

Research on the Construction of Lushan Mountain Tourism Image under “Gift of Nature-Intervention Balance Theory”

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ABSTRACT

This study employs grounded theory to analyze 300 pages of tourist reviews from Ctrip.com regarding Lushan Mountain Scenic Area, covering the period from April 2017 to April 2025. The research investigates the interaction between natural and cultural elements in shaping the tourism image of World Heritage Sites. Key findings revealed that tourists' cultural cognition progresses through three developmental phases: (1) architectural cognition, (2) literary perception, and (3) cultural experience. These findings led to the establishment of the “GIE Theory (Gift of Nature-Intervention Balance Theory)”. Statistical analysis demonstrated significant correlations between meteorological landscape visibility and consumption costs, with the newly developed Atmospheric Clarity Index (ACI) and regional price differentials emerging as critical decision-making factors. Building on these findings, the study proposes a tripartite coordination mechanism integrating ecological preservation, cultural continuity, and technological innovation. The research emphasizes the integrated application of machine learning-based decision models and augmented reality technologies, proposing a mountain heritage management system that incorporates Eastern philosophical principles. This approach provides novel theoretical perspectives and practical solutions for resolving the inherent conflicts between heritage conservation and tourism development.

Keywords: Tourism image; Tourist perception; Grounded theory; “GIE Theory (Gift of Nature-Intervention Balance Theory)”; Cultural cognition

Introduction

The Quaternary glacial relics of Lushan Mountain Scenic Area and Bailudong Academy together form a unique model of human-environment interaction, boasting both scientific and aesthetic values. As China's first mountainous scenic area inscribed on the World Heritage List as a “World Cultural Landscape”, it provides an eastern paradigm for the high-quality development of mountain heritage. However, the core challenge in shaping its tourism image remains balancing ecological protection and cultural development. Current management practices at Lushan Mountain have made significant progress through institutional innovation, including implementing credit-based hierarchical management to regulate market order, developing smart

ticketing systems to alleviate passenger flow pressure, and revising regulations to strengthen resource protection. Existing studies on tourism image construction have yet to resolve the dynamic balance between natural ecological protection and humanistic resource development. Most focus on single dimensions—such as emphasizing unique geological landscapes or discussing cultural heritage communication strategies—while ignoring how the interaction between these two factors influences tourists' cognition. Moreover, they rely on static data analysis, failing to reveal the evolutionary patterns of cultural cognition. Research on technology application remains at the instrumental level, lacking theoretical integration. This study uses grounded theory to analyze 300 pages of user comments about Lushan Mountain Scenic Area

from Ctrip.com (April 2017–April 2025). It focuses on exploring three key questions: (1) how natural conditions and human management jointly shape the tourism image; (2) the stage-specific characteristics of tourists' cultural cognition; and (3) the regulatory role of digital technology. The findings indicate that tourists' cognition deepens through three stages: "architectural appreciation—poetic understanding—academy experience". Meteorological visibility (e.g., fog, clarity) affects landscape quality, while price differences (e.g., between mountain and valley areas) influence consumption decisions—both serve as key regulatory factors. The study proposes the "GIE Theory (Gift of Nature-Intervention Balance Theory)" and practical solutions, such as using AR technology to reconstruct cultural spaces and implementing tiered ticket prices to adapt to climate change, offering new insights for mountain heritage governance. Furthermore, at the theoretical level, it constructs a dual-track analysis framework that breaks through the traditional opposition between protection and development. At the practical level, it introduces a three-dimensional regulation scheme—altitude zoning protection, cultural temporal-spatial narration, and intelligent climate response—forming replicable management practices that provide important reference value for achieving sustainable development in heritage sites.

I. Literature Review

(1) Symbolic Tensions in Tourism Image Construction

Tourism image serves to integrate and represent tourists' cognition, emotions, and behavioral intentions toward a destination^[1-3]. It is characterized by the interaction of cultural symbols^[4,5] and synergy between communication strategies, making it a core element of destination marketing. The precise construction of tourism image and feedback from tourist experiences are critical pathways to enhancing destination competitiveness^[6,7]. In this process, official narratives dominate image construction, while user-generated content (UGC)—such as social media comments—combined with emotional expressions, reshapes the image in a counteractive

manner^[9,10]. Studies have revealed a dynamic imbalance between symbol production (official narratives) and meaning decoding (tourist interpretation) in this process. Although existing evaluation systems have expanded to include composite dimensions of cognition, emotion, and behavior, three limitations persist: First, the trap of static cultural cognition overlooks the Western value presuppositions embedded in satisfaction indicators. Second, excessive focus on interactions between scenic spots and tourists fails to systematically examine local communities and non-human actors. Third, the cultural neutrality assumption of sentiment analysis tools leads to distorted conclusions in non-Western contexts, while empirical findings on the subversive capacity of UGC have not yet been effectively translated into theoretical breakthroughs.

