hypotheses are supported.

The results of the study indicate that Sustainable Destination Image has a positive and significant effect on Memorable Tourism Experience ($\beta = 0.405$; $p < 0.001$) and Positive Word-of-Mouth ($\beta = 0.423$; $p < 0.001$). Experience Co-Creation is also found to have a positive and significant influence on Memorable Tourism Experience ($\beta = 0.492$; $p < 0.001$) as well as Positive Word-of-Mouth ($\beta = 0.231$; $p < 0.001$). Furthermore, Memorable Tourism Experience has a positive and significant effect on Positive Word-of-Mouth ($\beta = 0.296$; $p < 0.001$).

Based on the path coefficient values, Experience Co-Creation is the most dominant factor in shaping Memorable Tourism Experience, while Sustainable Destination Image is the most dominant factor in driving Positive Word-of-Mouth. These findings indicate that tourists' involvement in local activities plays a crucial role in creating memorable experiences, whereas perceptions of destination sustainability serve as the primary reason for tourists to recommend Sibandang Island to others.

Mediation effect testing is conducted to examine whether Memorable Tourism Experience is able to mediate the relationship between Sustainable Destination Image and Experience Co-Creation on Positive Word-of-Mouth.

Table 7. Mediation Effect Test Results

Indirect Relationships	Coefficient(β)	t-statistics	p-value	Hasil
ECC $\rightarrow$ MTE $\rightarrow$ WOM	0.146	4.482	0.000	Signifikan
SDI $\rightarrow$ MTE $\rightarrow$ WOM	0.120	4.442	0.000	Signifikan

Based on the mediation analysis in Table 7, Memorable Tourism Experience (MTE) significantly mediates the relationships between Experience Co-Creation (ECC) and Positive Word-of-Mouth (WOM) ($\beta = 0.146$, $p < 0.000$), as well as between Sustainable Destination Image (SDI) and WOM ($\beta = 0.120$, $p < 0.000$). Substantively, this finding confirms that MTE does not merely act as a statistical variable, but rather serves as a crucial psychological mechanism. It functions as an internal bridge that actively translates tourists' cognitive perceptions of destination sustainability and their physical participatory engagements into passionate advocacy behaviors.

Because the direct effects of both SDI and ECC on WOM remain significant, MTE is established as a partial mediator. From a behavioral perspective, this dual-pathway indicates that while tourists may recommend Sibandang Island purely based on their rational appreciation of its conservation efforts or local interactions, the presence of a profoundly memorable emotional experience significantly amplifies their likelihood to become active destination advocates.

Furthermore, the analysis reveals that the indirect effect of ECC on WOM through MTE is stronger than the indirect effect driven by SDI. This carries a critical substantive implication: while a destination's sustainable image provides the initial cognitive groundwork, the authentic, hands-on experiences constructed through direct interaction with the local community serve as the most powerful psychological engine for cementing the enduring memories required to generate organic positive word-of-mouth.

Table 8. Predictive Relevance Test Results (Q² Predict)

Endogenous Variables	Q ² Predict	RMSE	MAE
Memorable Tourism Experience (MTE)	0.684	0.568	0.463
Positive Word-of-Mouth (WOM)	0.720	0.535	0.419

Predictive relevance is used to evaluate the model's ability to predict the indicators of endogenous constructs. According to Hair et al. (2022), a Q² Predict value greater than zero indicates that the model has predictive relevance, and higher Q² Predict values reflect better predictive capability.

Based on Table 8, the Memorable Tourism Experience (MTE) variable has a Q² Predict value of 0.684, while the Positive Word-of-Mouth (WOM) variable has a Q² Predict value of 0.720. All Q² Predict values are substantially greater than zero, indicating that the research model demonstrates very strong predictive relevance for the endogenous constructs.

These results suggest that Sustainable Destination Image and Experience Co-Creation are able to accurately predict Memorable Tourism Experience. Furthermore, Sustainable Destination Image, Experience Co-Creation, and Memorable Tourism Experience also exhibit strong predictive capability in explaining Positive Word-of-Mouth among tourists.

