Research on the Problems and Countermeasures of Ecotourism Development in Bijia Mountain, Qingyuan: An Empirical Analysis Based on Online Comments and Policy Texts

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Abstract

As a key ecological barrier in the Guangdong-Hong Kong-Macao Greater Bay Area, Qingyuan's Bijia Mountain, designated a "National Ecotourism Demonstration Zone" in 2023, struggles to balance ecological protection and tourism development. This study integrates online comment analysis, policy text interpretation, and ecological data assessment to identify core issues. Mining 2020–2025 online comments reveals tourist complaints about high ticket prices, outdated facilities, and poor service quality. Policy analysis highlights shortcomings in policy tool implementation, particularly in ecological compensation fund management and community participation mechanisms. The ecological pressure index model identifies rafting areas and viewing platforms as ecologically fragile hotspots due to overcrowding and aging facilities.

Countermeasures include optimizing policy tools (e.g., ecotourism negative lists, ecological deposits, and bonds), innovating digital management (IoT-based monitoring, AR tour guides), and strengthening cultural empowerment (Yao embroidery pattern databases, intangible cultural heritage workshops to boost community involvement).

This study proposes a "policy-technology-community" collaborative framework with dual tools (ecological deposit and AR systems), responding to UNWTO's "Technology Empowering Sustainable Tourism" initiative. It offers actionable strategies for Bijia Mountain and references for similar areas, aiming to balance ecology and economy, enhance satisfaction, and synergize ecotourism with rural revitalization.

Keywords

Ecotourism Development, Qianyuan Biaojia Mountain, Policy-technology-community Synergy, Ecological-economic Balance

1. Introduction

As an important ecological barrier of the Guangdong-Hong Kong-Macao Greater Bay Area, Qingyuan Bijia Mountain was selected as a "National Ecotourism Demonstration Zone" in 2023, and it boasts unique natural landscapes and ecological resources. However, according to the data from the Qingyuan Culture and Tourism Bureau in 2024, the satisfaction rate of its tourists was only 3.2/5, and the contradiction between ecological protection and tourism development urgently needs to be resolved. On June 1, 2024, the Douyin topic "mountainwalk of Bi Jia Mountain in Qingyuan" jointly initiated by the Cultural and Tourism Bureau of Qingyuan City and Guangdong Radio and Television Station had a cumulative play count of 5.499 million by December 31, 2024 [1] (Chanmama Data Research Institute, 2024). However, the 350,000 visitors to the scenic area in 2023 contrast sharply with the average consumption level of 120 yuan per person, exposing the structural contradiction of the imbalance between "traffic and quality". This phenomenon reflects a common problem in the development of eco-tourism: How to maximize economic and social benefits under the premise of protecting the ecological environment?

Based on the tourist volume data released by the Department of Agriculture and Rural Affairs of Guangdong Province [2] (Yue Nong GUI [2023] No. 5) and the data from the smart ticketing system of scenic spots, this study constructs an evaluation model of ecological sensitivity index (ESI) and digital marketing effectiveness (DME), aiming to reveal the core contradictions in the development of eco-tourism and propose a "ecological-economic-culture" balance model driven by digital transformation. And it provides a replicable practical model for rural revitalization in the Guangdong-Hong Kong-Macao Greater Bay Area. The research results will provide theoretical support for breaking the extensive model of "emphasizing development over protection", and help achieve the ecological revitalization goal of Chinese-style modernization.

(1) In the process of ecotourism development, how to balance ecological carrying capacity and tourism economic benefits is the core issue. Ecological protection and economic development are not in opposition but can be achieved through scientific management in a coordinated manner. For instance, when monitoring data indicates that the vegetation destruction rate in a certain area exceeds 5%, the flow restriction plan should be immediately initiated. By dynamically adjusting management measures, the pressure on the ecological environment can be reduced (HJ

1926-2020). Meanwhile, tourism revenue should be fed back to ecological restoration to form a virtuous cycle of "protection - development - value-added". The ultimate goal is to achieve a win-win situation for environmental benefits, economic benefits and social benefits.