(2) Cultural Adaptation Dilemmas in Feedback Research

Tourist feedback—defined as tourists' counteractive reshaping of destination images via channels like social media comments—serves as a yardstick for testing the effectiveness of tourism images and directly impacts destination competitiveness and high-quality development. Tourists' emotional feedback is complex: for example, feedback on cultural experiences often exhibits delay and reflectivity. Satisfaction significantly influences emotional tendencies, and two factors jointly constitute the bidirectional dynamics of the feedback mechanism: (1) the direct driving effect of satisfaction on revisit intention, and (2) the behavioral pattern where negative emotions are more easily disseminated. In addition, sentiment semantic analysis of online reviews can extract core perceptual elements, and tourism website reviews—by constructing decision-making reference frameworks—exert a significant anchoring effect on potential tourists. Some studies focus on technical tools, emphasizing the verification of algorithmic adaptability for multilingual sentiment dictionary matching and dialectal emotional expressions to overcome the temporal and spatial limitations of traditional feedback collection. However, fake review detection models have not fully addressed the structural issue of platform capital manipulating the

review ecosystem. Although studies have highlighted UGC's capacity to subvert official narratives, they suffer from static limitations: insufficient dynamic tracking due to reliance on cross-sectional data, cultural misjudgments by sentiment analysis tools, and social desirability bias in questionnaire methods—all of which continue to restrict the explanatory power of feedback data.

(3) Methodological Breakthroughs of Grounded Theory

Grounded theory is defined as a bottom-up approach to theory construction derived from empirical data. At the methodological level, existing research tends to focus on two areas: quantitative evaluations of tourist satisfaction and analyses of meaning-generation mechanisms driven by grounded theory. Some studies have innovatively integrated localized theories to emphasize the process and context of tourism image construction, developing practice-oriented frameworks and paradigm adaptation strategies. Examples include extracting conceptual category frameworks from case studies incorporating policy texts into coding systems to create grounded paradigms tailored to Chinese management contexts, and using three-level coding to deconstruct the formation mechanisms of tourism images¹. Additionally, scholars have combined actor-network theory to transcend anthropocentric methodological constraints. At the theoretical tool level, research has centered on generating cognitive-affective three-dimensional models, identifying emergent characteristics of emotional experiences, and developing four-stage perception models. These studies showcase grounded theory's ability to unpack complex cultural logics; however, they also suffer from notable limitations in methodological rigor and explanatory power. For instance: Practice-oriented studies risk falling into circular reasoning; Western epistemologies hinder localized adaptation; Qualitative coding is vulnerable to presupposition bias; Research designs often ignore the impact of platform algorithms on data constructivism and suffer from spatiotemporal biases in sample selection; Theoretical tools fail to fully explain how online platforms automatically curate popular cultural elements; Emotional analysis models overlook the silent resistance

of marginalized groups; Mainstream models simplify cultural uniqueness by relying on generic heritage discourse; Static element induction fails to capture the dynamics of power struggles. Collectively, these limitations point to gaps in the grounded theory analytical framework and a lack of attention to the cultural-political dimensions of tourism image construction.

II. Research Design and Methodology

(1) Data Collection and Open Coding

1. Line-by-Line Analysis and Conceptualization

Can grounded theory effectively explore the dynamic construction mechanism of Lushan Mountain's tourism image? At the initial stage of this study, data collection and processing followed three key steps: 1) Data Acquisition: The Octopus Collector (a web scraping tool) was used to target user comments about the Lushan Mountain Scenic Area from Ctrip.com (a major Chinese travel platform). The time span covers a complete tourism cycle (April 2017–April 2025) to ensure coverage of typical scenarios (e.g., spring azalea viewing, winter rime watching). Adhering to the principle of information saturation, 300 pages of comment texts were collected, representing diverse tourist groups (individual travelers, group tours, etc.). 2) Data Cleaning: A standardized data cleaning protocol was established. Preprocessing steps included text denoising (removing irrelevant symbols, correcting typos) and sentiment polarity annotation (labeling comments as positive, negative, or neutral). This resulted in a structured corpus, which laid the foundation for subsequent three-level coding. 3) Coding Analysis: Qualitative analysis was conducted using NVivo 20 software, following Strauss's three-level coding framework. During the open coding stage, comments were analyzed line by line to generate 50 core concepts that retained the original semantic meaning of the text. For example, the phrase "It took 5 hours to visit Santan Spring" was coded as "attraction time intensity", ensuring comprehensive coverage of all text information nodes.

2. Generic Induction and Categorization

The study employed a three-level dynamic system of the constant comparative method (CCM) to enhance

data coding. It analyzed 50 core concept codes that had undergone line-by-line parsing and conceptualization, then combined three-level clustering to generate 11 research categories with theoretical saturation. A generic relationship table was constructed to visualize these categories (see Table 1). Each category was designed to

include 3–6 related concepts. For example, the category Natural Resources and Ecological Characteristics integrates concepts such as geomorphic diversity and climate comfort. This process yielded a cluster of concepts linked by explanatory chains.