Therefore, the research model not only demonstrates strong explanatory power, as reflected by the R² values, but also exhibits high predictive accuracy in explaining tourist behaviour within the context of sustainable tourism destinations based on geopark tourism.

Table 9. Model Fit Test Results

Model Fit Indices	Values
SRMR	0.034
d_ULS	0.121
d_G	0.177
Chi-square	235.972
NFI	0.926

The evaluation of overall model fit in this study was conducted using several model fit indices recommended in PLS-SEM analysis. The test results indicate that the Standardized Root Mean Square Residual (SRMR) value is 0.034, which is below the recommended maximum threshold of 0.08 as suggested by Hair et al. (2022). This result indicates that the research model demonstrates an excellent level of fit between the theoretical model and the empirical data.

In addition, the Normed Fit Index (NFI) value of 0.926 indicates a high level of model fit, as it exceeds the recommended minimum threshold of 0.90. The values of d_ULS (0.121) and d_G (0.177) further show that the discrepancy between the empirical correlation matrix and the model-implied correlation matrix is relatively small. Therefore, the results of the model fit evaluation suggest that the structural model developed in this study meets the required goodness-of-fit criteria and is appropriate for hypothesis testing.

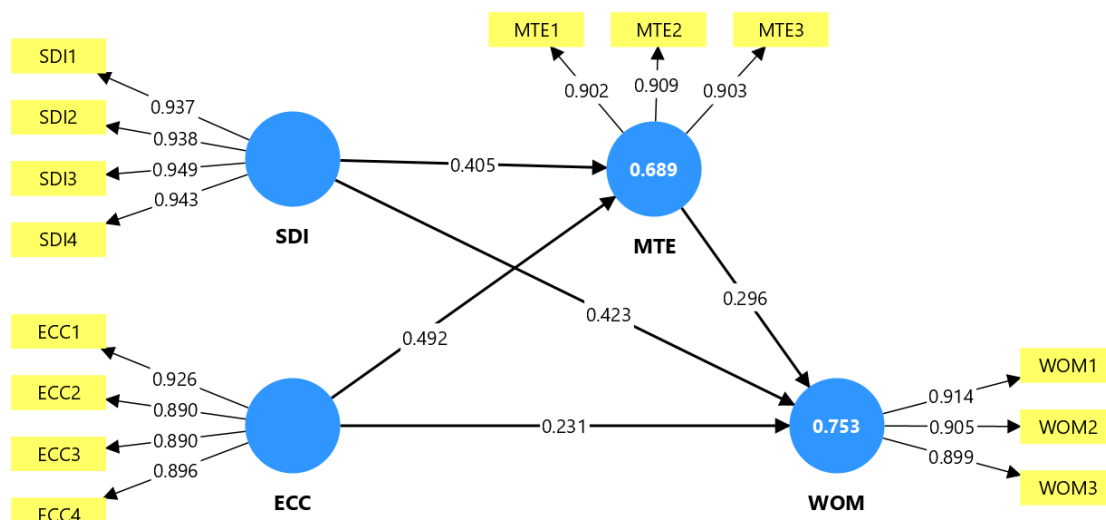


Figure 1. Results of the PLS-SEM Model Estimation

Figure 1 illustrates the results of the structural model estimation using PLS-SEM. The path coefficients indicate that Experience Co-Creation has the strongest influence on Memorable Tourism Experience ($\beta = 0.492$), while Sustainable Destination Image has the strongest direct effect on Positive Word-of-Mouth ($\beta = 0.423$). In addition, the R^2 values of 0.689 for Memorable Tourism Experience and 0.753 for Positive Word-of-Mouth indicate that the research model demonstrates strong explanatory power for both endogenous constructs.