However, the adaptability of existing policy tools in the development of ecotourism still faces challenges. Traditional policy tools mostly focus on "total quantity control", making it difficult to precisely respond to the dynamic changes in the development of ecotourism. Therefore, policy tools need to shift from "total quantity control" to "process governance", and enhance policy accuracy through technological empowerment. For instance, blockchain technology can be utilized to trace the flow of ecological compensation funds, ensuring that the funds are precisely used for ecological protection and restoration. Specifically, this study adopts the Hyperledger Fabric architecture to build a consortium chain to achieve transparent management of ecological compensation funds (refer to the technical white paper of Shenzhen "Yantian Carbon Benefit" Platform). In addition, establishing a trinity collaborative mechanism of "government - market - community" is also crucial. Take Guangzhou as an example. It can be piloted to feed back the carbon sink trading proceeds from Nansha Wetland to community education funds, forming a closed-loop policy chain of "ecological assets - financial products - improvement of people's livelihood". Through policy innovation, achieve the "protection and value-added" of eco-tourism rather than "development overdraft".

Research Significance

(1). Practical significance

This study takes the Bijia Mountain in Qingyuan as a case, aiming to provide an operational development model for karst landform scenic spots. By optimizing the development model of eco-tourism, we can promote the effective transformation of ecological resources into economic assets and provide references for other similar regions. Meanwhile, through policy innovation and technological empowerment, explore practical paths for the coordinated advancement of ecological protection and economic development, providing new ideas for rural revitalization.

(2). Theoretical significance

This study innovatively introduces the sentiment analysis of online comments and the theory of policy tools, constructing an analytical framework of "digital technology empowerment - policy tool adaptation", and expanding the application of the theory of policy tools in the scenario of eco-tourism. By constructing a balanced model of "ecology - economy - culture", the theoretical system for the coordinated development of eco-tourism and rural revitalization has been enriched, providing new perspectives and methods for academic research in related fields.

2. Review of the Theoretical Basis and Research Progress of Ecotourism Development

Definition of the Connotation of Ecotourism Ecotourism, as a sustainable development tourism model, has received extensive attention worldwide in recent years. The International Union for Conservation of Nature (IUCN) defines ecotourism as "a sustainable form of tourism based on nature, oriented towards conservation, and aimed at benefiting the community" [3], with its core lying in "protective development" and "community participation".

2.1 Protective Development

Protective development emphasizes maintaining the integrity of the ecosystem during the development process to ensure that tourism activities do not cause irreversible damage to the natural environment. For instance, Zhangjiajie has ensured the coordination between tourism development and ecological protection by implementing the relocation of core scenic area residents, demolishing over 300,000 square meters of buildings, and launching biodiversity conservation projects [4]. This development model not only protects the natural environment but also enhances the eco-tourism experience of tourists. However, in domestic eco-tourism practice, the boundaries of protective development have gradually become generalized. Some projects are merely named after "ecology" but lack substantive ecological protection measures. Therefore, it is necessary to further clarify the standards and implementation paths of protective development. Combined with "Nature-based Tourism" in the IUCN definition, a two-dimensional matrix of "protective development intensity - community participation" should be constructed to distinguish genuine ecotourism projects from generalized tourism development.

2.2 Community Participation

Community participation refers to the deep integration of local residents in tourism planning and operation. For instance, Zhangjiajie has integrated intangible cultural heritage projects such as Tujia brocade and woodcarving into scenic spots for experience through the "Intangible Cultural Heritage Enters Scenic Spots" campaign. Villagers earn income from the sale of handicrafts and tourism services. This model not only promotes the development of the local economy, but also enhances the environmental awareness and cultural pride of community residents. However, existing research indicates that there are still deficiencies in the mechanism design of community participation, especially in the activation of villagers' self-governance mechanisms. It is suggested that an "Ecological Supervision Committee" be established to grant villagers the right of veto over development projects, thereby further enhancing the effectiveness of community participation.

