

RESEARCH ARTICLE

Sustainability Assessment of the Cultural and Economic Symbiotic System of Yunnan Torch Festival

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Abstract

The Yunnan Torch Festival is an important traditional festival for the Yi and other ethnic minorities, representing both cultural heritage and cultural tourism resources. However, commercialization driven by tourism development threatens cultural authenticity, necessitating an assessment of the balance between culture and economy. This study constructs a dynamic evaluation system to quantitatively analyze the threshold for balancing cultural preservation and tourism development. A "spatiotemporal zoning" management strategy is proposed, and the effectiveness of digital promotion in attracting youth participation is verified. Based on these findings, a dynamic evaluation matrix is constructed, integrating three dimensions: culture (65%), economy (23%), and technology (12%). An operational threshold rule is introduced: "Preservation Priority" (triggered when cultural authenticity falls below 0.4) and "Commercialization Review" (activated when economic score exceeds 0.7). This provides a scientific decision-making tool for the sustainable development of the Torch Festival's cultural and economic symbiosis and offers a framework for other intangible cultural heritage festivals.

Keywords: Torch Festival; Cultural protection; Tourism development; Sustainability; Hybrid analysis

1. Introduction

The Torch Festival, celebrated by the Yi, Bai, and Naxi ethnic groups in southwest China (Qubi et al., 2024), holds deep cultural significance and has become a vital cultural tourism asset in Yunnan Province (Peng, 2024). Rooted in the Yi people's agricultural civilization, it originated as a ritual blending religious worship, agricultural practices, and communal activities, serving functions like ancestral veneration, harvest prayers, and protection against misfortune (Mo, 2025). Its symbolic richness reflects the Yi people's spiritual beliefs and cultural identity, making it a key vessel of traditional Yi culture (Hua and Ren, 2024). The relationship between cultural preservation and economic development is a complex one of dynamic symbiosis, mutual constraint, and mutual promotion. The ideal relationship between cultural preservation and economic development is not a binary choice, but rather a search for a sustainable symbiotic path within a dynamic balance. This requires: identifying the core, immutable elements of culture (such as ritualistic spirit and collective community memory); allowing for innovative adaptation of non-core elements (such as forms of dissemination and experiential design); and establishing a multi-party consultation and scientific evaluation mechanism to ensure that development does not come at the cost of the loss of cultural roots. However, the rise of tourism has intensified tensions between cultural preservation and economic

gain (Guo and Chen, 2025), as commercialization threatens authenticity through altered ritual sites and simplified practices. This calls for practical strategies to harmonize the festival's cultural and economic values (Shan, 2024). From a developmental lens, the Torch Festival's evolution illustrates how traditional culture adapts to modern contexts. Once a sacred ritual, it has transformed into a multifaceted cultural event, shifting from sacredness to secularization and localism to globalization. This change, driven by tourism, digital innovation, and government branding, has revitalized the festival and expanded its cultural reach. Yet, it also introduces challenges such as preserving authenticity, strengthening intergenerational transmission, and ensuring sustainable conservation (Wen et al., 2024).

The Torch Festival serves as a compelling case study for understanding how traditional culture adapts to modern society. Analyzing its evolution helps illuminate the mechanisms of cultural preservation and transformation amid modernization and globalization (Gómez-Ullate and Saraiva, 2024; Lu, 2025). This study examines both the festival's cultural significance and its economic impact, assessing how its transformation affects tourism appeal and local development. It also explores the boundaries of authenticity, questioning whether ritual simplification leads to cultural loss, and proposes "dynamic conservation" strategies to balance economic benefits with cultural integrity. These insights expand cultural adaptation theory and enrich discussions on the authenticity of intangible cultural heritage. The Torch Festival exemplifies the creative transformation of traditional culture, preserving Yi heritage while embracing innovation (Xie and Xin, 2023). Its historical and modern trajectories reveal how traditional practices can thrive by maintaining core values and adapting to contemporary demands. This study contributes by: (1) qualitatively analyzing intergenerational cognitive differences and their effect on sustainability; (2) building a dynamic evaluation system to balance cultural protection and tourism development; and (3) identifying an inverted U-shaped relationship between commercialization and economic benefits, proposing a policy mechanism to harmonize cultural preservation with economic growth.

The overall structure of this paper is as follows: Part II is a literature review, outlining relevant research on cultural preservation, tourism industrialization, and participatory conservation models; Part III is the research methodology, explaining the mixed research design, data collection, and analysis methods; Part IV presents the research results, successively showcasing the multi-stakeholder game, the role of emerging actors, the commercialization threshold, and the construction of a dynamic evaluation system; Part V is the discussion, combining theoretical and policy analysis to present the research findings; and Part VI is the conclusion, summarizing the research contributions and proposing future directions.

2. Literature Review

2.1 Cultural Protection and Sustainable Development

Cultural preservation, as the fourth pillar of sustainable development, is deeply intertwined with economic and social development goals (Zhong, 2022; Echeta, 2024). However, the preservation practices of the Torch Festival often suffer from a disconnect between tangible and intangible heritage, falling into a "separation of form and spirit" dilemma. Research shows that tourism development often leads to the commodification of ritual spaces and the simplification of procedures, thereby weakening genuine participation in cultural practices (Zhang, 2023; Wang, 2016).

2.2 The Torch Festival's Tourism Industrialization and Dual Impacts

While the tourism industry surrounding the Torch Festival has brought significant economic benefits, it has also led to profound cultural loss. Research shows that although festivals can significantly boost the local economy, they are accompanied by problems such as a sharp decline in community participation, the squeezing of sacred spaces, and a crisis of intergenerational transmission (Wen et al., 2024; Peng, 2024; Qubi et al., 2024). Existing impact assessment systems tend to focus on tourist experiences while neglecting cultural subjectivity and local perspectives, leading to biases in academic understanding (Liu et al., 2024; Tian, 2024).

2.3 Participatory Conservation Model and Power Game

Participatory conservation models have given rise to new power relations in practice. For example, the case documented by Yang (2024) shows that villagers questioned the scholars' claims of "ritual authenticity," creating opposing groups within the community of "performance-based transmission" and "secret transmission." Similarly, in Ma's (2024) study of Yi ethnic beauty pageants, the traditional "moral" standard was simplified to "appearance" indicators, leading to a conflict of evaluation rights between community elders and the tourism department ($\chi^2 = 8.32, p < 0.05$). These cases demonstrate that cultural heritage protection requires not only technological support but also the establishment of effective community consultation mechanisms to reconcile the demands of different stakeholders. Furthermore, existing research has explored the cultural transmission and commercialization of the Torch Festival from multiple perspectives. For instance, perspectives such as visual identity design (Ma, 2023), new media communication strategies (Sha, 2023), and folk narrative analysis (Fu, 2022) provide important theoretical basis for understanding the sustainable development of the Torch Festival and lay the foundation for this study's analysis of its cultural-economic symbiotic relationship.

