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ASSESSMENT OF LISU ETHNIC CULTURAL LANDSCAPE IMAGERY BASED ON SBE-SD EVALUATION IN XINSHAN LISU TOWNSHIP, MIYI COUNTY, CHINA

AVALIAÇÃO DE IMAGENS DA PAISAGEM CULTURAL ÉTNICA LISU COM BASE NA AVALIAÇÃO SBE-SD NO MUNICÍPIO DE XINSHAN LISU, CONDADO DE MIYI, CHINA

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Abstract
Based on a comprehensive field survey of villages in Xinshan Lisu Township, Miyi County, Panzhihua, China, 17 typical Lisu landscape imagery elements were selected as research objects. Using the psychophysical Scenic Beauty Estimation (SBE) method and Semantic Differential (SD) method, qualitative and quantitative evaluations of the perceived Lisu cultural value were conducted, and a landscape evaluation model was established to explore the relationship between perception levels and key landscape characteristic factors. The results show that the perceived Lisu cultural value of the 17 landscape imagery elements ranges from -1.91429 to 1.45222. Elements with relatively higher perception values include buildings/structures (landmarks), notable landscape trees (landmarks), and vegetation/farmland (regions), reflecting the significant synergistic effect of artificial structures and natural elements in enhancing landscape attractiveness. Among the characteristic factors, Uniqueness and Pleasantness exert the most substantial influence on the perception of Lisu culture. The established multivariate linear evaluation model provides an

Resumo
Com base em um levantamento de campo abrangente em vilarejos no município de Xinshan Lisu, condado de Miyi, Panzhihua, China, 17 elementos típicos da paisagem Lisu foram selecionados como objetos de pesquisa. Utilizando o método psicofísico de Estimativa da Beleza Cênica (EBC) e o método do Diferencial Semântico (DS), foram conduzidas avaliações qualitativas e quantitativas do valor cultural Lisu percebido, e um modelo de avaliação da paisagem foi estabelecido para explorar a relação entre os níveis de percepção e os principais fatores característicos da paisagem. Os resultados mostram que o valor cultural Lisu percebido dos 17 elementos da imagem da paisagem varia de -1,91429 a 1,45222. Os elementos com valores de percepção relativamente mais altos incluem edifícios/estruturas (pontos de referência), árvores notáveis da paisagem (pontos de referência) e vegetação/terras agrícolas (regiões), refletindo o efeito sinérgico significativo de estruturas artificiais e elementos naturais no aumento da atratividade da paisagem. Entre os fatores característicos, Singularidade e Agradabilidade exercem a influência mais substancial na percepção da

effective tool for accurately assessing the ethnic cultural perception of Lisu rural landscapes.

Keywords: Lisu Ethnic Group. SBE-SD Evaluation. Miyi County China. Ethnic Culture. Rural Landscape Imagery.

cultura Lisu. O modelo de avaliação linear multivariada estabelecido fornece uma ferramenta eficaz para avaliar com precisão a percepção étnico-cultural das paisagens rurais Lisu.

Palavras-chave: *Grupo Étnico Lisu. Avaliação SBE-SD. Condado de Miyi. China. Cultura Étnica. Imagens de Paisagens Rurais.*

1 INTRODUCTION

Xinshan Lisu Township in Miyi County, Panzhihua, is one of China's 23 Lisu ethnic townships(YANG, X., 2016) and represents a sacred ancestral homeland for the Lisu people (LUO, 2022). It possesses distinctive Lisu cultural characteristics and maintains a well-preserved rural landscape pattern. However, with the accelerated urbanization in China in recent years, the unique ethnic culture of Xinshan Lisu Township has faced irreversible impacts and integration pressures (YANG, J., 2016). The inheritance of ethnic culture in rural areas is under significant strain and challenge (ZHU; XIE; XIAO, 2020), leading to substantial changes in the rural landscape (GAO; ZHANG; HUANG, 2018).

Concurrently, as China intensifies its efforts to protect and revitalize rural ethnic cultures, local governments have formulated tourism plans for Xinshan Lisu Township within the framework of the national Rural Revitalization Strategy. These plans aim to promote local rural development through the preservation and adaptive reuse of Lisu cultural elements (DAIQIANG, 2018). Based on the cultural landscape resources of Lisu villages, classified development strategies have been proposed for different settlements (ZHONG, 2013). This has gradually formed tourism clusters represented by Lisu cultural rural tourism, driving the rapid development of the local cultural tourism industry and actively responding to the national Rural Revitalization Strategy. While the tourism boom has brought many visitors to Lisu villages, the integrity of Lisu culture faces significant tests.