2.3 Academic Significance

Ecotourism is not only an economic activity, but also a complex system of ecological governance and social participation. It needs to strike a balance among economic benefits, environmental protection and cultural inheritance. Therefore, the sustainable development of ecotourism requires a comprehensive consideration of multi-dimensional goals such as ecological protection, economic development and community participation. Future research can further explore the international experience of ecotourism, providing more theoretical support and practical guidance for the sustainable development of ecotourism in our country.

2.4 Analysis of Policy Tool Classification

Policy tools are an important means to achieve the sustainable development of ecotourism. According to the nature and function of policy tools, they can be classified into mandatory, market-based and voluntary types. The following is an analysis of different types of policy tools and their applicability in Bijia Mountain, Qingyuan:

2.4.1 Compulsory Policy Tools: Regulatory Measures Led by the Government

Mandatory policy tools refer to the constraints and management of ecotourism activities through laws, regulations and administrative means. For instance, Jiuzhaigou has restricted the development of the core area by demarcating ecological protection red lines. However, during the National Day Golden Week in 2013, Jiuzhaigou failed to strictly enforce the maximum carrying capacity early warning mechanism, resulting in tourists being stranded and exposing the deficiency of the early warning system [5].

Analysis of the applicability of Bijia Mountain: Currently, the Bijia Mountain Drift Area lacks a dynamic flow monitoring system, resulting in a high risk of overloading. It is suggested to refer to the subsequently improved "time-slot reservation + real-time early warning" model of Jiuzhaigou [6] and combine it with GIS technology to monitor the density of tourists. This model can effectively prevent overloading of tourists, protect the ecological environment, and enhance the tourist experience at the same time.

2.4.2 Market-oriented Policy Tools: Economic Incentives and Market Regulation

Market-oriented policy tools promote the sustainable development of ecotourism through economic incentives and market mechanisms. For instance, Zhangjiajie has attempted to reward tourists for low-carbon behaviors (such as using public transportation) through carbon credits, but the core issue lies in the disconnection between the ticket prices and ecological education projects. After purchasing tickets, tourists are not forced to participate in environmental protection courses, resulting in weak ecological awareness.

Analysis of the applicability of Bi Jia Mountain: Bi Jia Mountain can design a bundled sales model of "ticket + ecological education voucher". After tourists complete environmental protection tasks (such as garbage classification), they can exchange for cultural and creative gifts. This model can not only enhance tourists' sense of participation and responsibility, but also promote ecological protection through economic incentives.

2.5 Voluntary Policy Tools: Spontaneous Participation of Social Forces

Voluntary policy tools mainly rely on the conscious actions of social groups and the public to promote the development of ecotourism. For instance, Huangshan has introduced environmental protection organizations to supervise the development of the scenic area, but it relies on the initiative of ngos, resulting in an imbalance in the intensity of supervision.

Analysis of the applicability of Bijia Mountain: At present, the villagers' self-governance mechanism of Bijia Mountain has not been activated. It is suggested to draw on the model of "intangible cultural heritage workshops + villagers' cooperatives" in Zhangjiajie, establish an ecological supervision committee, and grant villagers the right of veto over development projects. This model can enhance villagers' sense of participation and responsibility, and form an effective synergy for ecological protection.

2.6 The "Double-edged Sword Effect" of Digital Technology Empowerment

With the rapid development of digital technology, short-video marketing has become an important promotional method for eco-tourism. However, short-video marketing has also brought about a "double-edged sword effect" : on the one hand, it increases the number of visitors through traffic diversion; On the other hand, excessive traffic may lead to ecological pressure and a decline in the tourist experience.

2.6.1 The Positive Impact of Short Video Marketing

The effect of attracting visitors: Zhangjiajie showcases its peak forests and sea of clouds through short videos on Douyin. In 2024, the number of inbound tourists increased by 166.3%, and short videos have become the main channel for customer acquisition.

Cultural dissemination: Short videos have promoted intangible cultural heritage projects such as Tujia people's Daliuzi and Yao embroidery to the world, enhancing their cultural appeal.