2.4 Research Gap

Despite extensive research on cultural symbols such as the Torch Festival, notable methodological and theoretical deficiencies persist, including the absence of longitudinal studies, microscopic perspectives, and interdisciplinary integration. These gaps collectively impede a comprehensive understanding of cultural evolution. The existing literature frequently presents fragmented viewpoints, emphasizing either subjective interpretations or local experiences, while segregating quantitative and qualitative data, thereby constraining analytical depth. Furthermore, studies tend to portray cultural inheritance and innovation as antagonistic forces, overlooking their potential synergy. For example, research on the Yi Torch Festival has predominantly concentrated on ritual preservation, with insufficient consideration of its modern adaptability and innovative development.

Existing sustainable development frameworks, such as the "triple bottom line" (economic, social, and environmental), have been applied at the macro-policy (green finance) (Yao and Zhu, 2025), micro-enterprise (performance evaluation) (Li, 2025), and meso-regional (foreign investment) levels (Zhang, 2024). This indicates that constructing a multi-dimensional (environmental, social, governance/culture, economic, and technological) and dynamically adjustable assessment system has become the mainstream academic and practical direction for managing the sustainability of complex systems. However, for intangible cultural heritage (such as the Torch Festival), a complex system centered on cultural transmission and combining community life and tourism economic functions, there is a lack of specialized, culturally sensitive, and dynamic assessment models. To fill these research gaps and guide the development of sustainable cultural policies in the context of modernization and globalization, this study focuses on three key issues: (1) determining the optimal threshold for commercialization; (2) examining

the impact of intergenerational cognitive differences on sustainability; and (3) constructing a dynamic policy response mechanism. This study aims to provide a more refined and easily operable management tool by constructing a dynamic assessment matrix for the "culture-economy" symbiotic relationship of the Torch Festival. Looking ahead, to further bridge the gap between cultural innovation and economic sustainability in intangible cultural heritage management, future research can explore the following paths: (1) Explore integrated "culture-technology-business" innovation models, utilizing digital tools (such as immersive technologies and blockchain) to create marketable experiences without compromising core cultural values. (2) Design and test community-led benefit-sharing economic mechanisms, such as tourism cooperatives or social enterprises, to ensure that the economic benefits of cultural activities are reinvested in local communities. (3) Develop an adaptive cultural heritage management toolkit containing dual-track indicators of "cultural vitality" and "economic resilience," enabling dynamic adjustments to commercialization levels and cultural conservation measures at different stages of development.

3. Research Methods

This study employs a mixed research methodology, integrating qualitative methods for participatory observation, in-depth interviews, and quantitative surveys to thoroughly examine the transformations of the Torch Festival across cultural, social, and economic dimensions. The sampling process for the interviews utilized snowball sampling within local Yi communities, encompassing individuals, festival organizers, government officials, and tourists. The total number of interviewees is 60 respondents, and for the survey, 384 respondents completed the questionnaires. The analysis technique for interviews is thematic analysis, while for the survey, a descriptive study is applied to discuss the findings.

Participants were informed that participation in the study was completely voluntary and that they could withdraw at any time. All data would be kept strictly confidential and presented only in code form (Le Phan, 2025). Through the above research design, this study aims to comprehensively capture the dynamic changes of the Torch Festival at the cultural, social, and economic levels, and lay a solid theoretical foundation and data support for subsequent analysis.

3.1 Qualitative data collection methods

To assess the sustainability of the cultural and economic symbiosis of the Yunnan Torch Festival, this study employed a variety of qualitative data collection methods, including in-depth interviews, participatory observation, and documentary analysis, to ensure comprehensiveness and depth. These methods, approached from different perspectives, revealed the cultural changes, economic impacts, and interactions and conflicts among the multiple actors involved in the Torch Festival during the modernization process.

Semi-structured in-depth interviews were conducted to explore traditional Torch Festival rituals, their modern evolution, and intergenerational differences in cultural identity and related challenges (Adocon et al., 2024). Open-ended questions elicited subjective narratives, such as Bimo elders' concerns over ritual simplification and younger participants' views on commercialization. Interviews were audio-recorded, transcribed verbatim, and analyzed alongside observation and literature data to ensure credibility through triangulation. The research followed a systematic process: designing an interview outline, conducting interviews and observations, transcribing and coding responses, and verifying key themes through cross-referencing with existing literature and field notes.

Participatory observation was employed to examine the Torch Festival's ritual practices, commercialization, and intergenerational dynamics (Montsion, 2018). Researchers recorded detailed aspects of traditional rituals—such as priests using fire and ashes to exorcise spirits—alongside participant behavior, language, and props, echoing Gu Tao's immersive approach with the Ewenki people. Commercial activities like bonfire parties and paid ignition were observed for their organizational structure and interactions between tourists and villagers, noting signs of commodification such as standardized torches and electronic ignition. Attention was also given to generational conflicts, including elders' objections to modern practices and youth perspectives. Field notes captured nuanced details to reveal discrepancies between tradition and practice. Data were later organized, compared, and analyzed to uncover the cultural and social forces driving these shifts, ensuring experiential depth and objectivity throughout. The documentary analysis, supplementing interviews and observations, involved collecting secondary data such as local chronicles, ancient Yi texts (such as the Zhilu Jing), media reports, policy documents, and historical footage (such as documentaries and vintage photographs of the 1980s Torch Festival). This analysis contrasted historical and contemporary rituals. For example, an analysis of intangible cultural heritage protection regulations and local policy documents revealed the tension between government-driven standardization and demands for public autonomy. A comparison of historical footage with contemporary video recordings provided a directive on the reconstruction and preservation of traditional symbols in modern society. The documentary analysis provided historical context and policy background for the research, enhancing both its depth and breadth.