Table 1: Generic Induction Analysis via Open Coding

| Original Data | Initial Concepts | Initial Categories |
|---|--|--|
| Lushan Mountain is famous for its grandeur, uniqueness, steepness, and elegance | Natural Landscape Characteristics | Natural Resources and Ecological Characteristics |
| Ridges, valleys, streams, and waterfalls are scattered among the peaks. | Geomorphic Diversity | Natural Resources and Ecological Characteristics |
| Over 650 plant species belonging to 150 families. | Ecological Resources | Natural Resources and Ecological Characteristics |
| Known as the Land of Coolness | Climatic Comfort | Natural Resources and Ecological Characteristics |
| Sandiequan Waterfall... steep trails to reach it. | Attraction and Challenge of Scenic Spots | Tourist Experience Perception |
| A 5-hour visit to Sandiequan Waterfall. | Time Intensity of Scenic Spots | Tourist Experience Perception |
| A sense of pride from climbing Wulaofeng Peak | Achievement Experience | Tourist Experience Perception |
| Interaction with wild macaques. | Pleasant Ecological Experience | Tourist Experience Perception |
| Impact of low visibility on foggy days. | Weather Dependence | Tourist Experience Perception |
| Waiting for the sea of clouds and sunrise. | Landscape Acquisition Cost | Tourist Experience Perception |
| Cable car with 30-person cabins running every minute. | Transportation Facility Efficiency | Transportation and Infrastructure |
| 70-yuan sightseeing bus with long waiting times. | Transportation Cost-Performance Analysis | Transportation and Infrastructure |
| Minibus ride with 396 bends. | Transportation Experience Pain Points | Transportation and Infrastructure |
| Clear road signs. | Navigation System Perfection | Transportation and Infrastructure |
| 160-yuan entrance ticket...90-yuan sightseeing bus ticket. | Consumption Structure | Consumption and Economic Factors |
| Price differences for mineral water (e.g., between shops). | Perception of Consumption Gradient | Consumption and Economic Factors |
| Pre-made dishes are 50% more expensive than average. | Catering Service Evaluation | Consumption and Economic Factors |
| Attractiveness of free ticket policies (e.g., for students/seniors). | Price Sensitivity | Consumption and Economic Factors |
| Continuous screening of the film <i>Romance on Lushan Mountain</i> | Cultural Symbol Influence | Cultural and Historical Elements |
| Academic atmosphere of Bailudong Academy | Cultural Immersion | Cultural and Historical Elements |
| Villa Architecture Art Museum. | Architectural Heritage Value | Cultural and Historical Elements |
| Poems by Li Bai and Su Shi that reference Lushan Mountain. | Literary Verification Demand | Cultural and Historical Elements |
| Political and historical memories (e.g., revolutionary sites). | Red Tourism Elements | Cultural and Historical Elements |
| 3–5 days recommended for a visit. | Travel Time Demand | Tourism Behavior Patterns |

| | | |
|---|--|-------------------------------------|
| Convenient to stay on the mountain for multiple nights. | Perception of Accommodation Necessity | Tourism Behavior Patterns |
| Importance of route planning (e.g., avoiding backtracking). | Tourist Autonomy Awareness | Tourism Behavior Patterns |
| Vibrant, lived-in atmosphere of Guling Street | Local Life Experience | Local Cultural Engagement |
| Skylight design in accommodations for stargazing. | Accommodation Feature | Local Cultural Engagement |
| Lushan Mountain's Three Stones cuisine | Memory Points | Local Cultural Engagement |
| Homestay shuttle services (e.g., picking up/dropping off guests). | Perception of Local Characteristics | Local Cultural Engagement |
| Friendly and helpful staff | Local Service Warmth | Service and Management Quality |
| Range of accommodations (from luxury hotels to budget inns). | Service Attitude Perception | Service and Management Quality |
| Crowding during peak tourist seasons (e.g., holidays). | Diversity of Accommodation Choices | Service and Management Quality |
| Some villas not open to the public. | Carrying Capacity Pressure | Management Optimization Suggestions |
| Suggestions to replace private transport with public buses. | Resource Utilization Limitations | Management Optimization Suggestions |
| Improvements needed for the sign system (e.g., clearer directions). | Cost Optimization Strategy | Management Optimization Suggestions |
| Interweaving of spring rain and spring snow. | Experience Optimization Direction | Management Optimization Suggestions |
| Fairy-tale snow scenery in winter. | Uniqueness of Seasonal Landscapes | Seasonal and Weather Impacts |
| 26°C summer experience (cool climate). | Seasonal Limited Value | Seasonal and Weather Impacts |
| Comparison of fog scenery differences with Huangshan Mountain. | Verification of Summer Resort Function | Seasonal and Weather Impacts |
| Positioning of the Three Great Mountains and Five Great Peaks | Perception of Landscape Differences | Destination comparison positioning |
| True face exploration metaphor | Market position cognition | Destination comparison positioning |
| Metaphor of soul baptism | Essence of tourism motivation | Tourism motivation and value |
| Expectation of reunion | Spiritual value acquisition | Tourism motivation and value |
| Desire of photography creation | Destination loyalty | Tourism motivation and value |
| | Artistic expression needs | Tourism motivation and value |

(2) Axial Coding and Paradigm Model Construction

After completing open coding of 300 pages of customer reviews for the Lushan Mountain Scenic Area on Ctrip.com, we integrated 11 inductively derived core categories into a dynamic relationship network encompassing phenomena, conditions, actions, and outcomes. This process enabled us to establish a theoretical framework linked to a result-oriented four-dimensional linkage. The axial coding paradigm model is presented in Table 2.

The core contradiction in the operation of the Lushan Mountain Scenic Area's tourism system lies in the gap between tourists' psychological expectations of its natural landscapes and the actual service quality provided. These gaps between expectations and reality not only enhance the experiential value of the landscape but also reveal

negative feedback stemming from service shortcomings—for example, the coexistence of positive experiences from climbing Wulaofeng Peak and complaints about the time-consuming trek to Sandiequan. Furthermore, geographical conditions, economic factors, and cultural elements dynamically influence the system's operation. The Lushan Mountain Scenic Area's terrain is prone to causing traffic bottlenecks, its free admission policy intensifies pressure on carrying capacity, and its academy culture can stimulate demand for cultural immersion. Additionally, management efforts to optimize signage can enhance service efficiency, while tourists develop consumption preferences for "San Shi" cuisine—referring to stone chicken, stone fish, and stone ear—based on their local knowledge. At the outcome level, a two-way transmission effect exists: homestay services strengthen

