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RESEARCH ARTICLE

Landscape design guidelines for ecotourism-oriented rural homestays based on environmental, social and governance performance

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ABSTRACT

Ecotourism-oriented homestays are a significant driving force for rural revitalization. The landscape is instrumental in distinguishing homestays from one another and enhancing their allure, contributing to cultural heritage and sustainable economic development. However, the current homestay development landscape is marred by several challenges, including a lack of diversity in landscapes, a disconnect from local cultural roots, overdevelopment, ecological protection imbalances, a dearth of interactive experiences, and unregulated service standards. This study uses six representative cases in Zhejiang Province, China, integrating publicly accessible government environmental performance data, tourist review texts sourced from online travel platforms, and insights gleaned from semi-structured expert interviews. A multi-dimensional evaluation framework is established based on Environmental, Social, and Governance (ESG) principles. Quantitative text semantic analysis techniques were applied to parse the review texts, subsequently utilizing statistical methods to ascertain the relative importance of dimensions and indicators and explore their relationships. A significant correlation was observed between the prevalence of ecologically favorable language in user reviews and official environmental assessment scores. The frequency of culturally specific references in guest reviews exhibited a statistically significant positive correlation with tourist ratings. Drawing upon the preceding analysis, the study formulates landscape design guidelines that emphasize green technology, cultural empowerment, and social identity.

1. INTRODUCTION

Tourism is an industry that heavily relies on natural resources, encompassing natural landscapes, climate features, water resources, and environmental quality (Milanović Pešić et al., 2020; Xu, 2024). A pristine ecological environment holds immense allure for tourists. Tourism can stimulate economic growth and optimize resource utilization, significantly influencing ecological dynamics (Avci et al., 2024). Sustainable tourism development necessitates judicious rural development and management, striking a balance between economic development and environmental preservation (Li et al., 2019; Ortega et al., 2020). While tourism development can spur rapid economic growth and create employment opportunities (Giotis, G. 2022), excessive exploitation can lead to ecological degradation, resource depletion, and infrastructure overload (Liu et al., 2020). Ecotourism, rooted in sustainable development principles, advocates for harmonious coexistence between humanity and nature, and it hinges on protecting the ecological environment, leveraging a robust natural ecosystem and its coexisting human culture, and emphasizing ecological conservation, environmental education, and local community benefits. Rural areas are important carriers and places of ecotourism. The development of rural digital economy, environmental regulation, and plant ecosystem services are important factors affecting the development of ecotourism (He, Sun, & Xu, 2023).

The booming tourism industry has driven the development of homestays. As living standards rise, homestays have evolved from small-scale accommodations operated and serviced by original owners, offering tourists an immersive local nature, culture, production, and lifestyle experience, into more comprehensive tourism activities (Hu, 2019). However, the proliferation of rural homestays has led to issues such as landscape homogenization, ecological damage, lack of governance, insufficient interactive experiences, and irregular services, stemming from extensive development and business model convergence (Su et al., 2021). In addition, some homestay designs are disconnected

from local culture, featuring exterior materials and basic tourist facilities that clash with the local environment and style (Xie et al., 2020). These problems not only affect the tourists' experience and the operation of the B&B itself but also have a series of negative impacts on the ecological environment, social culture, and community relations.

A study jointly released by the United Nations World Tourism Organization and Oxford University (UNWTO) underscores the pivotal role of ESG considerations for global companies, including greenhouse gas emissions, biodiversity, employee welfare, community impact, and other critical non-financial factors. The ESG reporting framework is instrumental in advancing the United Nations Sustainable Development Goals (SDGs). Theoretically, ESG metrics can gauge a region's ability to address and mitigate ESG-related risks to a certain extent. ESG information disclosure has emerged as an important means for tourism companies to implement sustainable development goals, with high ESG disclosure levels seen as a testament to companies' sustainable responsibilities, risk mitigation, and investment appeal (García, 2024). Reducing ESG risks can enhance a region's attractiveness to international tourists (Hassan et al., 2022). The ESG concept provides a systematic basis for evaluating and improving the environmental friendliness, social value, and service standards of homestays. By formulating explicit policies, establishing investment infrastructure standards, and providing product and service training, homestay tourism can flourish, offering travelers authentic experiences and benefiting local communities (Kafle, 2023). Integrating ESG concepts into homestay industry research can foster long-term value and steer rural tourism towards high-quality, sustainable development.