Overall, the results of the study indicate that Sustainable Destination Image and Experience Co-Creation play significant roles in shaping Memorable Tourism Experience and tourists' Positive Word-of-Mouth. Experience Co-Creation emerges as the primary determinant of Memorable Tourism Experience, whereas Sustainable Destination Image serves as the main determinant of Positive Word-of-Mouth. Furthermore, Memorable Tourism Experience functions as a partial mediator that strengthens the relationships between these variables and Positive Word-of-Mouth.

DISCUSSION

The findings of this study indicate that Sustainable Destination Image (SDI) has a positive and significant effect on Memorable Tourism Experience (MTE). This result suggests that tourists' perceptions of destination sustainability constitute a key factor in shaping memorable tourism experiences. When tourists perceive that a destination is able to preserve the natural environment, safeguard local culture, provide social benefits to the community, and support local economic activities, they tend to develop a stronger emotional attachment to the destination.

While previous research frequently highlights the positive impact of sustainability on tourist responses (Almeida-Santana & Moreno-Gil, 2019; Conti et al., 2023), the literature is not entirely unanimous. Several studies argue that cognitive perceptions of a destination's sustainability do not automatically translate into profound emotional memories. In some contexts, overly rigid conservation measures can constrain tourist activities, potentially diminish the hedonic value of the experience and resulting in non-significant effects on MTE (Font & McCabe, 2017; Ponnappureddy et al., 2019). However, the findings of this study contradict such skeptical views. This empirical divergence can be critically explained by three interrelated factors: destination characteristics, tourist typology, and the measurement approach. First, regarding destination characteristics, studies reporting non-significant effects typically investigate conventional or highly institutionalized mass tourism settings (such as chain hotels), where sustainability is often implemented as top-down regulatory constraints that may compromise tourists' hedonic comfort. Second, from a tourist typology perspective, visitors to mass destinations often prioritize personal luxury over ecological compliance. In contrast, tourists visiting a hidden geosite like Sibandang Island exhibit a distinct psychological profile; they are intrinsically motivated to seek authenticity, cultural immersion, and educational value rather than mere hedonic escape (Kastenholz et al., 2018). Third, concerning the measurement approach, while prior skeptical studies sometimes reduce sustainability strictly to environmental compliance, this study operationalizes SDI comprehensively across environmental, socio-cultural, and economic dimensions. Consequently, in the context of Sibandang Island, sustainability is not perceived as a regulatory burden but rather as a core experiential value that enriches the meaning of the travel experience.

This distinct outcome can be theoretically explained by the specific operational framework of the research setting. Sibandang Island is not merely an ecotourism site; it is an integral part of the Toba Caldera UNESCO Global Geopark. Unlike conventional nature reserves that often isolate conservation from human activity, a geopark operates on a holistic paradigm that explicitly integrates geological heritage protection, public education, cultural preservation, and local economic empowerment (Farsani et al., 2011; UNESCO, 2015). This implies that tourists visiting Sibandang Island do not experience sustainability in a vacuum. Instead, they evaluate SDI based on how the destination seamlessly integrates natural beauty with cultural identity and tangible community benefits. This aligns with recent developments conceptualizing SDI as a multidimensional construct encompassing environmental, socio-cultural, and economic dimensions (de Araújo et al., 2022; Cavalcante et al., 2025), and further supports the holistic approach advocated by Šerić et al. (2024).

In the context of Sibandang Island, the sustainable destination image is constructed through the integration of the scenic landscape of Lake Toba, the preservation of Batak cultural traditions, and local economic activities supported by MSME-based products. Because a geopark mandates community involvement, these characteristics position sustainability not merely as a formal marketing attribute or restrictive regulation, but as a living, educational, and experiential element directly perceived by tourists during their visit.

Therefore, the more positive tourists' perceptions of Sibandang Island's holistic sustainability, the greater the likelihood of forming memorable tourism experiences. This explanation is supported by Cavalcante et al. (2025), who link sustainability perceptions to place memory, and is reinforced by the broader understanding that authentically implemented sustainable place branding positively shapes visitor responses (Garanti et al., 2024; Quynh et al., 2020).