This study focuses on Pingshan Village, located in Xinshan Lisu Township, Miyi County, Panzhihua, where tourism development started relatively late. Due to its unique geographical location and climatic conditions, the indigenous Lisu residents still preserve primitive and traditional folk customs (YANG, X., 2016). On the other hand, however,

this has also resulted in insufficient development of Lisu culture-based rural tourism and a lack of effective exploration of Lisu landscape cultural elements, preventing the full utilization of the Lisu cultural landscapes inherent to the village.

Currently, the Scenic Beauty Estimation (SBE) method and the Semantic Differential (SD) method have been widely applied in various fields, including tourism development and landscape design(QIUYAN; CHUNYAN, 2022). This paper employs these methods to explore the scenic perception evaluation of landscape imagery in Lisu villages.

2 RESEARCH OBJECTIVES

Effectively excavate and refine the core of Lisu traditional culture, achieve the modern transformation of traditional ethnic culture, and ensure the protection, inheritance, and development of Lisu culture through tourism development, thereby enabling the sustainable development of Lisu rural areas. To this end, this study aims to achieve the following objectives:

⑴ Identify and systematize the landscape cultural elements and cultural semantics of the Lisu ethnic group in Xinshan Lisu Township.

⑵ Evaluate the perceived ethnic cultural value in Xinshan Lisu Township based on the Scenic Beauty Estimation (SBE) method.

⑶ Extract representative Lisu landscape characteristic factors through Semantic Differential (SD) evaluation.

⑷ Construct a model of the relationship between Lisu cultural perception and landscape characteristic factors.

3 METHODS

To achieve the above objectives, this study adopts a mixed-methods approach integrating quantitative and qualitative research. The Scenic Beauty Estimation (SBE) method, widely recognized in academia for its reliability, feasibility, and intuitiveness (DANIEL, 1976), is employed. This method utilizes sample photographs as the evaluation medium, where respondents rate the samples based on a 7-point scale. By analyzing the scores, it assesses participants' perceptions and preferences regarding the

physical characteristics of the samples, combining both subjective and objective evaluation (QIUYAN; CHUNYAN, 2022).

The Semantic Differential (SD) method, a landscape assessment technique developed from psychophysics, objectively measures the public's intuitive perception of landscapes. Originally proposed by American scholar Osgood et al. in 1957, the SD method analyzes people's evaluations and views of research objects through the meaning and intensity of various descriptive terms. Currently, the SD method is applied across multiple evaluation fields, including urban public spaces (YIRAN; JIHUI, 2017), rural landscape environments (YINGSHUN; SHOUYUN; WEN, 2022), and architectural culture (MING; ZHENBIN; CHUNHUI; XIAOYONG, 2021).

In this study, the SBE method is first applied to assess the perceived Lisu cultural value in Xinshan Lisu Township. Subsequently, the SD method is used to extract the characteristic cultural features embedded in the landscapes. This process helps identify the landscape characteristic factors influencing the perception of Lisu culture and establishes a correlation model between Lisu landscape characteristics and rural scenic beauty perception. The findings aim to provide support for local rural tourism development and the preservation and utilization of Lisu cultural elements.

3.1 Evaluation of lisu cultural perception — SBE Method

3.1.1 Sample site selection and data collection

Xinshan Lisu Township in Miyi County is one of China's 23 Lisu ethnic townships (YANG, X., 2016)and represents a sacred ancestral homeland of the Lisu people (LUO, 2022), covering a total area of 78.7 square kilometers. This study selected Pingshan Village within the township as the sample site. The ethnic cultural landscape imagery includes socio-cultural imagery, natural landscape imagery, and architectural imagery (CHANGXIN; YUQING; XINGYUN; MANLI, 2023). Investigators conducted intentional field surveys within the delineated village study area. This involved examining buildings, roads, vegetation, ethnic totems, natural landscapes, and the daily life of residents (ZHANG; FANG, 1994). Through direct observation and documentation of real-life conditions, they gathered information on the current state of the rural landscape

and details of ethnic culture. This collected information is collectively termed "landscape imagery" (PEIHONG; KERUN; XIAOGANG, 2022).

Based on the classification of Lisu culture and the identification of factors related to landscape imagery, researchers photographed scenes within Pingshan Village. The analysis focused on the perceptible differences in Lisu cultural characteristics of the landscapes and their constituent elements. Guided by Kevin Lynch's theory of landscape imageability classification, the Lisu cultural landscape imagery factors were categorized into: landmarks, nodes, edges, paths, patches, and districts(LYNCH, 1960; YUNBIN; XINYU; WENQING; CHANGJIN, 2018). Following this theoretical framework, researchers collected the most representative Lisu cultural landscape imagery on-site, encompassing scenes related to buildings/structures, landscape ornaments, plazas, large trees, mountain features, vegetation/farmland, Lisu colors, materials, and street texture (XIAOYI; BOONYANMETHAPORN, 2024b). A minimum of one photograph was taken for each landscape imagery scene. The photographic content included newly built or restored buildings, vegetation, colors, various spatial types, edges, and other landscape spaces within the Lisu rural landscape. Ultimately, 17 landscape photographs were selected as evaluation samples.