The sustainable development of homestays is mirrored in the experiential value perceived by tourists. Experience and emotional value are pivotal determinants of homestay satisfaction and revisit intentions, forming the crux of improving market competitiveness (Sharma et al., 2021). Perceived value encompasses a multifaceted perspective, representing consumers' subjective appraisal of the price paid versus the benefits received, including multiple attributes like price and quality (Zeithaml, V.A. 1988). Sheth et al. proposed that functional, emotional, and social value constitute the three key dimensions of perceived value. Functional value pertains to the utility derived from a product or service's functional, utilitarian, and physical attributes; emotional value relates to a product or service's capacity to evoke emotions or emotional states; social value stems from the perceived utility associated with a specific social group (Sheth et al., 1991). Educational experiences influence functional value, aesthetic experiences affect emotional value, and both collectively impact tourists' satisfaction (Song et al., 2015). Investigating tourists' perceived value aids in comprehending their behavioral characteristics, consumption behavior, and consumption psychology, thereby providing a theoretical basis for product development and marketing strategies in local knowledge tourism (Zhang, 2023).

With the development of Internet technology, leveraging web text mining methods to study tourism attractions has become a research hotspot. Mining, analyzing, and applying customer online review data can unveil customers' genuine needs, thereby optimizing products and services and enhancing customer service satisfaction. Customers' online comments on products and services reflect their emotional inclinations. Sentiment analysis quantifies the level of emotional evaluation, discerning the emotional polarity of the text. Positive emotions typically denote favorable evaluations, expressing consumers' satisfaction with products or services, significantly boosting customer recommendation probability and hotel ratings. Conversely, negative evaluations can significantly reduce potential customers' purchase intent and trust (Mehraliyev et al, 2021; Wen et al, 2023). Based on the above research, it can be seen that online text evaluation holds significant research value for tourism development and subsequent homestay enhancements. This study aims to propose a homestay landscape design guide based on the ESG performance evaluation system, exploring how homestays can balance environmental protection, social equity, and governance effectiveness, while promoting cultural heritage and economic sustainability through in-depth mining of relevant online text information.

2. MATERIALS AND METHODS

2.1. Study area

This study focuses on rural homestays in the Moganshan Mountain Area of Huzhou City, Zhejiang Province, as its research domain. Zhejiang, situated on China's southeastern coast, boasts a thriving homestay industry, with over 20,000 licensed establishments as of July 2025 and revenues exceeding 10 billion yuan in 2024. Huzhou City, a prefecture-level city within Zhejiang's northern region, enjoys a northern subtropical monsoon climate characterized by four distinct seasons and abundant rainfall. Mogan Mountain, a national scenic area located in Deqing County, Huzhou City, Zhejiang Province, garnered international acclaim when The New York Times listed it among "the 45 most worthwhile places to visit globally" in 2012. The charming natural scenery, long history and culture, convenient transportation conditions, and strong support from the government and local villagers have made Mogan Mountain

homestays a well-known tourist destination. In addition, the proactive construction and strategic planning of the homestay industry across various villages have positioned Mogan Mountain's homestay sector as a core sample of China's homestay industry. Drawing upon the list of national Class A tourist homestays released by China's Ministry of Culture and Tourism and the tiered selection of homestays by Zhejiang Province, this study meticulously chose six representative cases as its research subjects (Table 1). The case selection criteria were based on a structured theoretical framework designed to ensure that the samples are representative and diverse in terms of ESG dimensions and certification levels.