The findings of this study indicate that Experience Co-Creation (ECC) is the strongest determinant in shaping Memorable Tourism Experience (MTE). This result suggests that memorable tourism experiences are not solely formed by what tourists observe, but more importantly by what they actively do, feel, and experience during their visit to the destination. Tourists who engage in interactions with local communities, observe local economic activities, try MSME products, learn about local culture, and participate in various local activities tend to acquire more personal and meaningful experiences compared to those who only passively consume attractions.

However, the literature on tourist participation is not unequivocally positive, and theoretical debates persist regarding the outcomes of co-creation. Several studies caution that active engagement does not automatically guarantee a positive memorable experience. Under certain conditions—such as when interactions are perceived as forced, commercialized, or physically and cognitively burdensome for the tourist—participation can actually lead to "value co-destruction," resulting in diminished satisfaction and negative memories (Echeverri & Skålén, 2011; Heidenreich et al., 2015; Järvi et al., 2018). Despite these theoretical risks, the present study demonstrates a highly positive and dominant effect of ECC on MTE. This empirical absence of value co-destruction on Sibandang Island can be critically attributed to three specific factors: tourist characteristics, the organic level of community involvement, and the unstructured design of tourism activities.

First, regarding tourist characteristics, visitors to hidden geosites are typically driven by a high intrinsic motivation for cultural immersion and learning; thus, they do not perceive participative efforts as a cognitive burden, but rather as the primary goal of their visit. Second, the level of community involvement on the island is deeply rooted in traditional Batak hospitality rather than aggressive commercialization (Lin et al., 2017). Because local MSME actors and residents interact authentically—treating tourists as guests rather than mere economic targets—tourists are shielded from the transactional fatigue often associated with co-destruction. Third, the tourism activity design is highly unstructured and voluntary. Tourists are not forced into staged, rigid participation; instead, they organically engage in local daily lives, such as observing the mangga udang harvesting process, at their own pace.

This distinct success is theoretically reinforced by the unique operational framework of a UNESCO Global Geopark. Unlike conventional mass tourism settings where co-creation might feel staged, a geopark is founded on the organic integration of geological conservation, public education, cultural preservation, and local economic empowerment (Farsani et al., 2011; UNESCO, 2015). Within this framework, when tourists interact with locals or consume community-based products, they are participating in a structured yet natural educational exchange. Therefore, such active involvement enables tourists to become part of the living landscape, resulting in deeper impressions that are more enduring in their memory. By incorporating this geopark perspective, the current study not only confirms but theoretically extends the findings of Liang (2022) and Adie et al. (2023), proving that co-creation functions optimally and avoids co-destruction when it is deeply rooted in the authentic educational and cultural pillars of a heritage destination.

Therefore, such active involvement enables tourists to become part of the living landscape, resulting in deeper impressions that are more enduring in their memory. By incorporating this geopark perspective, the current study not only confirms but theoretically extends the findings of Liang (2022) and Adie et al. (2023), proving that co-creation functions optimally and avoids co-destruction when it is deeply rooted in the authentic educational and cultural pillars of a heritage destination. Furthermore, these results enrich the perspective of Cavalcante et al. (2025) and Sthapit et al. (2024) by highlighting that experiences involving emotional participation, interaction with the experiencescape, and escapism are significantly magnified when supported by a geopark's community-empowerment ethos.

Interestingly, the results also reveal that the effect of ECC on MTE is stronger than that of SDI on MTE. This suggests a critical theoretical nuance: memorable tourism experiences are more strongly shaped by interaction processes rather than cognitive perception alone. While tourists may initially be attracted to visit Sibandang Island due to its sustainable destination image, the memories they retain are fundamentally forged by their direct, on-site involvement with local communities and cultural activities. In other words, destination image acts as the cognitive trigger for visitation, whereas authentic co-creation functions as the primary psychological mechanism that transforms the visit into a truly memorable experience.