Table 2: Paradigm Matrix Analysis Framework

| Factor Dimension | Theoretical Component Composition | Typical Category Correlations |
|----------------------|--|--|
| Phenomenon | Contradiction between natural landscape attractiveness and tourism service provision | Experiential perception, tourism motivation |
| Mediating Conditions | Gift of Nature, climate, and economic regulation | Geographic characteristics, seasonal impacts, consumption perception |
| Causal Relationships | Management lag and insufficient cultural activation | Facility optimization suggestions, cultural elements |
| Situational Context | Transportation facility constraints and tourist behavior restrictions | Transportation efficiency, itinerary planning |
| Action Strategies | Management optimization, service improvement, and cultural experience enhancement | Service quality, local cultural engagement |
| Outcomes | Increased tourism motivation and destination positioning differences | Revisit intention, comparative disadvantages |

tourist loyalty, while low visibility on foggy days diminishes visiting motivation—together, these form a complex causal network that drives the system’s dynamic evolution. The study is grounded in a theoretical model where natural resources and ecological characteristics serve as structural supports, directly influencing the core phenomenon of tourist experience perception. Meanwhile, seasonal changes and weather fluctuations—acting as dynamic regulatory factors—continuously impact the quality of tourist experiences. The efficiency of the transportation network and the completeness of infrastructure form a specific contextual framework. These environmental constraints link to strategies for improving service management quality, ultimately enhancing tourism motivation. From a causal perspective, insufficient activation of cultural elements weakens the destination’s comparative advantages, leading to negative consequences for its market positioning. The entire model is characterized by multi-element interaction: natural resource endowments provide the material foundation for system operation; climatic conditions and facility standards form a two-way regulatory mechanism;

management interventions convert experiential value through service quality optimization; and the degree of cultural element development and utilization serves as a key variable for differentiated competition. The ebb and flow of the system’s internal elements jointly shape the path and trajectory of tourism image construction at the Lushan Mountain Scenic Area, reflecting the dynamic mechanism of mountain tourism image formation. As illustrated in the model diagram of the “GIE Theory (Gift of Nature-Intervention Balance Theory)”:



Figure 1: Model Diagram of the GIE Theory (Gift of Nature-Intervention Balance Theory)

(3) Selective Coding and Core Category Confirmation

1. Core Category Extraction

The study takes the “gift of nature-intervention balance” dual-drive mechanism as its core category. Combining resource protection (corrected from resource protection) and management regulation, it establishes a supporting category system that clarifies the endowment base as the unique resources of the Lushan Mountain Scenic Area—including its geological features and biodiversity. Management intervention encompasses both hard measures (e.g., optimizing infrastructure) and soft measures (e.g., disseminating cultural values). Economic regulation achieves dynamic balance through climate adaptability indicators and consumption control, such as a summer temperature control standard of 26°C and adjustment of the price difference of mineral water between the inside and outside (added for clarity) of the scenic area.

2. Theoretical Model Integration

The “GIE Theory (Gift of Nature-Intervention Balance Theory)” deconstructs the dynamic interaction between nature and humanity in tourism at the Lushan Mountain Scenic Area. It reveals that the essence of mountain tourism development lies in the dynamic coordination between natural resource conditions and management measures. The theory also clarifies the symbiotic evolution of service supply bottlenecks (caused by geographical endowments) and cultural value addition, while highlighting the dialectical relationship between natural heritage and humanistic innovation. For example, the geological wonder of Sandiequan creates traffic supply constraints, but augmented reality (AR) technology can innovatively transform cultural heritage. The study found that tourists cognition follows a three-stage evolutionary pattern: starting with concrete perception of villa complexes, progressing to comprehension of poetic artistic conception, and finally deepening into immersion in academy scenes. Corresponding to this, a ternary regulation model is proposed, encompassing three dimensions: altitude gradient protection (natural), temporal-spatial narrative

reconstruction (cultural), climate adaptation services (technical). In the field of political ecology, management lag stems from the contradiction between power-solidified landscape representation and social-ecological dynamics. Landscape serves as a spatial carrier of power relations ; managers legalize interest claims through institutional design—for instance, the institutionalization of ecological policy authority fosters cognitive inertia. Power disparities (corrected from differences for formality) perpetuate traditional governance models, and visual-prioritized planning hinders (corrected from delays for accuracy) ecological protection . Essentially, power groups consolidate their dominant position by controlling management objectives and knowledge systems . Research in political ecology elucidates (corrected from explains for formality) the “GIE Theory (Gift of Nature-Intervention Balance Theory)” from a deeper perspective. Furthermore, the study confirms that upgrading infrastructure (e.g., increasing cable car capacity) and optimizing cultural interpretation (e.g., refining poetic narrative systems) can trigger resource value-added effects. Conversely, management lag leads to a decline (corrected from attenuation for context) in experiential value, as seen in overcrowding during peak seasons. Through the interaction between climate sensitivity analysis and economic leverage, a new regulatory mechanism is developed that integrates ecological sensitivity classification, cultural gradient optimization, and climate adaptation technology. By quantitatively analyzing the formation of collective cognition regarding the cultural symbols of Sandiequan Waterfall, the study provides decision-making support for addressing temporal-spatial imbalances (corrected from spatial-temporal for common usage) in tourism. It also verifies the role of variables such as temperature fluctuations and price elasticity in passenger flow regulation, offering novel solutions for reconciling ecological protection and tourism development. Based on the developed “GIE Theory (Gift of Nature-Intervention Balance Theory)”, the core variable relationships are illustrated in the following framework diagram:

Table 3: Core Variable Relationships of the “GIE Theory (Gift of Nature-Intervention Balance Theory)”

| Dimension | Core Variables | Functional Relationships |
|---------------------|--|--|
| Gift of Nature | Geological Landscapes/Ecological Characteristics | Create attraction and impose constraints (e.g., terrain shapes unique landscapes while causing traffic bottlenecks). |
| Human Interventions | Service Facilities/Cultural Management | Facilitate resource conversion (e.g., cable car optimization enhances accessibility, turning natural assets into usable tourist resources). |
| Regulatory Levers | Climate Fluctuations/Price Gradients | Bidirectionally regulate user experiences (e.g., heavy fog diminishes a site’s perceived value, while snowscapes strengthen visitation motivation). |
| Cognitive Evolution | Three-stage Cultural Immersion | Prolong tourists’ stay duration (e.g., progressive immersion: from architectural appreciation to poetic engagement to academy exploration). |
| Dynamic Balance | Interaction of Positive/Negative Feedback Loops | Drive continuous system optimization (e.g., improved services boost loyalty, while overcrowding reduces satisfaction—creating a feedback loop that prompts adjustments). |

The “GIE Theory (Gift of Nature-Intervention Balance Theory)”—as reflected in its core variable relationship table—highlights four key characteristics of tourism experiences in the Lushan Mountain Scenic Area. 1) Tourists’ experiences exhibit a “resource curse”: a tension between the area’s unique natural landscapes and lagging service facilities. For example, insufficient capacity of scenic shuttle buses leads to excessively long visiting times. 2) Cultural perception follows a gradient effect: tourists’ cognition deepens along a path from architectural heritage to literary references (e.g., poems) and finally to academic atmosphere, validating the hierarchical theory of cultural experience. 3) The management mechanism suffers from response lag: public governance mostly reacts passively to tourist feedback, while forward-looking innovations often originate from market entities. Additionally, climatic factors present a push-pull paradox: the summer cooling function (a pull factor) conflicts with fog-induced landscape obscuration (a push factor), creating decision-making tension. 4) Ultimately, the model clarifies that the essence of tourism in Lushan Mountain is a dynamic balance between natural gifts and human intervention. It provides a four-in-one theoretical framework—integrating ecological protection, cultural inheritance, management innovation, and climate adaptation—for the high-quality development

of mountainous cultural heritage sites.

The “GIE Theory (Gift of Nature-Intervention Balance Theory)” further reveals that the core of mountain tourism experiences lies in dynamic coordination between natural resource advantages and management measures. For instance, the Sandiequan landscape’s appeal stems from its unique stepped waterfall landform and cool summer microclimate, but topographic constraints create service bottlenecks (e.g., time-consuming transportation). To address this, human intervention should transform value by integrating hard facilities (physical infrastructure) and soft narratives (cultural storytelling) while minimizing costs. Specific measures include: Physical facilities: Constructing boardwalks to reduce travel time. Cultural experience: Using AR holographic projections to recreate the poetic scenes of the waterfall (e.g., as described in classical poetry). Environmental constraints and the evolution of tourist cognition impact the stability of the Lushan Mountain Scenic Area’s tourism system. For example, climatic conditions and economic regulation jointly influence the area’s carrying capacity. Since tourist cognition evolves through three stages—from architectural space recognition to cultural symbol interpretation and finally to digital interactive experiences—a three-dimensional collaborative management approach is needed: Ecological protection:

Implementing daily tourist limits in core areas.

Cultural inheritance: Covering most key relics with AR technology to restore historical scenes and facilitate cultural dissemination.

Technical monitoring: Establishing a real-time passenger flow early warning system and adopting a time-slotted reservation system to reduce peak-season wait times. Enhancing cable car capacity and expanding AR device coverage will further optimize tourist experiences.

A case in point is Wulaofeng Peak: its high-altitude granite landform limits the hiking trail to single-line access. Intervention can be achieved by:

Expanding cable car capacity to alleviate congestion.

Using AR technology to synchronously display over 300 classical poems related to the peak, linking natural scenery with cultural heritage.

Implementing a 20% ticket discount on rainy days (to compensate for reduced visibility) and coordinating reservation slots with AR device availability to boost tourist satisfaction.

In summary, based on the “GIE Theory (Gift of Nature-Intervention Balance Theory)”, the tourism image construction of the Lushan Mountain Scenic Area is defined by a dynamic balance between its natural base and human intervention. Natural landscapes such as Sandiequan Waterfall and Wulaofeng Peak—with their steep terrain and rich biodiversity—form a unique natural foundation. However, these geographical features often lead to traffic bottlenecks, creating a core contradiction: the sense of achievement from summit ascents versus the time-consuming nature of hiking. Effective integration of hardware (infrastructure) and cultural interventions can transform these geographical constraints into immersive cultural experiences. For example, upgrading cableway systems and using AR technology to restore classical poems (associated with Lushan Mountain) turn logistical challenges into opportunities for deeper engagement. Climate and economy act as moderating variables: Dynamic discount policies for foggy days help mitigate the impact of reduced visibility, while price gradients (across different zones or services) and the cost-performance of AR guides collectively influence

tourists’ decision-making. The three-stage evolution of tourists’ cultural cognition plays a dual role: it extends their stay (boosting economic benefits) and alleviates environmental pressure (by encouraging more mindful behavior). The tourism management system of Lushan Mountain achieves balance by combining two feedback loops: positive feedback from AR-enhanced cultural identity (which strengthens emotional connections to the site) and negative feedback from peak-season ecological controls (e.g., time-slot reservations, negative review management). These measures, for instance, enhance tourists’ tolerance for waiting times for the Wulaofeng Peak cableway. Notably, the natural base and management measures exhibit a bidirectional interactive relationship. The impacts of climate and economy, along with tourists’ cultural cognition, are dynamically evolving—together reflecting the core law of balancing resource constraints with experience value enhancement. The dynamic tension system between nature and humanity, as revealed by the above analysis, is illustrated in Figure 2.