Table 1: Homestay Cases in Zhejiang Province

No.	Homestay Name	Official Rating	Unique Features	ESG Dimensions
A01	Naked Stables	International LEED Platinum Certification for Green Buildings	Western-Style Rural Homestay;Eco-Resort	This certification encompasses key environmental (E) dimensions, including green building, energy and resource management, and ecological conservation. The selection of this case aims to provide a benchmark reference that has achieved world-class standards in the environmental (E) dimension.
A02	Leafone	National Class-A Homestay; Zhejiang Platinum Homestay	Hub for Art and Culture	The selection of this case study seeks to capture the exemplary standards defined by different authoritative certification systems within China's homestay industry. Greater emphasis is placed on key aspects such as "model innovation, demonstration effect, host culture, and integration with local culture". This indicates that the "National Class A" designation essentially certifies the benchmark level that a homestay can achieve in the social (S) dimension.
A03	Ying Xuan	Zhejiang Platinum Homestay	All-Electric Homestay	The Platinum Homestay represents the highest level within the provincial comprehensive evaluation system, emphasizing overall facilities and service quality. The inclusion of the "all-electric" and "zero-waste" labels as critical environmental practices in this case simultaneously demonstrates both environmental (E) performance and governance (G) capacity, serving as an exemplary link between strategic objectives and practical execution.
A04	View in the Cloud	Zhejiang Gold Homestay	Focus on Natural Ecology & Immersive Experience	Contrasting and complementing the aforementioned cases, this example illustrates how varied market positioning, thematic features, and operational models can emerge under the same umbrella of official recognition. Through ecological projects such as firefly restoration, the case provides unique natural experiences, highlighting the integration of environmental (E) and social (S) values.
A05	Fan Gu	Zhejiang Silver Homestay	French Manor Style	The Zhejiang Provincial homestay classification system is divided into three levels—Platinum, Gold, and Silver—ranked from highest to lowest. A higher level denotes superior reception facilities, service quality, product innovation, demonstration potential, and the preservation and experience of local cultural heritage. This system ensures that the selected cases meet a reliable baseline in ESG dimensions, preventing the inclusion of substandard operators in the study.
A06	YunAn ShanJu	Zhejiang Provincial Cultural Theme Homestay	Traditional Chinese Medicine (TCM) Wellness Culture	This case aims to guarantee the inclusion of exemplary samples that deeply integrate local cultural heritage and manifest distinctive social (S) values within the dataset.

2.2. Source of data

According to the "Blue Book on China's Homestay Development Report", homestay operators typically opt for multi-platform sales integration via online travel platforms (OTAs) to enhance visibility and booking rates. Among them, 70% of operators choose Ctrip, while 45% opt for Meituan. In order to ensure the objectivity and comprehensiveness of the sample data, this study selected these two mainstream platforms as the primary sources for online review data. Initial research data was gathered by scraping online evaluation data from these travel platforms, and the online text underwent rigorous screening and cleaning processes to identify high-frequency words and conduct sentiment analysis, yielding objective data that authentically reflects tourists' genuine feelings and evaluations. In addition, this study also draws on official data, mainly from policy documents and official propaganda texts on homestays issued at the national, provincial, municipal, and county levels. To guarantee a comprehensive and scientifically valid research perspective, an expert interview outline was crafted based on ESG-oriented landscape evaluation principles, and a panel of five experts was convened, representing a diverse array of professional backgrounds and practical experiences, including an ecological environment specialist, a homestay designer, an ESG consultant, a policymaker, and a homestay operator. During the interviews, the researcher flexibly adjusted the sequence and phrasing of questions according to each interviewee's background and expertise. With the

experts' consent, all sessions were audio-recorded and meticulously documented to ensure data accuracy and traceability. The interview guide (Table 2 Interview Outline) was thoughtfully designed to elicit profound insights on ecological conservation, sustainable design, ESG assessment, policy support, and operational feedback.