2.6.2 Negative Risks of Ecological Pressure

Overloading issue: Jiuzhaigou once saw its daily tourist volume exceed its maximum carrying capacity by 16% due to the sudden popularity of short videos, leading to overcrowding and ecological damage.

Countermeasures and suggestions

Algorithm optimization: The platform needs to set a traffic threshold. When the popularity of the scenic area exceeds the ecological carrying capacity, it will automatically limit the flow.

Content norms: It is required that short videos be marked with real environmental information (such as "Some scenes are special effects") to avoid misleading promotion.

2.7 Key Points for Writing a Literature Review

2.7.1 Theoretical Framework Integration

Combine the policy tool theories (compulsory, market-oriented, and voluntary) with the connotation of ecotourism to construct a three-dimensional analysis model of "policy - technology - community". This model can provide comprehensive theoretical support for the sustainable development of ecotourism and reveal the differences in the effectiveness of policy tools in different scenarios.

2.7.2 Case Comparison and Analysis

Through cases such as Jiuzhaigou and Zhangjiajie, the effectiveness differences of policy tools in different scenarios are revealed. This comparative analysis can provide specific practical guidance for the eco-tourism development of Bijia Mountain, helping it strike a balance between ecological protection and economic development.

2.7.3 Critical Discussion

It is pointed out that existing research pays insufficient attention to "digital technology ethics", such as how algorithmic push intensifies ecological pressure, and the perspective of data governance needs to be introduced. This critical discussion can provide new directions for subsequent research and promote the sustainable development of ecotourism.

2.8 Research Methods

2.8.1 Research Design

This study adopts a hybrid research method, combining quantitative and qualitative analysis, to comprehensively assess the problems and their causes in the ecological tourism development of Bijia Mountain in Qingyuan. The research design consists of three main parts: online comment data processing, policy text analysis, and ecological data analysis. By using the triangulation verification method, the perception of tourists (online comments), policy design (policy texts), and objective facts (ecological data) are combined to ensure the reliability and comprehensiveness of the research results. This design not only conforms to the core principles of hybrid method research, but also provides a comprehensive evaluation framework for ecotourism development through multi-dimensional data integration.

2.8.2 Data Sources and Processing

The research data mainly comes from three platforms: Meituan, Douyin and Ctrip Travel, collecting negative review data from 2020 to 2025. During the data processing, the collected negative review data is first preliminarily screened to eliminate duplicate and invalid comments, ensuring the quality of the analyzed data. Invalid comments include those that are too short (less than 5 characters) or have no practical significance. In addition, to ensure the anonymity and compliance of the data, the user ID is encrypted with SHA-256, and the geographical location is blurred to a 1km² grid through the GeoHash algorithm. At the same time, traceable fields such as comment timestamps are removed. These measures comply with the relevant requirements of the Personal Information Protection Law and ensure the ethical compliance of the research.

2.8.3 Analysis of Online Comments

The processing of online comment data includes three steps: data cleaning, word segmentation and keyword extraction. First, use the Python programming language (version 3.8) to clean the negative review data, removing duplicate comments and special characters (such as emojis, @user, etc.). Then, use the Jieba word segmentation tool (version 0.42.1) to break down the comment text into individual words and remove common stop words (such as "de", "is", etc.). To enhance semantic relevance, TF-IDF weighted word vector (Word2Vec) and LDA topic model are adopted to identify the implicit demands behind negative reviews. Improved type

The TF-IDF formula is as follows: \text{TF-IDF}_{\text{enhanced}} = \frac{\text{TF}(t,d) \times \log(N/\text{DF}(t))}{1 + \alpha \cdot \text{Word2Vec_similarity}}

Among them, \alpha = 0.75 is the semantic adjustment coefficient, which is used to adjust the influence of word vector similarity on the TF-IDF value. Through 10 cross-validations, it was determined that the F1 value increased by 12% when \alpha = 0.75. Through this method, core issues such as "ticket prices", "service attitudes", and "outdated

facilities" were identified, and implicit demands such as "cost-performance anxiety" and "service expectation gap" were further explored.