The findings of this study indicate that both Sustainable Destination Image (SDI) and Experience Co-Creation (ECC) have positive effects on Positive Word-of-Mouth (WOM). However, SDI exerts a stronger influence compared to ECC. This suggests that tourists are more likely to recommend a destination when they perceive it as having high sustainability value. This finding presents an intriguing theoretical contribution, as it challenges a prominent skeptical view in the tourism literature. Several previous studies have argued that sustainability attributes often function merely as "hygiene factors"—basic expectations that prevent dissatisfaction but are insufficient on their own to trigger proactive advocacy or WOM, especially when tourists suspect superficial "greenwashing" practices by destination managers (Chen & Chang, 2013; Font & Hindley, 2017). Contrary to this skeptical perspective, the present study demonstrates that in the context of Sibandang Island, SDI transcends being a mere background attribute and emerges as the primary driver of positive tourist recommendations.

This deviation from the skeptical literature can be theoretically elucidated by examining the institutional and operational framework of the research setting. Sibandang Island is not an isolated ecotourism site making abstract green claims; it is an integrated entity within the Toba Caldera UNESCO Global Geopark. A recognized geopark theoretically mandates the tangible integration of four core pillars: geological conservation, public education, cultural preservation, and local economic development (Farsani et al., 2011; UNESCO, 2015). Because these pillars are visibly operationalized—such as through the preservation of Batak culture alongside the empowerment of MSMEs (mangga udang)—the destination's sustainability image becomes highly credible. Consequently, when tourists share their experiences (WOM), they are not merely recommending a beautiful landscape; they are engaging in pro-environmental and social advocacy, actively endorsing a holistic model of community well-being. This aligns with Conti et al. (2023) and de Araújo et al. (2022), who highlight that authentic sustainable attributes compel tourists to attribute higher moral and experiential value to a destination. Furthermore, while Arif et al. (2024) and Marpaung et al. (2024) established the baseline importance of conventional destination image, this study extends their premise by confirming that explicitly sustainable place branding (Garanti et al., 2024) and visible social responsibility (Yu & Hwang, 2019) are the true catalysts for advocacy in geopark settings.

At the same time, the findings also reveal that ECC has a positive influence on WOM. This indicates that higher levels of tourist engagement in local experiences increase their likelihood of sharing those experiences with others. While some critical literature suggests that highly personalized co-created experiences can be too niche or difficult to articulate to others, thus limiting WOM dissemination, this study proves otherwise in a community-based setting. Tourist recommendations are shaped not only by the cognitive belief that a destination is valuable (SDI) but also by participatory experiences that create a sense of closeness, authenticity, and emotional engagement. Rather than merely supporting the findings of Liang (2022), Adie et al. (2023), and Juliana et al. (2025)—which primarily limit the role of co-creation to enhancing satisfaction—this study pushes the theoretical boundary by proving that co-creation directly stimulates post-visit communication behaviour. Immersive, participatory, and meaningful interactions (Sthapit et al., 2024; Cavalcante et al., 2025) provide the personal narrative that makes the WOM compelling.

Interestingly, although ECC has the strongest effect on MTE, SDI emerges as the most influential direct determinant of WOM. This dual mechanism theoretically refines our understanding of tourist behavior in geoparks: co-creation provides the deep, emotional internal memory (the 'how' it felt), but the sustainable destination image provides the cognitive and moral justification to publicly advocate for the destination (the 'why' others should visit). In the context of sustainable tourism, tourist recommendations are driven by the belief that the destination contributes positively to environmental preservation, cultural sustainability, and community well-being (Nukhu & Singh, 2024; Šerić et al., 2024). Therefore, sustainable destination image not only shapes tourists' perceptions during their visit but also functions as the definitive trigger for their communication behaviour long after the visit has ended.