Table 2: Interview Outline

Interviewee	Purpose	Interview Outline
Ecological and Environmental Expert	Focus: Low-carbon development, ecological restoration, and water resource management	① In your opinion, what are the most critical ecological indicators in landscape design? ② What major challenges do homestay projects currently face regarding energy efficiency, carbon reduction, or water resource management? ③ Could you share any practical suggestions for ecological restoration or water management in rural accommodations? ④ Are there any green certification systems or evaluation standards you recommend as references?
Homestay Designer	Focus: Integration of sustainability into architectural and landscape design	① What are your primary design considerations when working on homestay architecture or its surrounding landscape? ② How do sustainable design principles manifest in your projects? ③ How do you approach the balance between traditional cultural elements and contemporary design language? ④ What factors do you believe enhance the environmental friendliness and user comfort of a homestay project?
ESG Consultant	Focus: Strategic evaluation of ESG value in landscape projects	① Among the three ESG dimensions—ESG—which do you consider most crucial in assessing rural tourism landscapes? ② From an investment perspective, do ESG-oriented landscape projects for homestays hold competitive advantages? If so, how are these advantages demonstrated? ③ Are there currently any well-established ESG scoring systems or certification frameworks applicable to homestay projects?
Policy Maker	Focus: Governmental support and regulatory mechanisms	① Are there any existing policies or incentives specifically aimed at promoting eco-friendly homestays or green landscapes? ② Do local authorities take ESG considerations into account during project approval or subsidy allocation? ③ How do you view the role of multi-stakeholder participation (e.g., communities, designers, enterprises) in advancing sustainable landscape development? ④ Are there actionable policy pathways to promote the implementation of ESG concepts in homestay and landscape planning?
Homestay Operator	Focus: On-the-ground feedback and user experience	① Are you familiar with the concept of "ESG" or sustainability-oriented design in homestay development? ② Is the current landscape design easy to maintain? What kind of feedback have you received from your guests? ③ Would you be willing to allocate more budget toward environmentally friendly landscape features? Why or why not?

2.3. Research Methodology

Initially, this study employed Python software to scrape 5,846 reviews of six selected homestays from two prominent platforms, Meituan and Ctrip. Considering that the collected data may have defects such as duplication and deviation from the subject. In order to ensure the correctness of the data and the correctness and scientificity of the subsequent experimental results, the text that can reflect and represent the tourist's perceived intentions was removed, and the comments, such as scenic spot introductions, experience sharing, and travel suggestions, were retained. Comments with too few words were deleted, and repeated comments and completely irrelevant content were removed. Finally, 2,362 comments from tourists were obtained. While individual words cannot be directly translated into numerical values, textual

information can be harnessed through statistical analysis of word occurrences. To further pinpoint thematic feature words in the online reviews of the case-study homestays, this study first performs vectorization of textual features. The Term Frequency–Inverse Document Frequency (TF-IDF) bag-of-words model was adopted to quantify the weight of each word. TF-IDF, a statistical approach that assesses a word's significance in a specific document relative to a collection of documents, integrates term frequency (TF) with inverse document frequency (IDF). A higher frequency of a word within a single document signifies its greater relevance to that document. The TF-IDF calculation formula is as follows:

$$\text{TF-IDF}_{i,j} = \text{TF}_{i,j} \times \text{IDF}_i$$

TF-IDF enhances the precision of keyword extraction, text classification, and information retrieval by combining the frequency of a word in a specific document (TF) with its prevalence across the entire document corpus (IDF). The formula for word frequency (TF) is:

$$TF_{i,j} = \frac{n_{i,j}}{\sum_k n_{k,j}}$$

where $TF_{i,j}$ denotes the frequency of the feature word in the review text, $n_{i,j}$ represents the number of occurrences of the feature word t_i in the j review text, and $\sum_k n_{k,j}$ signifies the total occurrences of all feature words in the j-th review text.

Semantic network analysis was utilized to examine the co-occurrence of high-frequency words, depicting the relationships between words or phrases in the text through semantic networks. Initially, a custom word list was established for text segmentation, followed by the creation of a filter word list to exclude terms unrelated to the travel experience. Subsequently, the top 120 network review feature words are selected (Table 3). In order to further extract the themes of tourists' experience, they are classified according to the dimensions of tourist's perceived value. Environmental value includes ecological protection, green buildings, landscape beauty, climate, carbon emissions, and pollution control; functional value includes food, accommodation, sightseeing, transportation, and shopping; service value includes service attitude and service management; emotional value includes pleasure, healing, and boredom; and social value includes cultural identity, community participation, and intergenerational interaction.