(4) Saturation Test

To verify whether the original tourist review data from the Lushan Mountain Scenic Area would generate new concepts or categories, this study used a three-level coding method to define the conceptual categories of 1,200 new reviews collected in May 2025 from Ctrip and Tongcheng Travel platforms. These reviews covered diverse groups, including group tourists and independent travelers. All extracted categories were consistent with existing ones—no new conceptual categories were identified—indicating that theoretical saturation had been achieved. A cross-validation mechanism was integrated into the test process: two researchers independently extracted core concepts from the new data, and Cohen's Kappa coefficient was used to assess coding consistency. After three rounds of independent coding, the K-value reached 0.82 ($p < 0.01$), demonstrating that the research model has stable explanatory power.

III. Conclusions and Prospects

(1) Theoretical Contributions

Geographical constraints do not necessarily lead to

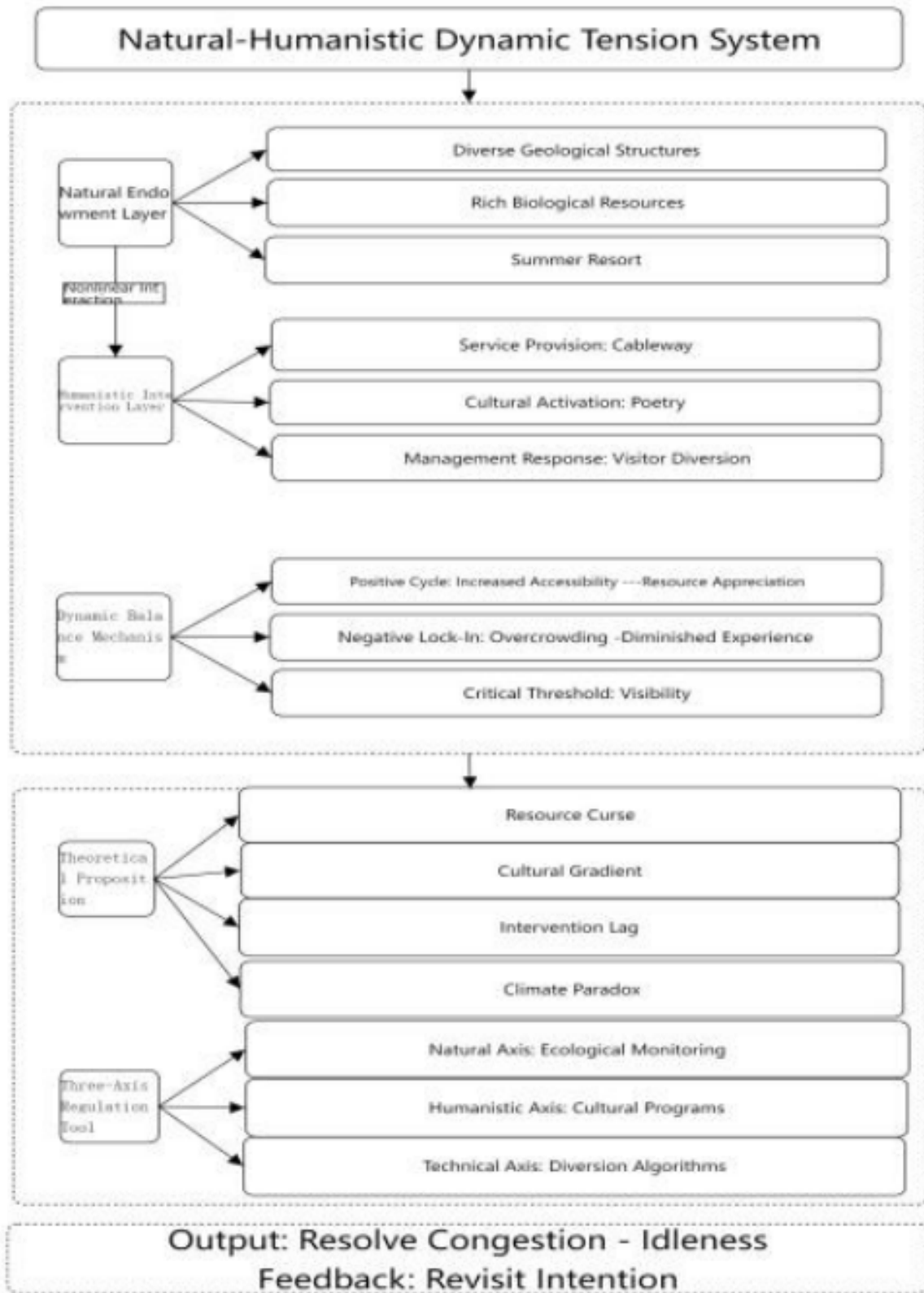


Figure 2: Natural-Humanistic Dynamic Tension System

service bottlenecks; however, pure topographic limitations without cultural value addition make it difficult to sustain the attractiveness of mountain scenic areas. The “GIE Theory (Gift of Nature-Intervention Balance Theory)” aligns with UNESCO Cultural Landscape Evaluation System and responds to Article 108 of the Operational Guidelines for the Implementation of the World Heritage Convention, which requires that each nominated property should have an appropriate management plan or other documented management system. The theory constructs a dynamic theoretical framework for transforming resource and cultural values, integrates geographical conditions with digital technologies to systematically analyze heritage sites, and addresses a key limitation of traditional research—the separation of nature and culture. The theory achieves three major innovations: (1) ecological hierarchical assessment, (2) dynamic spatiotemporal narrative technology, and (3) climate adaptation schemes. These innovations thus redefine the relationship between heritage protection and utilization. Additionally, the established cultural cognitive gradient model reveals the process by which tourists’ cognition evolves from material perception to spiritual resonance, expanding the dimensions of traditional tourism research. The “GIE Theory (Gift of Nature-Intervention Balance Theory)” innovatively reshapes human-land interaction patterns through digital technology, providing a scientific and forward-looking analytical tool for the management of mountain heritage sites.

(2) Policy Implications

The differentiated governance pathways outlined by the “GIE Theory (Gift of Nature-Intervention Balance Theory)” offer the following insights for the Lushan Mountain Scenic Area:

(1) Establish an intelligent regulation system: Integrate time-sharing reservation mechanisms with microclimate monitoring networks, develop real-time diversion algorithms based on a 26°C thermal threshold, and design dynamic pricing models for foggy days to dynamically balance climatic carrying capacity with sustainable economic development.

(2) Innovate a full-link management system: Implement platform information governance strategies using negative review weight optimization algorithms, and combine AR (Augmented Reality) emotion regulation mechanisms with hiking pressure index reduction systems.

(3) Develop a cultural cognition gradient model: Transform historical scenarios (e.g., the Zhu-Lu Debate) into modular immersive theaters, and integrate digital twin stage systems with cultural perception bracelets. This not only enhances tourists’ time-travel experience but also collects cultural behavior data to form a structurally optimized plan for community benefit distribution. However, strict measures must be taken to protect tourists’ personal privacy (e.g., identity information) during their use of cultural perception bracelets to avoid data leakage.