3.1.2 Evaluators

A review of recent literature in the field of landscape imagery evaluation reveals that experiments utilizing 20 to 60 participants account for nearly ninety percent of studies, indicating high feasibility and representativeness for this sample size (YINGSHUN; SHOUYUN; WEN, 2022). For organizational convenience, a panel of 20 to 50 evaluators is generally considered appropriate (LI; XINGYUAN; WENDUO; JIE, 2006). Furthermore, professionals typically possess higher expertise and sensitivity, leading to a more nuanced perception of landscapes compared to the public (DAWEI; YUJIA, 2014). Concurrently, some studies suggest no significant difference in evaluation results between university students and the public (KELLOMäKI; SAVOLAINEN, 1984). Additionally, tourism data for Xinshan Lisu Township indicates that university students constitute the largest occupational group among visitors, and individuals aged 21 to 35 represent the largest age demographic (SICHUAN, 2020). This is supported by the *Annual Report of China Domestic Tourism Development 2020* published by the China

Tourism Academy, which states that nearly 70% of domestic tourists are aged 35 or below, confirming young people as the main user group (NA, 2020). Therefore, this study selected 65 students and faculty members (aged 18 to 35) specializing in landscape studies and tourism as evaluators for the SBE assessment. A total of 60 valid questionnaires were collected, resulting in a validity rate of 92%. The evaluator group comprised 31 males and 25 females.

3.1.3 Questionnaire survey

In SBE evaluations, photographs (slides) are among the most used media, and their reliability as an assessment medium has been confirmed by numerous relevant studies (DANIEL, 1976). The test group collectively viewed the slides in a classroom setting before evaluating the samples. The evaluators were first briefed on the evaluation criteria, including the purpose of the assessment and the scoring method. They were then asked to review the 17 sample photographs. Each slide remained on screen for 8 seconds, a duration proven effective for research purposes (JIONGWEI; FEIJIE; SHENGQUAN, 2010; LI; XINGYUAN; WENDUO; JIE, 2006). No images were replayed, and evaluators scored each photograph based on their immediate perception.

3.1.4 Data processing

The collected questionnaires yielded 60 valid responses, representing a 100% retrieval rate. After removing 2 invalid responses, 58 valid questionnaires remained. The landscape evaluation data were entered into an Excel spreadsheet for the calculation of SBE standardized values. To address variations in individual aesthetic standards, each evaluator was required to provide precise ratings for the scenic beauty of each landscape sample. This was quantified using the standardized Z-value, representing the perceived landscape quality of each sample as evaluated by the respondents. The calculation followed the SBE standardization formula(DANIEL, 1976).

$$\boldsymbol{Z_{ij} = (R_{ij} - \bar{R}_j)/S_j} \qquad \textbf{(1)}$$

Formula Explanation:

In the formula:

Z_{ij}: represents the standardized value of the i-th landscape evaluated by the j-th evaluator.

R_{ij}: denotes the score assigned by the j-th evaluator to the i-th landscape.

$\bar{R}_j$: refers to the mean score given by the j-th evaluator across all landscape samples.

S_j: indicates the standard deviation of the scores assigned by the j-th evaluator for all samples.

This formula standardizes the landscape quality scores, and the average of all evaluations for each landscape is subsequently calculated (LI; YINGKUN; MENG; YING, 2023).

The result derived from the formula corresponds to the SBE value of the i-th sample as rated by the j-th evaluator. These values are then compiled to compute the standardized SBE value（Perceived Lisu Cultural Value） for each of the 12 landscape samples per evaluator, as well as the meaning of all standardized SBE values. Finally, the standardized SBE value for the i-th landscape, as evaluated by the test group, is determined and presented in Table 1.

$$\boldsymbol{Z_i = \Sigma Z_{ij} / N_j} \qquad \textbf{(2)}$$

Formula Explanation:

In the formula:

Zi: represents the standard value of landscape perception for landscape evaluation.

Zj: denotes the total score of the individual landscape.

Nj: indicates the number of evaluators for the i-th sample.

Table 1.