Table 3: Key Semantic Feature Words Identified from Online Review Data

Value Dimension	Secondary Dimension	High-Frequency Feature Words from Online Reviews
Environmental Value	Ecological Conservation	eco-quality, nature, environmental protection, lucid waters and lush mountains, harmony with nature, plant diversity, birdsong, lush greenery, pet-friendly, insect sounds, fireflies
	Green Architecture	solid wood, natural materials, site-specific adaptation, thatched roof, rammed-earth cottages, natural stone, renovation of old houses
	Aesthetic Landscape Quality	beautiful scenery, sense of design, well-organized layout, fairyland, sunrise, poetic atmosphere, bamboo forest, viewing platform, swimming pool, sunset, swing, rice field, sense of home, streams and bridges, wooden horse, flower appreciation, display design
	Climate	fresh air, clean air, high oxygen level, mist, open view, stargazing, moon viewing, high visibility
	Carbon Emissions	walking, low carbon, cycling, zero carbon, energy saving
	Pollution Control	waste sorting, rainwater harvesting, waste reuse
Functional Value	Food	delicious food, local specialties, organic farm, fresh, fruits, healthy, agricultural products, limited breakfast options
	Accommodation	clean, tidy, floor-to-ceiling windows, spacious room, good appliances, balcony, outdated facilities, poor sound insulation, dripping noise, water not hot
	Recreation	taking photos, sightseeing, driving, swimming, courtyard, drinking tea, children's playground, horseback riding, rock climbing
	Transportation	convenient, nearby, easy to get a taxi, parking lot, mountaintop, remote location, halfway up the mountain, no streetlights
	Shopping	handicrafts, tea, cultural and creative products, calligraphy works
Service Value	Service Attitude	enthusiastic, polite, no one answers the phone, indifferent, unresponsive
	Service Management	housekeeper, service evaluation, staff training, poor management
Emotional Value	Enjoyment	happy, joyful, warm, blissful, will come again, recommend
	Healing	stress relief, peaceful, relaxed, quiet
	Boredom	not fun, low cost-performance, not as expected, disappointed
Social Value	Cultural Identity	local characteristics, localization, cultural integration, modernization
	Community Participation	local villagers, corporate team building, government support
	Intergenerational Interaction	parent-child travel, family travel

During the experimental process, an imbalance was observed in the distribution of high-frequency feature words across different value dimensions. Predominantly, the descriptions centered around landscape beauty, largely attributable to the emphasis placed on landscape elements of homestays during the text capture and extraction phases. To

avoid the dominance of a single dimension in shaping the research conclusions and to enhance both the scientific rigor and the balance across multiple dimensions, this study supplements the high-frequency word analysis with expert interview transcripts, which were subsequently coded using NVivo 12. The purpose was to inductively compare and interpret the relative weights of the ESG dimensions. Specifically, a browsing-based coding approach was employed, involving the identification and annotation of key information through repeated readings of the interview texts. This approach aligned with the open coding stage, where no predefined categories were imposed, enabling themes to organically emerge from the data in a bottom-up manner. Through a thorough and iterative analysis of the entire interview transcript dataset, a total of 10 free nodes and 68 references were identified. Building on these results, NVivo's visualization functions were employed to illustrate the proportional distribution and salience of each node within the dataset.

Following the completion of open coding, the expert interview transcripts and tourist review texts were systematically integrated. Leveraging the existing logical structure of the free nodes, each text segment underwent manual coding to ascertain its emotional valence (as detailed in Table 4). Specifically, a set of positive emotional evaluation markers was established, encompassing terms like attractive landscape, good ecology, green architecture, enjoyable experience, rich cultural atmosphere, and good service, while negative emotional indicators were defined, including phrases like poor transportation, unpleasant experience, and poor service.