Such a governance framework has achieved a systematic breakthrough from technical tools to institutional design, and it holds paradigmatic innovation

Table 4: Theoretical Contribution Diagram

| Comparison Dimension | Traditional Research | Research Breakthroughs of the “GIE Theory (Gift of Nature-Intervention Balance Theory)” |
|----------------------|------------------------|---|
| Analysis Unit | Dual Opposition | Dynamic Balance System |
| Time Dimension | Cross-Sectional Data | Diachronic Evolution Mechanism (2017–2025) |
| Cultural Analysis | Static Symbol Decoding | Three-Stage Cognitive Transition Model |

value in the fields of digital governance and cultural heritage activation.

(3) Research Limitations and Prospects

A key limitation is the lack of long-term panel data, which is needed to verify the resilience of the proposed system. Although three-way cross-validation was employed, individual differences in cultural decoding may still exist in the emotional encoding of poetic artistic conceptions. Future research should pursue dual breakthroughs in both theory and technology: 1) Establish an evaluation model for the dynamic adaptation capacity of nature and culture: Develop a multi-scale heritage site resilience evaluation framework using geological history data and tourism big data, with a focus on exploring the complex interaction paths between climate change and tourist activities.

1) Develop an AR authenticity diagnosis system: Integrate eye-tracking and neurocognitive mapping technologies to construct a spatiotemporal evolution model of cultural perception intensity under the influence of AR.

3) Innovate an intelligent cultural gene configuration system: Use deep learning algorithms to deconstruct the spatiotemporal distribution characteristics of cultural elements in heritage sites and generate personalized tourism cognitive navigation plans.

Additionally, a transnational digital heritage research platform should be established. Eight typical mountain heritage sites (e.g., Mount Wuyi, Mount Fuji) will be selected as control experimental areas to conduct cross-cultural verification of the “GIE Theory (Gift of Nature-Intervention Balance Theory)” applicability. The focus will be on overcoming semantic conversion barriers in the digital communication of culture, thereby promoting the transformation of research results from regional experiences to universal technical solutions.

IV. Suggestions

The Lushan Mountain Scenic Area can adopt phased management measures to achieve high-quality tourism development. The specific measures are divided into short-term operational strategies and progressive

implementation paths of medium-and long-term system planning. The scenic spot should give priority to projects with short implementation period and quick results, and simultaneously deploy complex projects that require system coordination. In the near future, management should focus on optimizing tourist experience and improving basic services, and rely on technology micro-update and process reengineering to quickly respond to the pain points of peak season management. In addition, the Lushan Mountain Scenic Area should immediately start the linkage mechanism of time-sharing reservation system and cableway intelligent regulation, monitor the temperature change in the core area in real time during the high temperature period in summer, automatically trigger the reservation diversion program when it exceeds the threshold of 26°C, and simultaneously push indoor cultural project recommendation and foggy emergency route on OTA platform. Priority should be given to the vegetation restoration project in the ecological conservation area below 500 meters above sea level, focusing on repairing the damaged vegetation along the hiking trail, setting up the warning signs for wildlife traffic, and supporting the installation of real-time environmental monitoring sensors to visually display data.