Ranking of Perceived Lisu Cultural Value in Pingshan Village

Sample Number	Standardized Value	Sample Number	Standardized Value
2-1	-1.91429	5-2	0.40412
3-1	-1.35320	4-1	0.42906
7-1	-1.16617	6-3	0.69014
8-2	-0.97915	1-1	0.70410
5-1	-0.41806	4-2	0.89113
2-2	-0.23103	1-2	1.07816
8-1	-0.04401	6-1	1.26519
7-2	0.14302	1-3	1.45222
6-2	0.33005		

3.2 Quantitative evaluation of lisu landscape characteristics – SD Method

3.2.1 Landscape imagery samples for SD evaluation

The Semantic Differential (SD) method was employed to conduct a more detailed evaluation of Lisu cultural landscape characteristics. This process required the selection of photographs that were both qualitatively sound and representative in effect. Samples with notably higher or lower standardized values were chosen as they exhibit more pronounced contrasts for comparison (QIUYAN; CHUNYAN, 2022). Based on the landscape quality data presented in Table 1, eight photographs were ultimately selected as evaluation samples. These include three samples of buildings/structures (Samples 1-1, 1-2, 1-3), two samples of landscape ornaments (Samples 2-1, 2-2), one sample of notable landscape trees (Sample 4-2), one sample representing Lisu colors and materials (Sample 7-1), and one sample of street texture (Sample 8-2).

3.2.2 Landscape imagery samples for SD evaluation

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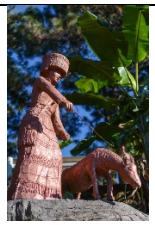
1-3), two samples of landscape ornaments (Samples 2-1, 2-2), one sample of notable landscape trees (Sample 4-2), one sample representing Lisu colors and materials (Sample 7-1), and one sample of street texture (Sample 8-2).

Table 2

Comparison of Landscape Imagery Samples for SD Evaluation

Samples with the highest scenic beauty values (in descending order): 1-3 > 6-1 > 1-2 > 4-2		**Samples with the lowest scenic beauty values (in ascending order): 2-1 < 3-1 < 7-1 < 8-2**	
 Sample 1-3	 Sample 6-1	 Sample 2-1	 Sample 3-1
 Sample 1-2	 Sample 4-2	 Sample 7-1	 Sample 8-2

3.2.3 Selection of factors for SD evaluation

The selection of adjectives is crucial for the Semantic Differential (SD) method (LI; YINGKUN; MENG; YING, 2023). A key aspect of SD research lies in determining appropriate semantic word pairs. A review of relevant literature indicates that there are no strict stipulations regarding the required number of adjective pairs (YIRAN; JIHUI, 2017). Consequently, this study, drawing from fields such as tourism, landscape architecture, and architecture, and combined with field research, ultimately identified the following adjectives to describe the cultural characteristics of Lisu landscapes: Uniqueness (E1), Primitiveness (E2), Attractiveness (E3), Vitality (E4), Pleasantness (E5), Aesthetic Quality (E6), and Mystery (E7) Table 3.

Table 3.

Evaluation factors and descriptions of the landscape imagery in Lisu rural areas

Factor	Factor Description	Score	Rating Description
Uniqueness **E1**	The landscape's uniqueness in visual, cultural, or spatial aspects, reflecting the distinctive character of the Lisu village.	-3	Extremely ordinary, lacking distinctive features and ethnic cultural elements.
		-2	Relatively ordinary, with sporadic ethnic symbols; overall plain.
		-1	Slightly unique, with some cultural features but not prominent.
		0	Moderately unique, possessing basic ethnic characteristics but lacking innovation.
		+1	Fairly unique, with distinctive elements that attract attention.
		+2	Unique, with strong visual impact and significant cultural scarcity.
		+3	Extremely unique, rare and distinctive, possessing cultural impact.
Primitiveness **E2**	The authenticity of the landscape, reflecting whether it retains its original features unmodified by modernization.	-3	Extremely unique, rare and distinctive, possessing cultural impact.
		-2	Highly modernized, traditional appearance has disappeared.
		-1	Clearly artificial, low authenticity.
		0	Slightly modified, partially influenced by modernization.
		+1	Moderately primitive, basically maintaining traditional appearance.
		+2	Relatively primitive, mainly using natural materials with minimal modern influence.
		+3	Very primitive, highly pristine, with well-preserved cultural customs.
Attractiveness E3	The comprehensive appeal of the landscape in visual, cultural, and experiential aspects.	-3	Completely unappealing, cluttered and dull.
		-2	Poor attractiveness, overall ordinary.
		-1	Slightly attractive, with some acceptable aspects but lacking highlights.
		0	Moderately attractive, possessing basic aesthetic or cultural characteristics.
		+1	Fairly attractive, with distinctive features that stimulate willingness to participate.
		+2	Very attractive, with strong visual or cultural impact.
		+3	Extremely appealing, possessing scarcity and appeal.
Vitality **E4**	The dynamic development state of the landscape in cultural continuity, community vitality, and ecological sustainability.	-3	On the verge of disappearance, cultural discontinuity, village hollowing out.
		-2	Low vitality, weak cohesion, lacking innovation.
		-1	Slightly vibrant, with occasional displays of traditional culture.
		0	Moderately vibrant, with some cultural continuity.
		+1	Fairly vital, culturally active with resident participation.
		+2	Very vital, strong cultural innovation, attracting external attention.
		+3	Full of vitality, traditional culture thrives with good intergenerational inheritance.
Pleasantness **E5**	The comfort and happiness evoked by the landscape, stimulating	-3	Uncomfortable, cluttered and disordered, evoking negative emotions.
		-2	Rather oppressive, monotonous and dull, lacking vitality.
		-1	Slightly plain, without obvious flaws but lacking highlights.