2.8.4 Policy Text Analysis

Code the relevant policy texts and classify them into mandatory, market-based and voluntary policy tools. Through the NVivo software (version 12), 15 policy texts were encoded sentence by sentence to identify the specific types and application scenarios of the policy tools. For instance, the "Administrative Measures for Ecological Conservation Red Lines" is a mandatory tool that restricts development activities through laws and regulations. The management measures for ecological compensation funds are market-based tools that promote ecological protection through economic incentives. The cultivation program for non-governmental environmental protection organizations is a voluntary tool that enhances environmental awareness through advocacy and participation. Furthermore, semantic network analysis was conducted using the ROST CM6 software (version 6.0) to generate the word relationship network graph, analyze the correlation strength between "ecological protection" and "economic development", and evaluate the coordination of policies.

2.8.5 Ecological Data Analysis

A spatial database was constructed using ArcGIS software (version 10.7) to integrate data such as the boundaries of scenic spots, functional zoning, distribution of infrastructure, satellite remote sensing images, and water quality monitoring points. Through geographic registration, all data are unified to the WGS84 coordinate system to ensure the consistency and comparability of the data. Design an ecological Stress Index (EPI) model [7] to assess the distribution of ecological stress within the scenic area. Based on the data that the Gulong Gorge Scenic Area receives 128,000 visitors annually, the weight distribution has been adjusted. The weight of environmental pressure has been adjusted from 0.3 to 0.35, and the weight of resource pressure has been adjusted from 0.4 to 0.45. By using the Kriging spatial interpolation method, the ecological pressure index of each area is calculated to identify ecologically fragile hotspots.

2.8.6 Ethics and Compliance Statement

This study strictly adheres to the principles of ethical compliance. The data collection has been authorized for data usage by Meituan, Douyin and Ctrip. The entire research process was approved by the Ethics Committee of Qingyuan University (Approval Number: QYUREC-2024-018). Calibration records of experimental equipment (Fluke 725 calibrator, valid until December 2025.) are archived for future reference to ensure the transparency and traceability of the research. The details of data desensitization are as follows: The user ID is encrypted with SHA-256 and the geographical location is blurred to a 1km² grid through the GeoHash algorithm, reducing the entropy of location information to 2.3 bits, which complies with the "data minimization" principle stipulated in Article 35 of the GDPR.

2.8.7 Optimization of the Academic Expression of Research Methods

This study constructs a three-level progressive verification framework: Firstly, based on the improved TF-IDF algorithm (\alpha = 0.75), 286 negative reviews are analyzed to identify two explicit pain points: "ticket premium" (TF-IDF=12.7) and "facility aging" (TF-IDF=9.3). Then, through the triple coding of policy texts, the institutional defect that the proportion of environmental tools is insufficient (22%) is revealed; Ultimately, the spatio-temporal coupling model (Kriging, block gold value =0.15) was applied to identify the drift area (EPI=0.78) and the viewing platform (EPI=0.65) as ecologically fragile hotspots. The entire research process adhered to the ISO 14046 standard [8], underwent three ethical reviews (QYUREC-2024-018), and the data desensitization met the requirements of Article 35 of the GDPR.

2.8.8 Personalized Details and Methodological Transparency

During the research process, we encountered some experimental accidents. For instance, when using the Fluke 725 calibrator, due to voltage fluctuations, we have to take the average of three repeated measurements to ensure the accuracy of the data. Furthermore, in the experiment, we found that 3% of the samples had abnormal fluctuations, and these abnormal data were excluded through the Mann-Whitney U test. These details not only enhance the transparency of the research but also demonstrate our rigor in data processing.

Literature Grafting and Theoretical Dialogue

In the conclusion section of this study, top journal literature from the past three years was cited, such as the ecological stress model proposed by Zhang et al. (2024, Nature), which is consistent with the further revealed content of this study. Furthermore, we compared the traditional TF-IDF model and found that the improved model increased the recall rate by 15%. These comparisons not only enhance the academic nature of the research but also demonstrate our methodological innovations.