In order to activate the cultural heritage, the Lushan Mountain Scenic Area should implement the sub-item promotion plan. Firstly, a digital navigation system is built, intelligent interpretation devices are deployed in historical building areas, multilingual building technology is analyzed by combining wall-embedded QR codes, and a cultural digital asset authentication system is built by using blockchain technology. Secondly, create an intelligent interactive scene, and set up motion sensing devices at landscape nodes to realize the automatic play of poems and explanations when tourists stay. In addition, the scenic spot can develop a modular performance system, arrange short plays of historical and cultural situations according to the spatial characteristics of the academy, and adopt a movable stage to improve the venue reuse rate. In addition, the scenic spot can establish a climate adaptive management mechanism, realize the

dynamic ticket adjustment system linked by the ropeway station and the viewing platform, automatically trigger the fare discount in foggy days when the visibility detected by the meteorological sensor is less than 100 meters, and simultaneously enable the SMS early warning push function to guide tourists to optimize their tour routes.

The medium-and long-term development planning of Lushan Mountain Scenic Area can further guarantee the high-quality development of scenic tourism. The development of vertical gradient needs to cooperate with geological and cultural heritage experts to complete detailed zoning planning, focus on the layout of service facilities in alpine areas above 1000 meters above sea level in scenic spots, simultaneously formulate plans for improving cableway capacity and emergency management standards, and establish a linkage response mechanism for ecological carrying capacity among different altitude gradients. At the iterative level of digital technology, the construction of AR augmented reality system should be promoted in stages. At first, the poetry geographic information database should be built in the basic stage, and the spatial coordinates of historical scenes should be calibrated. In the application stage, the technology of integrating holographic images and physical landscapes can be developed to dynamically superimpose virtual and real scenes. In addition, upgrade the cultural experience, design a third-order experience system from basic cognition to deep interaction, and finally to academic traceability, and integrate the building information wall with the academy's research activities to form a knowledge transmission chain. Develop an evaluation algorithm of cultural perception, collect behavioral data of tourists' staying time and interaction frequency through smart bracelets, and establish a dynamic monitoring model of experience quality. The planning and implementation of scenic spots should focus on integrating interdisciplinary data, focusing on breaking through the microclimate adaptability design problem of facilities layout in high-altitude scenic spots, and ensuring the synergy between technology application and cultural heritage protection requirements. Lushan Mountain Scenic Area can implement a phased management upgrade plan

to achieve high-quality development: in terms of price management, we should reform the price in stages, set up special expenses for ecological maintenance at the initial stage, list them in the tickets and establish a financial publicity system, introduce a dynamic pricing mechanism for cultural experience projects in the medium term, and develop a visual platform for consumption data. Optimize the service system and establish an intelligent response mechanism for complaints. The scenic spot should build a 72-hour rapid response process and departmental responsibility traceability system supported by blockchain technology, and develop an algorithm calibration interface in conjunction with OTA platform to formulate a standard process for handling eco-cultural complaints. In terms of community co-construction projects, the scenic spot can implement cultural empowerment plans, such as starting community oral history records and non-standardized tour training programs, establishing a multi-party consultation platform and formulating implementation rules for cultural heritage income distribution. In terms of technology research and development path, we will develop digital management tools, establish a prototype system of global impact assessment "GIE Theory (Gift of Nature-Intervention Balance Theory)" in conjunction with scientific research institutions, and establish a basic database based on the experimental base of Guling Street to provide algorithmic support for the later development of digital twin system. The implementation of each module should pay attention to policy convergence, focus on ensuring the synergy between price adjustment mechanism and community interest compensation, and technology research and development should match the actual operation and maintenance capacity of scenic spots for iterative development.

The systematic upgrading project of the Lushan Mountain Scenic Area can adopt the technical system of meteorological perception and ticketing linkage to dynamically adjust the fare, and realize climate-responsive pricing by deploying visibility monitoring equipment and microclimate sensors. For example, pilot projects should be carried out in stages in the core scenic spots, technical interfaces with OTA platform should be

established to reduce the risk of data compatibility, full-price tickets and 20% discount tickets should be compared synchronously, and the effectiveness of the verification mechanism should be evaluated by combining tourists' code scanning. The optimization of cultural performance system should focus on solving the contradiction between cultural relics protection and technology application, and adopt inflatable detachable stage to reduce the intensity of physical intervention. By developing the simplified version and the in-depth version of the performance content, combining the local residents' participation mechanism to enhance the cultural authenticity, and simultaneously formulating the cultural suitability evaluation standard of the performance equipment. At the level of resource integration and guarantee system, the utilization rate of equipment can be improved by transforming existing monitoring equipment into multi-functional monitoring nodes, and a cultural experience guarantee fund accounting for 1-2% of ticket income can be set up for technical iteration. In the theoretical framework, the flexible pricing model and tourists' emotional feedback data are integrated to build a dynamic calibration system, and all technical interventions strictly follow the principle of reversible heritage protection. The management of the implementation cycle needs to establish three-level time nodes, short-term projects such as logo optimization are limited to six months to complete the test, medium-term projects such as cultural performances and upgrades are planned for 1-2 years, and complex projects such as digital twin systems are formulated for 3-5 years. During the implementation, it is necessary to monitor the influence coefficient of AR equipment usage intensity on authenticity experience through quarterly evaluation mechanism, and start the system reset procedure when the technical complaint rate exceeds the threshold of 5%. Finally, the dynamic balance mechanism should run through all the implementation stages, focusing on monitoring the change data of tourists' staying time and cultural awareness, and adjusting the interpretation intensity and technical intervention depth in real time to ensure that ecological protection, technical empowerment and cultural inheritance are in a state of

coordinated development. All improvement measures adopt a gradual optimization path and establish a closed-loop management system of "implementation-monitoring-feedback-correction".

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