Factor	Factor Description	Score	Rating Description
	positive emotions.	0	Moderately pleasant, possessing basic aesthetic quality and comfort.
		+1	Fairly pleasant, rich in characteristics, capable of elevating mood.
		+2	Very pleasant, highly infectious, continuously stimulating happiness.
		+3	Extremely pleasant, perfectly integrating nature and humanity, bringing happiness.
Aesthetic Quality **E6**	The visual artistic value of the landscape in form, color, and cultural connotation.	-3	Ugly and cluttered, lacking aesthetic consideration.
		-2	Lacking aesthetic appeal, ordinary and monotonous.
		-1	Slightly aesthetic, with some acceptable aspects but overall insufficient.
		0	Moderately aesthetic, possessing basic formal beauty.
		+1	Fairly beautiful, with distinctive ethnic characteristics and harmonious composition.
		+2	Very beautiful, strong artistic expression, unity of form and function.
		+3	Ultimate beauty, reaching the level of artistic masterpiece.
Mystery **E7**	The sense of unknown and exploration evoked by the landscape reflects cultural hiddenness.	-3	Completely straightforward, lacking imaginative space.
		-2	Rather plain, difficult to evoke associations.
		-1	Slightly hidden, with some cultural hints.
		0	Moderately mysterious, containing symbols to be interpreted.
		+1	Fairly mysterious, possessing religious sanctuary characteristics.
		+2	Very mysterious, reflecting primitive beliefs, full of unsolved mysteries.
		+3	Extremely mysterious, completely preserving ancient cultural memories.

3.2.4 Scale construction

The SD evaluation questionnaire assessed the Lisu landscape imagery samples based on the seven Lisu cultural characteristic factors. Respondents rated each Lisu rural landscape photograph according to their personal experience and perception of the landscape imagery semantics, thereby obtaining quantitative data. The questionnaire employed a Likert scale for evaluation, using a 7-point scale ranging from -3 to +3 (left to right: -3, -2, -1, 0, +1, +2, +3). Higher absolute values indicate stronger intensity, with negative values representing the left-side tendency and positive values representing the right-side tendency (LIKERT, 1932).

3.2.5 Evaluators and methodology

The SD method typically involves 20 to 50 respondents, with diverse backgrounds recommended for comprehensive representation (YIRAN; JIHUI, 2017). To avoid overlapping with the landscape quality evaluation participants, local tourists were selected as evaluators. The evaluation was conducted in the village committee meeting room using a slideshow presentation (photographs were randomly arranged, with specific procedures like the landscape quality evaluation).

3.2.6 Data statistics

A total of 25 questionnaires were distributed. After excluding invalid responses, 23 valid questionnaires were collected, resulting in a retrieval rate of 92%. Data was processed using Microsoft Excel 365 to calculate the standardized mean values of the landscape characteristic factors for each landscape imagery sample in Table 4.

Table 4

Standardized Mean Values of Landscape Characteristic Factors for Each Landscape Imagery Sample

Sample Number	Uniquenes s	Primitivenes s	Attractivenes s	Vitalit y	Pleasantnes s	Aestheti c Quality	Myster y
1-3	2.20	2.40	2.40	2.20	2.40	2.40	2.40
6-1	2.60	2.20	2.80	2.60	2.00	2.00	2.00
1-2	2.40	3.00	2.20	2.20	3.00	2.20	2.60
4-2	1.20	1.00	1.40	1.00	1.60	1.80	1.20
8-2	-1.40	-1.40	0.60	0.20	-0.40	-0.40	-1.00
7-1	-1.60	-2.60	-0.20	-1.20	0.40	-2.00	-2.00
3-1	-2.40	-2.40	-0.80	1.00	-0.80	-0.60	-1.40
2-1	-1.80	-1.60	-1.20	-1.20	-0.80	-1.40	-2.00

4 DISCUSSION

4.1 Analysis of SBE evaluation results

Regarding the perceived Lisu cultural value of the 17 photographic samples, Table 1 shows that 7 samples recorded negative values while 10 samples recorded positive values. A direct comparison between the positive-value and negative-value sample

groups reveals distinct differences across six landscape imagery categories: architectural style, village layout, architectural ornamentation, building materials, Lisu colors, and Lisu patterns.