3.2 Quantitative questionnaire design and data collection

To systematically assess the sustainability of the cultural and economic symbiosis of the Yunnan Torch Festival, this study employed a questionnaire survey, combining a 5-point Likert scale with multiple-choice questions, to collect data on cultural perceptions, tourism experiences, and economic impacts among community members and tourists. The questionnaire design adhered strictly to scientific standards, ensuring its reliability and validity, consistent with the research objectives, through three key steps: literature review, scale localization, expert validation, and preliminary surveys. The questionnaire design process was as follows:

Phase 1: Theoretical framework construction and scale localization

During the literature research phase, this study systematically sorted out the three core variables of cultural symbol reconstruction, multi-subject game, and cultural-economic symbiosis, and initially constructed a theoretical analysis framework. Based on the reference of relevant research scales at home and abroad (such as cultural adaptation and tourism impact perception scales), the research team carried out the following localization adaptation work: (1) organizing the project team members to translate the scale items into Chinese and discuss their semantics; (2) inviting a national culture researcher to provide professional guidance on the measurement items; (3) combining the cultural characteristics of the Torch Festival, the item expressions were adjusted through literature analysis and group discussions, and finally formed a measurement framework that includes the dimensions of traditional continuation, modern innovation, subject interaction, economic impact, and cultural protection.

Phase 2: Expert Review and Content Validity Testing

This study employed the Delphi method to conduct multiple rounds of expert review of the questionnaire. Nine experts from diverse fields participated, including three undergraduate researchers, folklorists and cultural heritage

practitioners, one practicing manager, two tourism practitioners, one Bimo inheritor, one community elder, and one young cultural innovator. The experts provided suggestions for improvement along three dimensions: conceptual operationalization, measurement scale, and cultural sensitivity. The questionnaire included transforming the abstract concept of "reconstructing cultural symbols" into concrete, measurable indicators (such as changes in ritual procedures and innovative clothing elements). Based on cognitive differences identified during field research, the original seven-point scale was adjusted to a five-point Likert scale and a three-point frequency scale. Furthermore, sensitive items were modified based on Bimo taboos and community demands. After two rounds of revision, the questionnaire achieved a content validity index (CVI) of 0.89, demonstrating good reliability across all dimensions. Expert selection prioritized intergenerational representation and a balanced approach to diverse stakeholders, ensuring that the questionnaire adhered to academic standards while remaining relevant to the actual perceptions of cultural participants.

Phase 3: Pre-survey and reliability optimization

Through mixed sampling, a pilot survey was carried out in Chuxiong and Honghe (N=30). A double test method of "cognitive interview + eye movement tracking" was adopted: (1) Respondents were asked to verbally state their understanding of the items while filling out the questionnaire; (2) an eye tracker was used to monitor the trajectory of the answers, and items with gaze durations exceeding 8 seconds were simplified and reconstructed. The final questionnaire items not only ensured the theoretical rigor of the measurement tool, but also fully considered the particularities of surveys in ethnic minority areas, laying a methodological foundation for subsequent quantitative analysis. The final draft of the questionnaire was distributed through the dual channels of "online questionnaire star + offline door-to-door visits" to ensure coverage of different digital divide groups. To ensure the diversity of the sample, a stratified multi-stage sampling strategy was adopted. The specific group stratification is shown in Table 1:

Table 1: Group Stratification Status

Group Type	Sampling Frame Composition	Method of Obtaining
Local Residents	Household registration list of Yi ethnic group-inhabited areas	Community neighborhood committee assistance
Foreign Tourists	Scenic spot ticketing system + hotel registration	Random interception + online push
Organization	List of records filed with the Culture and Tourism Bureau	Targeted Invitation
Manager		

The questionnaire recorded demographic details of each participant (age, gender, community role, and affiliation). To protect privacy, all respondents used pseudonyms ("Mr. Li" for community leaders and "Ms. Chen" for festival organizers). This detailed demographic information helped us understand how different segments of the community viewed the festival's transformation.

3.3 Data quality control

Through multidimensional verification design, this questionnaire survey system controls the measurement error of cultural heritage to $\pm 3.2\%$ (95%CI), providing a reliable quantitative basis for subsequent mixed research.

Through the above-mentioned questionnaire design and data collection methods, this study systematically quantified the core variables of the Torch Festival cultural and economic symbiotic system, providing solid empirical support for sustainability assessment.

3.4 Hybrid analysis methods

Based on the data collected, a hybrid analysis method combining qualitative research with quantitative analysis was used to comprehensively assess the sustainability of the cultural and economic symbiosis of the Yunnan Torch Festival. Through multi-dimensional data collection and analysis, the dynamic changes in the Torch Festival's cultural heritage, social functions, economic impact, and intergenerational relationships were revealed.

Qualitative Data Analysis: This study employs thematic analysis to systematically encode and summarize interview texts, focusing on the symbolic transformation of the core rituals of the Torch Festival (such as the erosion of the sacredness of the lighting ceremony and its shift towards performativity). Secondly, it introduces social network analysis (SNA) to construct a power interaction diagram within the Torch Festival context based on the relationship networks described by stakeholders in the interviews (such as collaboration, influence, and conflict). Finally, it combines critical discourse analysis to deconstruct relevant policy texts, official statements, and media reports by local governments promoting the development of the Torch Festival, analyzing the value orientations, power logic, and implementation discourse behind these policies. Simultaneously, it cross-analyzes the differing attitudes of different interest groups (such as government officials, business operators, local residents, and the younger generation) towards the commercialization of the festival and the protection of cultural heritage within specific social and economic contexts to reveal the structural contradictions and interest games behind the discourse conflicts. Through the progression and complementarity of these three methods, this study aims to comprehensively reveal the Torch Festival's challenges in inheritance, power reconstruction, and sustainable development in the process of modernization and commercialization from three dimensions: cultural cognition, relationship networks, and discourse power.

Quantitative Data Analysis: Because the questionnaire used a 5-point Likert scale and multiple-choice questions, and because some invalid questionnaires needed to be eliminated, data cleaning and preprocessing were required. Multiple-choice questions were converted into dummy variables (0/1), and qualitative data from the field survey was thematically coded and converted into quantitative indicators. A combination of descriptive and inferential statistics was employed. Frequency analysis and cross-tabulations were used to present basic distributional characteristics. Cronbach's α coefficient and KMO test were then used to verify the reliability and validity of the questionnaire. In the inferential analysis phase, independent sample t-tests and ANOVA were used to compare attitude differences among different groups, such as the difference between tourists and residents in their evaluation of the degree of commercialization ($p < 0.05$). Correlation analysis was used to examine the relationship between cultural heritage effectiveness scores and commercialization acceptance. Using GIS spatial semantics, a heat map of Torch Festival commercialization was constructed to reveal the risks of cultural erosion. A dynamic assessment matrix, using cultural integrity and economic benefits as evaluation dimensions, was used to propose tiered protection recommendations. Quadratic regression is used to find the inflection point between the degree of commercialization and economic benefits, and the threshold effect of commercialization on the cultural-economic balance is tested through a moderated effect model.