One of the key findings of this study is the role of Memorable Tourism Experience (MTE) as a partial mediator in the relationships between Sustainable Destination Image (SDI), Experience Co-Creation (ECC), and Positive Word-of-Mouth (WOM). This partial mediation theoretically resolves the ongoing tension between the ethical consumption paradigm—which argues that advocacy is driven rationally by civic duty—and the experience economy paradigm, which insists on emotional arousal (Caruana et al., 2014; Doran & Larsen, 2016). Specifically, the findings demonstrate a robust dual-pathway mechanism: tourists advocate for Sibandang Island both through a direct cognitive route (driven by moral support for its sustainability and local MSMEs) and an indirect emotional route (driven by profound personal memories). This implies that tourist advocacy for hidden geopark destinations is highly resilient, as it does not rely on a single psychological trigger.

The effectiveness of this indirect route is closely tied to the specific nature of the memories formed. Because the geopark environment organically integrates conservation and community empowerment, the resulting MTE is deeply eudaimonic—rooted in learning, cultural appreciation, and meaningful engagement, rather than superficial hedonic pleasure (Filep, 2014; Matteucci & Filep, 2017). By confirming MTE as a psychological bridge, this study specifies that in a heritage context, it is this eudaimonic quality that successfully translates sustainable stimuli into passionate behavioral outcomes (Sthapit et al., 2024; Cavalcante et al., 2025).

Notably, the analysis reveals that the indirect effect of ECC on WOM through MTE is stronger than the indirect effect of SDI on WOM. This finding is theoretically provocative, suggesting that while a destination's sustainable image provides the initial cognitive rationale for visitation, authentic, grassroots interactions with the local community serve as the primary psychological engine for cementing the memories required for advocacy. This challenges the over-reliance on top-down sustainable branding, proving that participatory co-creation is the most effective mechanism for transforming a sustainable visit into a memorable, advocate-worthy event.

CONCLUSION

Theoretically, This study examined the effects of Sustainable Destination Image (SDI) and Experience Co-Creation (ECC) on Positive Word-of-Mouth (WOM), mediated by Memorable Tourism Experience (MTE) within the Toba Caldera UNESCO Global Geopark, specifically Sibandang Island. The structural analysis confirms that both SDI and ECC significantly enhance MTE and WOM. Notably, ECC emerges as the dominant determinant of MTE, while SDI acts as the strongest direct driver of WOM. Furthermore, MTE functions as a partial mediator in these relationships. This establishes a robust dual-pathway mechanism where destination advocacy is driven simultaneously by cognitive support for sustainability practices and the formation of profound emotional memories.

Theoretically, this research extends the Stimulus-Organism-Response (SOR) framework and destination marketing literature by establishing the boundary conditions of a "hidden destination." The findings reveal a paradigm shift from consumption-oriented to participation-oriented tourism; for emerging geopark destinations with minimal formal visibility, the traditional reliance on pre-visit formal imagery is insufficient. Instead, the survival and growth of such destinations depend fundamentally on organic advocacy triggered by authentic, grassroots co-creation (Liang, 2022; Adie et al., 2023). By resolving the existing mechanism gap, this study proves that cognitive stimuli (SDI and ECC) strictly require the psychological bridge of MTE to transform into passionate behavioral responses (Sthapit et al., 2024; Cavalcante et al., 2025).

Practically, these findings urge destination managers, local governments, and MSME actors to pivot from conventional mass commercialization toward community-driven participatory initiatives. To overcome the visibility gap inherent in hidden destinations, stakeholders must prioritize direct tourist interaction through cultural immersion, environmental education, and MSME-based activities. Concurrently, since SDI remains a strong direct driver of WOM, preserving the holistic sustainability of the geopark—including Batak cultural heritage and ecosystem integrity—is non-negotiable (Sinulingga et al., 2024). Ultimately, synergizing a consistent sustainable image with deeply engaging on-site activities will cultivate the profound memories necessary to stimulate organic positive word-of-mouth, ensuring the long-term viability of the destination.

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