4.1.1 Architectural styles

The landscape architecture within the positive-value group represents typical Lisu dwelling styles. Structures include log-walled houses (Sample 1-1) and earthen-walled houses (Samples 1-2, 1-3) constructed with timber and earth. These dwellings are situated on terraced hillsides within mountain hollows. Dozens of wooden pillars are erected on the slopes and reinforced laterally at the base using simple mortise-and-tenon joints without load-bearing columns. These buildings demonstrate a harmonious relationship between human habitation and nature, reflecting unique living and production methods(XIAOYI; BOONYANMETHAPORN, 2024a), presenting a scene of human-nature integration.

4.1.2 Village layout

The positive-value group includes ancient trees (Samples 4-1, 4-2), two centuries-old specimens located at the village entrance. Over 20 meters tall with lush foliage, they have witnessed Pingshan Village's development. These trees are considered village mountain deities, protected from felling or climbing (YANG, X., 2016). Their expansive canopies resemble giant umbrellas, demonstrating vigorous vitality. Their aged yet vibrant forms, like natural bonsai, possess distinctive appeal. These ancient trees guard the village, forming unique landscape features (ZHA;; YUEWEN;; WANTING, 2021). The vegetation/farmland (Samples 6-1, 6-2, 6-3) consists of layered terraces constructed along mountain slopes. These terraces, resembling colorful ribbons connecting sky and land, represent exemplary models of the traditional Lisu living environment and agricultural culture. The mountain features (Sample 5-2) demonstrate well-preserved forest vegetation, embodying aesthetic qualities shaped by the unique local climate characterized by distinct seasonal variations within short distances. In contrast, negative-value samples exhibit rigid road designs lacking character and failing to harmonize with the surrounding environment (Sample 8-2).

4.1.3 Architectural ornamentation

Within the positive-value group, samples with higher perception values (Samples 1-1, 1-2, 1-3, 2-2) feature distinct Lisu totemic elements, including emblematic patterns composed of crossbows, shells, and the iron tripod of the hearth (LI, 2019). These reflect the totem worship practices of Lisu primitive religion. Negative-value samples (Sample 2-1) consist of modern landscape sculptures that, despite imitating Lisu production and daily life, are crudely made, possess a distinctly modern appearance, and conflict with the traditional village style.

4.1.4 Landscape materials

In the positive-value group, samples with higher perception values (Samples 1-1, 1-2, 1-3) utilize traditional materials including bamboo strips, wooden logs, and earthen walls. Both the styles and colors harmonize effectively with the surrounding environment. Negative-value samples (Samples 2-1, 2-2, 3-1) incorporate modern buildings and paving materials that are environmentally incompatible, adversely affecting the landscape.

4.1.5 Lisu colors

Positive-value samples (Samples 1-2, 6-3) display bright and elegant colors, reflecting the Lisu preference for vivid hues. These naturally derived colors decorate buildings and interiors, while flowers planted around houses create integration with nature. Samples (4-1, 4-2) evoke a sense of returning to nature, and the Phyto landscaping possesses distinctive characteristics that convey specific cultural connotations. Conversely, the negative-value group (Samples 2-1, 2-2, 3-1) exhibits monotonous landscape colors lacking aesthetic appeal.

4.2 Analysis of SD evaluation results

A quantitative evaluation of eight typical landscape imagery samples was conducted using the Semantic Differential (SD) method, with results presented in Table 3. Analysis reveals that the Lisu architectural samples 1-2 and 1-3 show positive values across all influencing factors, indicating well-preserved Lisu cultural characteristics with strong primitiveness and distinctive uniqueness compared to other regions, thereby attracting tourist engagement. Furthermore, as these buildings remain in active use, they reflect Lisu production and daily life, resulting in higher vitality scores. They also evoke pleasantness and aesthetic appreciation, while their unique architectural features impart a sense of mystery to the public.

Sample 6-1 represents the locally distinctive Xinshan terraced fields, which preserve the unique farming methods of the Lisu people. Consequently, it scores high in uniqueness and primitiveness and is highly appealing. The continuing traditional production methods demonstrate strong vitality and provide pleasantness and aesthetic value. Combined with the mountain features and distinctive terraces, they also evoke a sense of mystery for visitors. Sample 4-2 is a characteristic landscape tree at the village entrance, also regarded as a "sacred tree" in Lisu culture. However, it is otherwise ordinary, though it carries a mysterious aura due to its cultural significance.