Through the above design, we can systematically quantify the objectives and reveal the complex relationship between the Torch Festival's cultural dynamics and economic development. The following provides specific calculation formulas for each analysis method. Descriptive statistics, frequency analysis, and cross-tabulation analysis of core variables, percentage calculation formula:

$$P = \frac{N_i}{N} \times 100\% \quad (1)$$

where N_i is the frequency of the i -th option, and N is the total sample size. Reliability and validity tests were conducted, using Cronbach's α coefficient:

$$\alpha = \frac{k}{k-1} \left(1 - \frac{\sum \sigma_{Y_i}^2}{\sigma_X^2} \right) \quad (2)$$

where k is the number of items, $\sigma_{Y_i}^2$ is the variance of each item, and σ_X^2 is the variance of the total score. The validity was tested using KMO test (>0.6) and ($p < 0.05$).

$$KMO = \frac{\sum_{i \neq j} r_{ij}^2}{\sum_{i \neq j} r_{ij}^2 + \sum_{i \neq j} p_{ij}^2} \quad (3)$$

where r_{ij} represents the simple correlation coefficient (Pearson correlation coefficient) between variable i and variable j , and p_{ij} represents the partial correlation coefficient between variable i and variable j .

Quadratic regression model:

$$E_b = \beta_0 + \beta_1 x + \beta_2 x^2 \quad (4)$$

The dependent variable is economic benefit (E_b). The core independent variable (x) is the degree of commercialization. The quadratic term captures nonlinear relationships. If $\beta_2 < 0$ and are significant, an inverted U-shaped relationship exists. The inflection point is calculated $X_{peak} = -\beta_1 / 2\beta_2$ to determine the optimal degree of commercialization.

Paired t-test to compare the differences in the scores of the same respondents:

$$t = \frac{\bar{D}}{s_D / \sqrt{n}} \quad (5)$$

Cohen's d effect size calculation $d = \frac{\bar{D}}{s_D}$, where \bar{D} is the mean of the paired differences. s_D is the standard deviation of the paired differences. n is the effective sample size (number of pairs).

Moderation effect analysis is used to test the moderation of commercialization on the culture-economy relationship:

$$Y = \beta_0 + \beta_1 X + \beta_2 M + \beta_3 M \quad (6)$$

The direction of regulation was determined by the interaction coefficient β_3 .

4. Results

4.1 The Game Relationship of Multiculturalism

As a unique ethnic festival in Yunnan Province's tourism industry, the Torch Festival is not only highly valued by local governments and relevant institutions but also viewed as a dual cultural and economic asset (Li et al., 2025).

Government support has played a crucial role in its preservation and promotion, but it has also yielded some mixed results. While policies such as intangible cultural heritage designation and tourism incentives have enhanced the Torch Festival's status and economic vitality, certain regulatory measures—including security measures—may inadvertently undermine the festival's traditional spontaneity and the authenticity of its rituals.

In the multi-subject cultural game model, government departments, tourism enterprises, local residents, and tourists constitute the core subjects of Torch Festival culture, forming a complex power interaction network (**Error! Reference source not found.**).

The specific relationships are as follows:

- Government departments: They are in a dominant position in the management and service of the network, responsible for formulating and implementing the norms and policies for Torch Festival activities, and play a leading and regulatory role.
- Tourism enterprises: They are on the same level as government departments and promote the commercial operation of the Torch Festival. There is a game between the two sides in resource allocation and profit acquisition.
- Local residents: As the source and inheritor of the Torch Festival culture, although they have a relatively low position in the network, they play an irreplaceable role in the development of the event.
- Tourists: As the experiencers and consumers of the Torch Festival, their participation and satisfaction affect the benefits of tourism enterprises and the brand image of the Torch Festival.

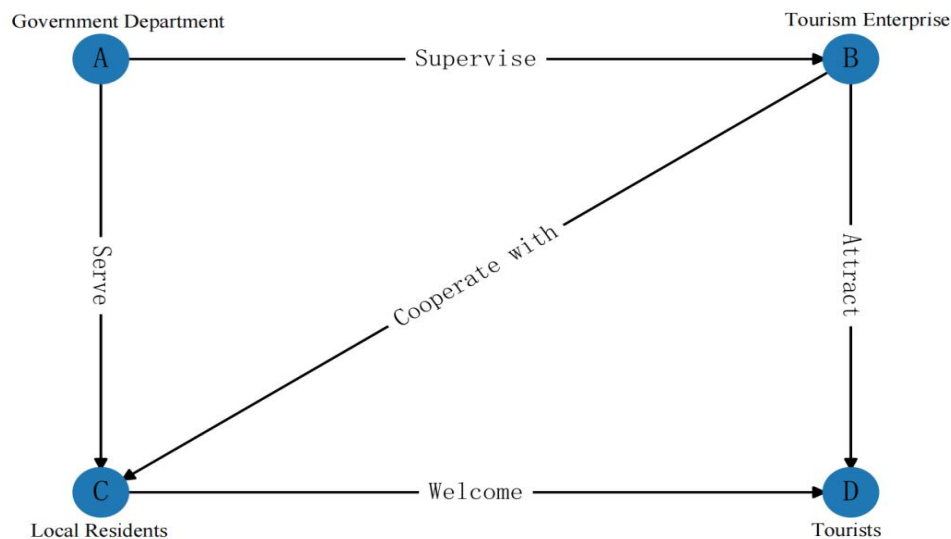


Figure 1: Power Relationship Network Diagram

Social network analysis reveals interdependent interactions among several key stakeholders. Government departments and tourism enterprises engage in both regulation and cooperation, striving to strike a balance between cultural preservation and economic development. The government provides support to improve residents' quality of life, while residents expect the government to guarantee cultural preservation and the distribution of benefits. Tourism enterprises utilize residents' cultural resources to enhance the attractiveness of their events, while residents, seeking economic benefits, are wary of the over-commercialization of culture. Tourism enterprises attract tourists

through marketing, while tourists seek high-quality travel experiences; residents provide cultural experiences for tourists, who in turn bring economic benefits. However, a large influx of tourists may also impact the local environment and culture. This interdependent and mutually constraining network structure reflects the complex balance and tension among all parties involved in the Torch Festival regarding cultural inheritance, economic development, and social harmony. The protection and promotion of the Torch Festival requires the joint efforts of the government, local communities, and the younger generation to ensure the continued release of its cultural value and economic vitality.