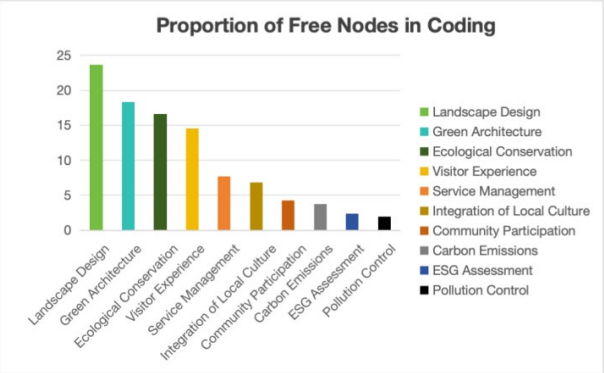

Figure 1: NVivo Text Analysis – Proportion of Free Node Coding

Table 4: Examples of Sentiment Evaluation Morphemes

High-Frequency Morpheme	Sentiment Orientation	Coding Node
Beautiful scenery, expansive mountain views, serene and elegant, great views, sense of design, well-planned layout, fairyland, white clouds, sunrise, poetic, bamboo forest, viewing platform, swimming pool, sunset, swing, rice field, homely feeling, small bridge and flowing water, wooden horse, flower appreciation, thoughtfully designed, good air quality, fresh air, high oxygen level, mist, broad view, stargazing, moon viewing, high visibility.	positive	Sentiment-Positive-Landscape Beauty
Good ecology, nature, environmentally friendly, lucid waters and lush mountains, harmonious coexistence with nature, plant diversity, birdsong, lush greenery, pet-friendly, insect sounds, fireflies, walking, low carbon, cycling, zero carbon, energy saving, good waste sorting, rainwater harvesting, waste reuse.	positive	Sentiment-Positive-Good ecology
Wooden, rustic, thatched roof, rammed-earth cottages, natural stone, renovated old houses, and a fusion design of Chinese and Western elements.	positive	Sentiment-Positive-green architecture
Clean, tidy, floor-to-ceiling windows, wellness herbal baths, balcony, gourmet food, local specialties, organic farm, Korean sauna, fruits, health, lei cha (traditional tea), desserts, great for photos, sightseeing, fishing, swimming, board games, hot springs, tea drinking, children's playground, horseback riding, rock climbing, suitable for family trips, couples' getaways, corporate team-building, friendly villagers, and convenient services provided by the government.	positive	Sentiment-Positive-enjoyable experience
Local culture, traditional handicrafts, intangible cultural heritage experiences, renowned calligraphy, as well as traditional Chinese medicine culture.	positive	Sentiment-Positive-rich cultural atmosphere
convenience; close by; easy to get a taxi; prior communication, warm, polite, patient, with butler service, good service attitude, well-trained staff.	positive	Sentiment-Positive-good service
Hilltop location, remote, traffic jams, no streetlights, and a long wait for the shuttle bus.	negative	Sentiment-negative-poor transportation
Rooms are crude, outdated facilities, old buildings, poor sound insulation, leaking water sounds, water not hot, limited breakfast options, hygiene needs improvement, low cost-performance ratio, did not meet expectations, as well as disappointing.	negative	Sentiment-negative-unpleasant experience
Few parking spaces, high accommodation fees, unanswered phone calls, indifferent staff, and unresponsive to issues.	negative	Sentiment-negative-poor service

An analysis of high-frequency terms in the filtered online review texts revealed that negative emotions predominantly arose from inadequate landscape maintenance and management at the homestays. Among them, Homestay

A01 garnered the most negative feedback due to its early construction and subsequent lack of upkeep, which significantly detracted from the guest experience. Apart from Homestay A04, the remaining five homestays all received negative comments regarding their service, with guests expressing similar concerns, underscoring the urgent need for some homestay managers to enhance their service quality. In addition, there were a few negative comments regarding transportation and location. To address these issues, homestay operators could consider increasing parking availability and providing clear route guidance in advance. Overall, as representative examples of boutique homestays in Zhejiang Province, the homestays in the case studies received significantly more positive than negative emotional evaluations, making them excellent references for rural homestay landscape design.

3. RESULT AND DISCUSSION

To delve into the relationship between the homestay environment and official ratings, this study employed Principal Component Analysis (PCA) to identify key influencing factors and conducted a correlation matrix analysis. By quantifying the rating levels of homestay cases, these ratings were converted into numerical values. For instance, rating levels were directly utilized as numeric variables (independent variable X1 = 1, 2, 3, 4, 5, 6). In scenarios with multiple rating levels, the highest level was prioritized for evaluation. Specifically, International LEED Platinum Certification for Green Buildings (X = 6), National Class A (X = 5), Zhejiang Platinum Homestay (X = 4), Zhejiang Gold Homestay (X = 3), Zhejiang Silver Homestay (X = 2), and Zhejiang Provincial Cultural Theme Homestay (X = 1).