Sample 8-2 is an old street in Pingshan Village that, after multiple renovations, has lost its traditional layout. The building colors, materials, and styles on both sides of the street lack Lisu characteristics. The street layout also diverges significantly from traditional village patterns, resembling more a modern urban street. Apart from maintaining some vitality due to ongoing commercial activity and pedestrian flow, and certain appeal from rural products sold to tourists, all other characteristics show negative values. Similarly, Sample 3-1, the village square, scores positively only in vitality due to gatherings of residents and tourists, with all other features being negative.

Sample 7-1 depicts Lisu figure murals that significantly differ from traditional Lisu totems in materials, colors, and style, appearing more like products of modern engineering. This leads visitors to perceive them as municipal street art typical of urban settings, resulting in negative scores across all indicators. Sample 2-1, a Lisu ornamental sculpture, scores entirely negative across all metrics. Its design, materials, and other

attributes are indistinguishable from modern crafts, and its crude workmanship creates a poor visual impression for tourists.

4.3 Inferential analysis results

4.3.1 Reliability and validity tests

Reliability and validity analyses were conducted on the seven Landscape Characteristic Factors to confirm their appropriateness. SPSS 27.0 was employed to assess the overall reliability and validity of the questionnaire, evaluating data authenticity and structural validity. The reliability test yielded a Cronbach's α 0.984 (>0.8) in Table 5, indicating high reliability and demonstrating the study's strong dependability.

Table 5.

Reliability Statistics

Cronbach's Alpha	Items
.984	7

4.3.2 Stepwise multiple regression analysis

To identify the key factors influencing the perception of Lisu ethnic cultural landscapes, a stepwise multiple regression analysis was conducted. The F-statistical probability thresholds were set as follows: variable entry at $p \leq 0.05$ and removal at $p \geq 0.10$.

The results Table 6 show that two variables were ultimately included in the model: " Uniqueness (E1)" and "Pleasantness (E5)". The remaining variables were excluded due to failure to meet the significance threshold.

Table 6

Variables Entered/Removed

Independent Variables		Adjusted
1	Uniqueness E1	Stepwise (Conditions: Probability of F to enter <= .050, Probability of F to remove >= .100).
2	Pleasantness E5	Stepwise (Conditions: Probability of F to enter <= .050, Probability of F to remove >= .100).

Notes: Dependent variable：Perceived Lisu Cultural Value

4.3.3 Excluded variables analysis

According to Table 7, compression from 16 variables to 2 key factors was achieved. other variables such as "Originality (E2)", "Liveliness (E4)", "Aesthetic Richness (E6)", and "Mystery (E7)" were not included in the final model, either due to insufficient significance (e.g., "Originality" p=0.967) or because their explanatory contribution was overlapped or superseded by other variables. This screening process demonstrates the effective elimination of redundant variables by the statistical method, enhancing the model's parsimony and explanatory power.

Table 7

Excluded Variables

Independent Variables		Input Beta	t	Significance	Partial Correlation	Collinearity Statistics Tolerance
1	Primitiveness E2	-.138[b]	-.239	.819	-.097	.106
	Attractiveness E3	.084[b]	.243	.816	.099	.293
	Vitality E4	.326[b]	1.628	.155	.554	.618
	Pleasantness E5	.532[b]	4.539	.004	.880	.585
	Aesthetic Quality E6	-.242[b]	-.620	.558	-.245	.220
	Mystery E7	-.367[b]	-.971	.369	-.368	.216
2	Primitiveness E2	-.013[c]	-.043	.967	-.019	.105
	Attractiveness E3	-.013[c]	-.073	.945	-.033	.288
	Vitality E4	.024[c]	.157	.881	.070	.397
	Pleasantness E5	-.185[c]	-.955	.384	-.393	.219
	Aesthetic Quality E6	-.032[c]	-.139	.895	-.062	.183

Notes: a. Dependent variable: Perceived Lisu Cultural Value
b. Predictors in the model: (Constant), Uniqueness E1
c. Predictors in the model: (Constant), Uniqueness E1, Pleasantness E5

4.3.4 Model Goodness-of-Fit

As shown in the Table 8:Model 1 (including only "Uniqueness") had R^2=0.786, Adjusted R^2=0.755.Model 2 (adding "Pleasantness") saw R^2increase to 0.952, with an Adjusted R^2=0.936. This indicates that these two variables together explain 93.6% of the variance in cultural landscape perception, demonstrating excellent model fit.

Table 8

Model Summary

Independent Variables	R	R^2	Adjusted R^2	Std. Error of the Estimate
1 Uniqueness E1	.886[a]	.786	.755	.61583378
2 Pleasantness E5	.976[b]	.952	.936	.31591604

4.3.5 Regression coefficients and collinearity diagnostics

The Table 9 reveals: “Uniqueness" had a standardized coefficient β=0.886, p=0.001."Pleasantness" had a standardized coefficient β=0.532, p=0. 004.Both variables were significant at the p<0.01 level, indicating a significant positive influence on perception. Collinearity statistics showed that all tolerance values were greater than 0.1, and all VIF values were below 10, confirming the absence of multicollinearity and supporting the robustness of the results.