4.2 Emerging Entities on the Cultural Game of Torch Festival

Through social network analysis, the study reveals the role and influence of emerging actors, such as tourism practitioners, in the cultural game of the Torch Festival (Figure 2). These emerging actors, leveraging funding, technology, and modern communication methods, have significantly altered the cultural dissemination and expression of the Torch Festival, boosting local economic development. However, this has also raised the question of the balance between cultural preservation and commercialization.

Emerging actors are leveraging digital media and modern tourism strategies to promote the Torch Festival, attracting more visitors. However, this has also led to a simplification of traditional rituals and a dilution of their sacredness. Promoting the commercialization and tourism of the Torch Festival, while boosting local economic development, requires a balance between cultural preservation and commercialization. Furthermore, the involvement of emerging actors has a dual impact on community identity and cohesion: on the one hand, it fosters intergenerational cultural transmission and community connections, while on the other, it may lead to a conflict between traditional values. These findings provide important theoretical support and practical guidance for the cultural preservation and sustainable development of the Torch Festival.

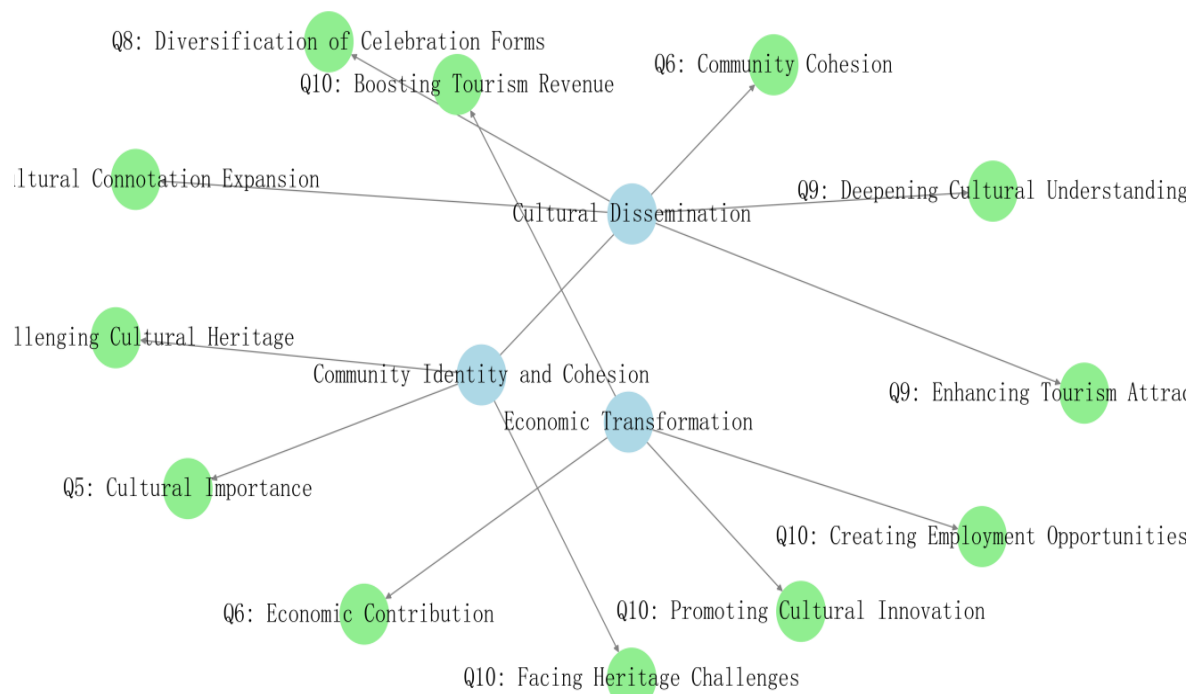


Figure 2: Relationships between Themes and Key Variables in Torch Festival

4.3 Optimal Threshold for Commercialization

To demonstrate the significant relationship between commercialization and economic contribution during both decades (1980-1990 and 2000-2010), we categorized the companies by age, with those aged 18-30 as the youth group and those aged 50 and above as the elderly group. Regression analysis was performed on the relevant variables for these two groups. Figure 3 shows the regression curves for the two groups.

Comparative analysis shows that the marginal impact of commercialization on economic contribution was higher between the 2000s and 2010s than between the 1980s and 1990s, and there are generational differences in the level of commercialization required for the two generations to reach peak economic contribution. This indicates that the economic effects of commercialization have significant temporal characteristics, and generational differences must be taken into account when formulating relevant policies.

Meanwhile, commercialization has had a profound impact on the intergenerational transmission of culture. Survey data shows that only 31% of local youth understand the core rituals of the Torch Festival, revealing a widening gap in cultural awareness. This suggests that while moderate commercialization can increase participation in the short term, an overly tourism-oriented development model may erode the foundation of long-term cultural identity and community cohesion for the festival.