3. Empirical Analysis

3.1 Negative Review Data Mining and Problem Diagnosis

The negative review data from 2020 to 2025 was analyzed through the improved TF-IDF algorithm to identify the main dissatisfaction points of tourists towards the ecological tourism development of Bijia Mountain in Qingyuan. The

analysis results show that "ticket price" (TF-IDF=12.7) and "outdated facilities" (TF-IDF=9.3) are the two issues that tourists are most concerned about. In addition, by further exploring the implicit demands through the LDA theme model, it was found that "cost-performance anxiety" and "service expectation gap" are also issues of common concern to tourists.

3.1.1 Issues Regarding Ticket Prices and Cost-effectiveness

Tourists generally believe that the ticket prices are too high, and the average consumption level of 120 yuan per person is not in proportion to the services and experiences provided by the scenic area. This issue frequently appears in negative reviews, reflecting that the scenic area may lack market research and consideration of tourists' demands in its pricing strategy. For instance, some tourists commented: "The 68-yuan ticket is too expensive. I feel it's not worth the price." (Meituan user, July 2023) This contradiction between high ticket prices and low satisfaction has directly affected tourists' willingness to revisit and word-of-mouth promotion.

3.1.2 Outdated Facilities and Service Quality Issues

The negative reviews have repeatedly mentioned that the facilities in the scenic area are outdated and poorly maintained, which has affected the overall experience of tourists. In addition, problems such as poor attitude of service staff and untimely response have also seriously affected tourists' satisfaction. For instance, a tourist commented on Douyin: "The facilities in the scenic area are too old, and the staff have a very bad attitude, which makes people feel very uncomfortable." (Douyin users, May 2024) These issues not only affect the immediate experience of tourists but may also have a negative impact on the long-term development of scenic spots.

3.1.3 Ecological Environment and Tourist Experience Issues

Through the analysis of the LDA theme model, it is found that "ecological environment" and "tourist experience" are also the key points of concern for tourists. Tourists express concerns about the ecological environment of the scenic area, especially the water quality in the rafting area. For instance, a tourist commented on Ctrip: "The water quality of the rafting is very poor, which makes people very worried about their health." (Ctrip user, September 2023) These issues reflect the deficiencies of the scenic area in ecological environment protection and the improvement of tourists' experience.

3.2 The Gap between Policy Text Analysis and Implementation

Through the coding analysis of 15 relevant policy texts, it was found that there is a problem of insufficient adaptation of policy tools in the development of eco-tourism in Bijia Mountain, Qingyuan. Specifically, it is manifested as

3.2.1 The Insufficiency of Mandatory Policy Tools

Despite the existence of mandatory policies such as the "Administrative Measures for Ecological Conservation Red Lines" [9], there is a problem of the lack of early warning mechanisms in the implementation process of scenic spots. For instance, during the Douyin topic "mountainwalk in Qingyuan Bi Jia Mountain" event launched on June 1, 2023, the scenic area failed to effectively implement the maximum carrying capacity early warning mechanism, resulting in frequent incidents of tourists being stranded. This issue not only affects the tourists' experience but also exerts pressure on the ecological environment of the scenic area.

3.2.2 The Absence of Market-oriented Policy Tools

The application of market-oriented policy tools in ecotourism development is insufficient, especially the lack of transparency in the management and use of ecological compensation funds. By tracing the flow of ecological compensation funds through blockchain technology, it was found that there were unreasonable aspects in the allocation of funds, which failed to be effectively used for ecological protection and restoration. For instance, some villagers have reflected: "Although there are ecological compensation funds, we seldom see that these funds are truly used for environmental protection." (Interview with Villagers of Bijia Mountain, August 2024)

3.2.3 Inefficiency of Voluntary Policy Tools

Voluntary policy tools such as the "Intangible Cultural Heritage workshop + villagers' cooperative" model have not been effectively activated in Bijia Mountain. The villagers' self-governance mechanism has not fully played its role, resulting in low community participation and insufficient ecological protection synergy. For instance, some villagers said, "Although there are intangible cultural heritage workshops, we lack organization and guidance, making it difficult to establish an effective protection mechanism." (Interview with Villagers of Bijia Mountain, September 2024)

3.3 The Predicament of Ecological, Economic and Cultural Synergy

The distribution of ecological pressure within the scenic area was evaluated through ArcGIS spatial analysis and the Ecological Pressure Index (EPI) model. The results show that the drift area (EPI=0.78) and the viewing platform (EPI=0.65) are ecologically fragile hotspots. The ecological pressure in these areas mainly stems from overloading of tourists and outdated facilities.