Table 9

Coefficients

Independent Variables	B	Std. Error	Beta	t	Sig.	Tolerance	VIF
(Constant))	.033	.209		.156	.880		
Uniqueness E1	.436	.086	.886	5.067	.001	.205	4.872
Pleasantness E5	.418	.092	.532	4.539	.004	.695	1.439

4.3.6 Regression equation construction

Based on the unstandardized coefficients, the regression equation is:

$$Y=0.33+0.436\,X_1+0.418\,X_2 \qquad (3)$$

Where X_1 represents " Uniqueness " and X_2 represents "Pleasantness".

The standardized equation is:

$$Z= 0.886Z_1 +0.532Z_2$$

The stepwise regression analysis ultimately identified "Uniqueness" and "Pleasantness" as the core factors influencing the perception of Lisu ethnic cultural landscapes. Together, they form a powerful and concise evaluation model with strong explanatory power. This result suggests that in the conservation and planning of Lisu

village landscapes, emphasis should be placed on enhancing the distinctive ethnic characteristics of the landscape and the observers' pleasurable experience to effectively improve cultural transmission and perceptual efficacy.

4.4 Evaluation of the perceived lisu cultural value in xinshan lisu township

Analysis of the 17 landscape imagery elements reveals that both natural elements—including vegetation/farmland, mountain features, and notable landscape trees—and artificial elements—comprising buildings/structures, landscape ornaments, landscape plazas, and street texture—exert either positive or negative influences on the perceived Lisu cultural value.

High Perception Level (SBE ≥ 0.7): This category is represented by "Buildings/Structures (Landmarks)" (1.07816–1.45222), "Notable Landscape Trees (Landmarks)" (0.70410–1.07816), and "Vegetation/Farmland (Regions)" (0.89113–1.26519). These results indicate that the synergistic effect between artificial structures and natural elements significantly enhances landscape attractiveness ($P < 0.05$).

Medium-Low Perception Level (-0.4 < SBE < 0.7): This group includes "Mountain Features (Edges)" (-0.41806–0.33005) and "Street Texture (Paths)" (-0.97915–-0.04401). The disconnection between their spatial forms and cultural functions leads to fluctuations in aesthetic value.

Low Perception Level (SBE ≤ -0.4): This level is primarily associated with "Landscape Ornaments (Landmarks)" (-1.91429–-0.23103), "Landscape Plazas (Nodes)" (-1.35320), and "Lisu Colors and Materials" (-1.16617–0.14302). This suggests prominent issues including a lack of symbolic representation and homogenization in rural landscape design.

4.5 Evaluation of the impact of landscape characteristic factors on the perception of lisu culture

Analysis of the landscape characteristic factors in the eight high- and low-value samples demonstrates that Uniqueness, Primitiveness, Attractiveness, Vitality, Pleasantness, Aesthetic Quality, and Mystery all influence the perception of Lisu culture. However, stepwise regression analysis resulted in a final quality evaluation model

retaining only two factors, ranked by importance: Uniqueness and Pleasantness. This indicates that these two factors have more universal significance and representativeness in influencing the perception of Lisu culture.

Uniqueness refers to the distinctiveness and atypical nature of the landscape in visual, cultural, or spatial aspects, reflecting the unique characteristics of Lisu village cultural landscapes. This factor is manifested through the rarity of landscape imagery elements, the prominence of ethnic symbols, and unconventional spatial composition, serving as a crucial dimension for measuring cultural appeal and memorability.

Pleasantness reflects tourist psychological needs. It denotes the comfort and happiness derived from the landscape in terms of visual sensation, psychological experience, and emotional interaction, indicating whether the Lisu village landscape imagery can evoke positive emotions and enjoyable experiences in viewers. This landscape characteristic factor is evaluated based on aesthetic harmony, environmental comfort, cultural affinity, and interactive engagement, emphasizing the positive psychological feedback and emotional satisfaction people gain from the landscape.

5 CONCLUSION

This study, utilizing the SBE-SD method, reveals a multidimensional driving mechanism for evaluating the perception of Lisu culture in Lisu villages: the Uniqueness of Lisu culture and the Pleasantness of landscape elements are key to enhancing the perceived Lisu cultural value in Xinshan Lisu Township. Future efforts should integrate community participatory design to balance the authenticity of Lisu culture with functional modernization and employ longitudinal tracking studies to verify the long-term effects of optimization strategies.

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Authors' Contribution

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Data availability

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