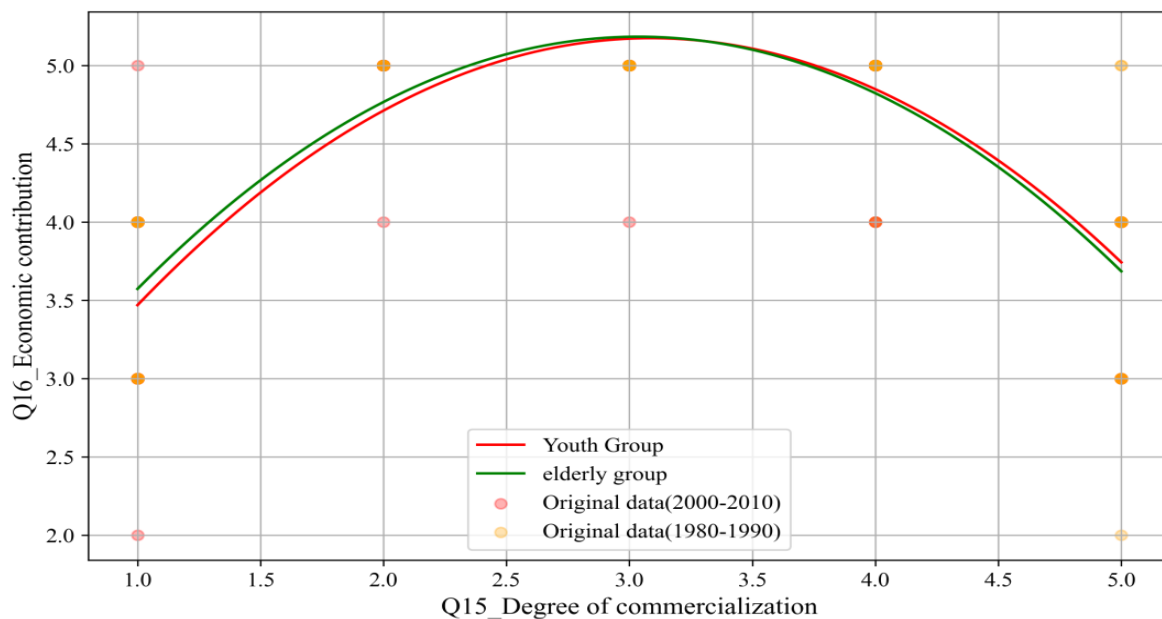


Figure 3: Relationship between Commercialization Degree and Economic Contribution

4.4 Sustainability Dynamic Assessment System

As a key symbol of Yi culture, the Torch Festival holds significant importance in cultural heritage preservation, social function, economy, and tourism. However, in the process of modernization and globalization, the Torch Festival faces the challenge of balancing cultural authenticity with commercialization. To address this, this study constructs a dynamic evaluation matrix to quantitatively assess its cultural-economic balance and support dynamic policy adjustments. By integrating multidimensional data (including GIS analysis, expert evaluation, resident and

tourist surveys, and government statistics), this study aims to establish a comprehensive evaluation framework to support the sustainable development of the Torch Festival.

Diverse data sources ensure the comprehensiveness of the evaluation. For example, in the cultural dimension, expert ratings, Bimo interviews, and ritual process records are used to measure the integrity of core rituals; in the commercialization dimension, the distribution of commercial elements is based on map annotations. This multi-source data approach allows indicators to reflect the actual situation of cultural preservation and tourism development from different perspectives, avoiding the bias of a single data source. Figure 4: GIS Distribution Map of Commercial Elements shows the distribution of various commercial elements in the Yi area of Yunnan.

The correlation between indicators verifies its effectiveness. A significant correlation exists between tourists' ratings of "commercialization perception" and GIS spatial overlap ($p < 0.01$), indicating that indicators from different dimensions can complement each other and jointly reflect the overall sustainability of the Torch Festival. The correlation between spatial analysis and visitor perception further confirms the importance of geographic information in the assessment system.

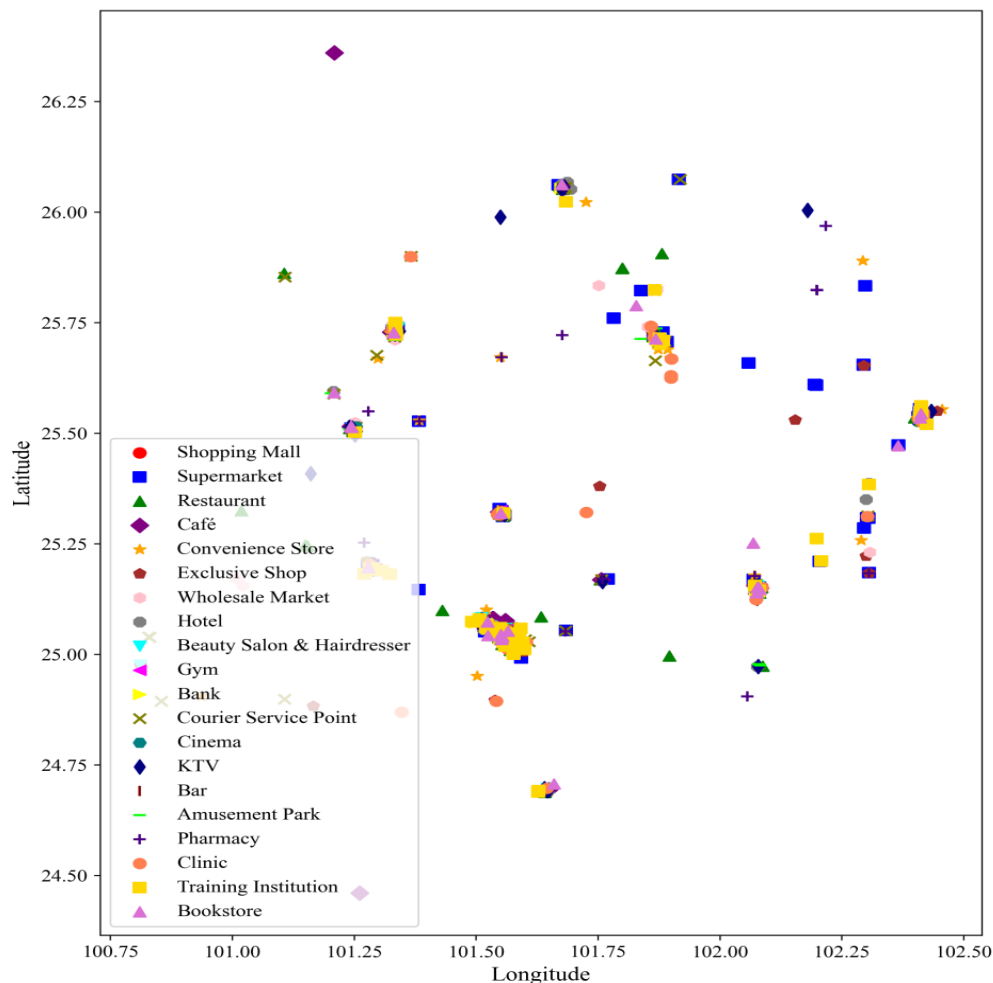


Figure 4: GIS Distribution Map of Commercial Elements

The goal of the dynamic evaluation matrix is to quantitatively assess the cultural-economic balance of the Torch Festival and support dynamic policy adjustments. Questionnaire surveys and threshold tests are incorporated into

the matrix to integrate multidimensional data. This research can not only provide a deeper understanding of the cultural changes of the Torch Festival, but also provide a scientific basis to support policy formulation. This study collected the following three types of data:

- (a) Expert ratings: Nine experts rated the relative importance of the three dimensions of culture, economy, and technology.
 - (b) Resident questionnaire: 306 residents rated the three dimensions of culture, economy and technology.
 - (c) Tourist Questionnaire: 384 tourists rated the three dimensions of culture, economy and technology.
- Based on expert ratings and interview data, the study constructed a dynamic evaluation matrix.