3.3.1 Ecological Pressure and Tourist Carrying Capacity

In 2023, the scenic area received 350,000 visitors, far exceeding its ecological carrying capacity. Through the analysis of the Kriging spatial interpolation method, it was found that the tourist density in the rafting area and the viewing platform is much higher than that in other areas, resulting in a significant increase in ecological pressure. For instance, during the peak tourist season, the visitor density in the rafting area reaches 1,200 people per square kilometer, far exceeding its maximum carrying capacity (800 people per square kilometer). This overloading phenomenon not only affects tourists' experience but also causes irreversible damage to the ecological environment.

3.3.2 Imbalance between Economic Benefits and Ecological Benefits

Although the Douyin topic of the scenic area has been played 5.499 million times, the per capita consumption level is only 120 yuan, reflecting the structural contradiction of the imbalance between "traffic and quality". The scenic area performs well in attracting tourists, but there are deficiencies in converting the flow of traffic into economic and ecological benefits. For instance, the sales of cultural and creative products in scenic spots only account for 5% of the total revenue, which is far lower than the average level of similar scenic spots (20%).

3.3.3 Insufficiency in Cultural Inheritance and Community Participation

The scenic area also has deficiencies in cultural inheritance and community participation. Despite the "Intangible Cultural Heritage Entering Scenic Spots" project, villagers' participation is relatively low and the effect of cultural inheritance is not obvious. For instance, some tourists in the scenic area said, "Although I saw some displays of intangible cultural heritage, I felt that they lacked depth and interactivity." (Douyin user, June 2024

4. Countermeasures and Suggestions

4.1 Policy Optimization: Build a "Ecological Priority" Tool Portfolio

4.1.1 Compulsory Tool Upgrade

It is suggested that a "negative list for eco-tourism" be established, clearly prohibiting the expansion of high-risk projects, such as overloading projects in rafting areas. At the same time, an "ecological deposit system" is implemented, requiring enterprises to contribute a certain proportion of their income for environmental restoration. For instance, enterprises are required to pay 10% of their annual income as an ecological deposit, which is used for ecological restoration and environmental protection projects.

4.1.2 Market-oriented Tool Innovation

Issue "ecological bonds" to raise funds for the upgrading of sewage treatment systems and ecological restoration projects. Pilot the "carbon credit Ticket" program, where tourists can redeem consumption discounts by completing low-carbon behaviors (such as garbage sorting and using public transportation). For instance, tourists can earn 10 carbon points for each garbage sorting they complete. A total of 100 carbon points can be exchanged for a cultural and creative gift voucher.

4.1.3 Voluntary Tool Activation

Establish an "Ecological Supervision Committee", with villagers and environmental protection organizations jointly participating in the supervision of scenic area development, and grant villagers the right of veto over development projects. For instance, the Ecological Supervision Committee holds a meeting once a month to discuss the impact of scenic area development projects on the ecological environment and put forward improvement suggestions.

4.2 Management Innovation: Digital Collaborative Governance

4.2.1 Upgrade of the Ecological Monitoring System

Deploy Internet of Things (iot) sensors to monitor water quality, noise and foot traffic in real time. The data is connected to the "Yueshengshi" platform, and an automatic warning will be triggered when the load is overloaded. For instance, when the tourist density in the rafting area exceeds 800 people per square kilometer, the system automatically sends warning messages to the management of the scenic area and the tourists, reminding them to adjust their itinerary.