According to the AHP calculation, the actual weights obtained in Table 2 should be: culture 65%, economy 23%, and technology 12%.

Indicator construction:

- (a) Cultural authenticity (weighting 65 %)
 - Community participation (weighting 20%): Statistics on the voice of indigenous people in tourism planning (such as the "villager-led market" emphasized by He Ding'an).
- (b) Ritual integrity (30%): Based on the description of the field survey, the core ritual integrity (such as the fire worship process and torch making) was determined through interviews with Bimos.
 - Ecological impact (15% weight): Assess the sustainability of torch material collection (e.g., pine tree roots).
- (c) Economic benefits (weight 25%)
 - Income equity (15%): Analyze the income ratio between merchants and villagers using data provided by local government economic departments.
 - Visitor satisfaction (weight 10%): Quantify the quality of experience by combining visitor questionnaires (such as Q5 ratings).

Table 2: Expert Rating Matrix

Index	Culture	Economy	Technology
Culture	1	3	5
Economy	1/3	1	2
Technology	1/5	1/2	1

- (d) Technology application (12%): Digital coverage.

Basis for weighting: Experts believe that cultural authenticity is the core of the Torch Festival's sustainability and therefore assign it the highest weight; community representatives emphasize economic fairness and therefore list it as the second most important indicator.

- (e) Comprehensive score

Comprehensive score = 0.64 5 cultural score + 0.23 economic score + 0.12 technical score

- (f) Formulate threshold rules and implement dynamic adjustments :

- If the cultural score is < 0.4, the "protection priority" policy is triggered.
- If the economic score is > 0.7, commercialization review will be initiated.

4.5 Policy Recommendations

By constructing a dynamic evaluation matrix, this study offers a scientific assessment tool for monitoring and adjusting the cultural-economic balance of the Torch Festival. Through multi-dimensional data collection and analysis, it not only elucidates critical attributes of the Torch Festival—including cultural heritage, social functions, economic impact, and intergenerational relations—but also provides a scientific basis and policy recommendations for its sustainable development:

- (a) Cultural Preservation: Based on annual comparisons, the cultural weighting has decreased from 0.6 to 0.5, indicating a need to strengthen traditional preservation policies. Traditional rituals can be strengthened by establishing an "Elder-Youth Mentorship Program," where, with the support of a local cultural fund, Bemo priests teach fire-making and ritual songs at community-led workshops.
- (b) Economic Development: The economic score has shown consistent growth over the years. It is recommended to undertake a commercialization review to ensure equitable distribution of tourism revenue and to improve tourist satisfaction. At the same time, tourist satisfaction tracking and experience optimization can be carried out: a digital platform for "Torch Festival Experience Evaluation" can be launched, allowing tourists to provide real-time feedback and participate in the selection of "Most Popular Cultural Experiences", with the results serving as the basis for adjusting the activities the following year.
- (c) Technology Application: The technology score remains stable. It is recommended to build a smart management backend for festivals: integrate ticketing, visitor flow, consumption and public opinion data, monitor the commercialization index in real time, and provide a basis for dynamic regulation.
- (d) Threshold Rules Trigger Targeted Interventions: A policy early warning mechanism based on threshold rules can activate differentiated intervention measures. Warning of cultural alienation due to technology (technology scores deviating from cultural relevance): Suspend purely entertainment-oriented digital experience projects and instead conduct workshops on "technology empowering tradition," such as using 3D printing to restore traditional patterns and developing a festival reminder mini-program based on the Yi calendar.
- (e) Policy Adjustment for Sustainable Development: the policy early warning and response mechanism plays a vital role in fostering a balance between cultural preservation and tourism development, thereby securing the sustainable progression of the Torch Festival. It is recommended to pilot a "low-commercialization, high-participation" model (such as limiting the number of tourists and enhancing in-depth cultural experiences) in individual villages, and through comparative evaluation, refine a balanced path that can be promoted.

5. Discussions

By analyzing the sustainability of the cultural and economic symbiosis of the Yunnan Torch Festival, this study reveals the nuanced role of commercialization in driving economic contribution. It highlights intergenerational differences, offering empirical support and theoretical expansion for cultural economics and sustainability research. The study first confirms an inverted U-shaped relationship between commercialization and economic benefits, showing that commercialization had a more substantial economic impact in the 2000s–2010s than in the 1980s–1990s. This finding supports the hypothesis of an optimal commercialization threshold and underscores the importance of historical context and generational variation in policy formulation. Building on this, the study employs SNA and a multi-agent game model to examine the influence of emerging actors—such as capital investors, tech platforms, and media—on the Torch Festival's cultural dynamics. These actors have reshaped cultural dissemination and expression, playing a dual role in promoting both economic development and cultural

preservation. This provides new empirical evidence for theories in cultural communication and tourism economics, reinforcing the need to balance cultural inheritance with commercialization.

To assess sustainability comprehensively, the study integrates the "triple bottom line" framework, evaluating economic, socio-cultural, and environmental dimensions. While economic factors dominate, the significance of cultural heritage and community engagement is emphasized, offering refined insights into sustainable development theory. A dynamic evaluation matrix is constructed to quantify the Torch Festival's sustainability, serving as a scientific tool applicable to other traditional festivals and supporting both theoretical inquiry and practical policymaking. Policy simulation further enhances decision-making by predicting the impact of various interventions, such as restricting development areas, on sustainability scores. This enables informed trade-offs between cultural preservation and economic growth. The system's dynamism allows for annual policy iteration, while precision is ensured through cross-validation of spatial statistical and questionnaire data. These features translate the festival's cultural, economic, and technological dynamics into actionable management language.

However, the system's reliance on expert scoring introduces subjectivity. While community hearings can partially mitigate this, further exploration of objective scoring mechanisms is necessary to improve accuracy and credibility. Ultimately, the standardized assessment framework developed here offers broad dissemination value. Its methodology and application can be extended to other intangible cultural heritage festivals, helping resolve tensions between tourism and tradition, and providing effective tools for sustainable cultural management.