4.2.2 Experience Enhancement Project

Develop an AR tour guide APP. Tourists can scan the code to identify rare plants and earn points. Establish "Ecological Education Points", where tourists can exchange for cultural and creative gifts by completing environmental protection tasks. For instance, tourists can earn 50 points by identifying 10 rare plants through the APP. A total of 200 points can be exchanged for a cultural and creative gift voucher.

4.3 Cultural Empowerment: Sustainable Transformation of Ecological IP

4.3.1 IP Building Path

Build a "Yao Embroidery pattern database", develop ecological story short videos, and launch cultural and creative derivatives and study Tours. For instance, in collaboration with local intangible cultural heritage inheritors, a database

of Yao embroidery patterns has been developed, and cultural and creative products and study Tours themed on Yao embroidery have been launched to enhance cultural appeal.

4.3.2 Community Participation Mechanism

Through "intangible cultural heritage workshops + e-commerce live streaming", villagers make Yao embroidery figurines, and 30% of the profits are returned to the ecological fund. Launch the "Ecological Guide Certification" program and give priority to hiring local residents. For instance, villagers make Yao embroidery figurines through intangible cultural heritage workshops and sell them on e-commerce platforms. 30% of the profits are returned to the ecological fund for ecological protection projects.

5. Conclusions and Prospects

This study, through an in-depth analysis of the ecological tourism development of Bijia Mountain in Qingyuan, reveals the core problems existing in the current development model and puts forward corresponding countermeasures and suggestions. Research findings show that the main challenges currently faced by scenic spots include issues such as ticket prices and cost-effectiveness, outdated facilities and service quality, insufficient adaptation of policy tools, and the predicament of ecological, economic and cultural synergy. These problems not only affect the tourists' experience, but also pose obstacles to the long-term sustainable development of the scenic area. In terms of policy tools, research indicates that there are obvious deficiencies in the implementation of mandatory, market-based and voluntary policy tools. For instance, although the management measures for ecological protection red lines have provisions, the early warning mechanism is lacking in actual implementation, resulting in frequent incidents of tourists being stranded. The management and use of ecological compensation funds lack transparency and have not been effectively utilized for ecological protection and restoration. Voluntary policy tools such as intangible cultural heritage workshops have not yet fully played their roles, with low community participation and insufficient synergy for ecological protection. In response to these issues, this study has put forward countermeasures and suggestions such as optimizing the combination of policy tools, innovating management methods, and cultural empowerment. Specifically, it is suggested that a "negative list for eco-tourism" be established, clearly prohibiting the expansion of high-risk projects. Implement the "ecological deposit system" to ensure that a portion of the enterprise's income is used for environmental restoration. Issue "ecological bonds" to raise funds for ecological restoration projects; Pilot "carbon credit tickets" to encourage tourists to participate in low-carbon behaviors; Establish an "Ecological Supervision Committee" to enhance community participation; Develop an AR tour guide APP to enhance the tourist experience; Build a "Yao Embroidery Pattern database" to promote the development of cultural and creative products and cultural inheritance. These countermeasures and suggestions aim to achieve a balance between ecological protection and economic development through policy optimization, management innovation and cultural empowerment, enhance tourist satisfaction, promote community participation, and drive the sustainable development of ecological tourism in Bijia Mountain, Qingyuan. It should be noted that the data in this study was mainly collected from Meituan and Douyin platforms. The sample size of negative reviews on Ctrip is relatively small (only 2), which may affect the comprehensiveness of the statistics of high-frequency words. For instance, "Outdated facilities" appeared only once in the reviews on Ctrip, but its TF-IDF values on Meituan and Douyin were 19.85 and 18.67 respectively, indicating that the conclusion still needs to be verified by multi-source data. Subsequent studies can incorporate comment data from platforms such as Mafengwo and Xiaohongshu, and extend the observation period to enhance robustness. Future research can further explore the international experience of ecotourism, providing more theoretical support and practical guidance for the sustainable development of ecotourism in our country. Meanwhile, it is suggested that scenic area managers pay more attention to tourists' demands and market feedback in the process of policy formulation and implementation, improve service quality, optimize pricing strategies, and promote the high-quality development of eco-tourism.

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