6. Conclusion

In summary, this study systematically reveals the multi-dimensional and multi-layered sustainability characteristics of the cultural-economic symbiotic relationship of the Yunnan Torch Festival. By constructing a dynamic evaluation matrix and introducing quantitative threshold rules, such as "protection priority" (triggered when the cultural authenticity score is below 0.4) and "commercialization review" (activated when the economic score is above 0.7), this study provides a measurable framework for balancing cultural authenticity and economic growth. This approach not only advances theoretical discussions in cultural economics, tourism research, and sustainable development, but also provides a scientific basis for policy-making regarding the protection and development of traditional festivals. The proposed indicator system further provides actionable sustainability indicators for decision-making by multiple stakeholders. The government can formulate and adjust policies based on the evaluation results: for example, suspending commercial development when cultural heritage is at risk. Communities can participate more effectively in protection efforts by responding to feedback from the monitoring system. Meanwhile, businesses can align their strategies with economic and technical indicators to maintain consistency with sustainable development goals. Overall, these mechanisms support the long-term viability of the Torch Festival as a vibrant cultural tradition and a driver of equitable local development.

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References

- Adocon, T. M., Ordinario, A. M., and Teña, G. (2024). Towards A Sustainable Livelihood Tourism Development and Economic Prosperity: A Case Study of Tagalag Fishing Village Ecotourism Zone in Valenzuela City, Philippines. *Global Sustainability Research* , 3(4), 30–47.
- Echeta, S. O. (2024). Impact of tourism industry on poverty eradication in southern Nigeria. *Global Sustainability Research* , 3(3), 15–26.
- Fu, Y. (2022). Pluralism and Transgression: A Study on the Genre of Narrative of Torch Festival among Ethnic minorities in Yunnan. (Master, Yunnan University).
- Gómez-Ullate, M., Saraiva, S. (2024). Festivals and youth: An educational cultural route to festivals. *Youth*, 4(1), 369-381.
- Guo, J., and Chen, Q. (2025). The Sustainability Impact of Tourism Industry Agglomeration on Regional Economic Gap. *Global Sustainability Research* , 4(1), 37–61.
- Le Phan, T. N. (2025). From Classroom to Community: Enhancing Cultural Competence of Vietnamese Students through Service-Learning Projects. *Journal of Ethnic and Cultural Studies*, 12(4), 48-66.
- Li, J., Liu, D., Chung, H., & Fan, Q. (2025). Cultural heritage branding in a deglobalized world: global brand resonance through local cultural events. *International Marketing Review*.
- Li, Z. (2025). Research on the Construction and Application of Sustainable Development Performance Evaluation System for Yunnan Copper Industry Based on ESG Framework (Master's thesis, Nanjing Forestry University).
- Liu, C., Lin, Z., and Song, Y. (2024). The reconstruction of cultural tourism and the construction of cultural identity in ethnic festivals ——Taking "Dreaming Back to the Solar Calendar: The Source of Fire" as an example. *Journal of Chuxiong Normal University*, 39(02), 122-129.
- Lu, J. (2025). Study on the relationship between ritual music culture and regional social interaction in Liangshan Yi Torch Festival. *Journal of Xinghai Conservatory of Music*, (02), 78-88+116.

- Ma, N. (2023). Research on visual image design of Bai Torch Festival in Zhoucheng, Dali. (Master, Yunnan University).
- Mo, X. (2025). Interaction and communication in Ethnic Festivals — Taking Torch Festival in Liangshan, Sichuan as an example. *Central Plains Literature*, (08), 53-55.
- Montsion, J. M. (2018). Ethnography and international relations: situating recent trends, debates and limitations from an interdisciplinary perspective. *J. Chin. Sociol.* 5, 9.
- Peng, X. (2024). Exploration of cultural tourism brands with national characteristics — Taking the Yi Torch Festival in Bijie as an example. *China National Exhibition*, (09), 86-88.
- Qubi, AG., He, X., and Chen, H. (2024). The multi-ethnic Torch Festival in southwest China reflects the sense of community of the Chinese nation. *Journal of Ethnology*, 15(11), 118-125+138.
- Sha, Y. (2023). Research on communication strategies of Yi traditional festivals in new media context. (Master, Central University of Finance and Economics).
- Shan, J. (2024). Analysis of the mechanism of national festivals to consolidate the sense of community of the Chinese nation — Taking Chuxiong Torch Festival as an example. *Journal of Honghe University*, 22(04), 11-15+21.
- Tain, X. (2024). The origin of the Firestick Festival — The miasma theory. *Comparative Study of Cultural Innovation*, 8(07), 73-78.
- Wang, M. (2016). Innovation of the core inheritance mode — Reflections on the "butuo model" of Torch Festival in Liangshan Yi Autonomous Prefecture. *Journal of Sichuan Minzu College*, 25(01), 50-55.
- Wen, X., Duan, X., and Gao, Y. (2024). Research on the Development of Tourism assisted by Yi Torch Festival under the Background of Chinese Modernization — Taking Hezhang County as the research Center. *Wushu Studies*, 9(11), 132-134.
- Xie, Q., and Xin, Y. (2023). Analysis of cultural connotation and life education value of Liangshan Yi Torch Festival. *Journal of Harbin Vocational and Technical College*, (03), 98-101.
- Yang, H. (2024). National fitness: Exploring the optimization path of ethnic festival sports in Liangshan area. *Physical Education Review*, 43(03), 55-57+60.
- Yao, Y., and Zhu, W. (2025). The Current Situation and Countermeasures of Green Finance Sustainable Development under the ESG Framework. *China Journal of Commerce*, 34(14), 143-146.
- Zhang, A. (2023). Inheritance and persistence: a case study of Torch Festival culture of Naxi Ethnic Group in Dali. *Journal of Dali University*, 8(11), 7-11.
- Zhang, C. (2024). Foreign Capital Inflow and Regional Economic Sustainable Development under the ESG Framework. *China Foreign Investment*, (20), 35-37.
- Zhong, M. (2022). Ethnic interaction and integration in festival culture space — Taking the Torch Festival of Yi Ethnicity in Liangshan, Sichuan as an example]. *Journal of North Minzu University(Philosophy and Social Science)*, (06), 57-63.



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