Through repeated comparisons of online reviews across various cases and incorporating expert feedback on landscape design, this study summarized three major categories of influencing factors based on government rating standards: Environmental Perception Factors (F1), encompassing Y1 Spatial Layout, Y2 Landscape Facilities, Y3 Plant Diversity, Y4 Ecological Protection Measures, Y5 Application of Sustainable Materials, Y6 Green Building, Y7 Carbon Emissions, and Y8 Pollution Control. These eight landscape variables primarily represent visitors' positive ecological experiences within the homestay environment. Social Perception Factors (F2), including Y9 Local Culture, Y10 Social Activities, Y11 Community Involvement, and Y12 Visitor Experience, reflect the social-level experiences of both visitors and homestay operators. Governance Factors (F3), such as Y13 Service Management, Y14 Landscape Maintenance, and Y15 Disclosure of Green Performance Data, mainly represent visitors' evaluations of homestay operations.

Based on the weights of each factor, the comprehensive weighted score of each sample was calculated using the formula:

$$F = \sum_{i=1}^{n} Fac\_i * Fn$$

where F represents the comprehensive weighted evaluation score of the landscape sample, i.e., the weighted index of each factor; $Fac\__i$ denotes the characteristic factor value, and Fn represents the characteristic value of each factor. Samples were then ranked based on these characteristic factor values and comprehensive weighted scores, with higher scores indicating better performance on that factor.

Subsequently, SPSS software was utilized to conduct a factor analysis on the six landscape evaluation indicators. The analysis revealed that the cumulative variance explained reached 88.270% of the original variables, indicating that the three dimensions—Environmental Perception Factor (F1), Social Perception Factor (F2), and Homestay Governance Factor (F3)—encompass the majority of the original landscape feature information and demonstrate strong representativeness and explanatory power (Table 5).

The evaluation results indicate that the overall score of homestay landscapes aligns closely with official ratings, with the sole exception of Homestay A03, which scored marginally higher than A02. According to the All-Electric Homestay Construction Standards issued by the Zhejiang Electric Power Industry Association, renovated all-electric homestays can boost alternative electricity consumption by 200 million kWh annually, significantly reducing emissions of CO_2, SO_2, and NO_x. This innovative approach not only lowers carbon emissions and overall energy costs for homestays but also enhances rural electrification levels. Consequently, it gradually improves the living environment, promotes new energy consumption through a targeted, widespread approach, and fosters the development of an economically efficient, low-carbon, and environmentally friendly lifestyle across society. As a government-promoted all-electric homestay, A03 stands out in carbon emission control, pollution management, and operational efficiency, granting it a notable edge in the ecotourism-oriented evaluation system. In contrast, A02's primary competitive strength lies in its unique cultural attributes and high social recognition, consistent with its national Class A homestay status. Drawing on Tsang et al.'s (2023) comprehensive review of the motivations, impacts, and characteristics of corporate ESG information disclosure, applying the ESG theoretical framework to rural homestay landscape research can

effectively evaluate the sustainable performance of homestays in terms of environmental design, community integration, and governance mechanisms.

Table 5: Comprehensive Landscape Evaluation Table

Homestay No.	Official Rating X (1–6)	Environmental Perception Factor F1 (Variance Contribution Rate 45.833%)	Social Perception Factor F2 (Variance Contribution Rate 23.062%)	Governance Factor F3 (Variance Contribution Rate 19.375%)	Comprehensive Landscape Evaluation F
A01	6	2.153	1.379	0.928	1.485
A02	5	1.556	1.233	0.745	1.142
A03	4	1.672	1.158	1.257	1.277
A04	3	1.306	0.857	-0.064	0.784
A05	2	0.824	0.962	0.811	0.756
A06	1	0.679	1.216	0.468	0.682

In recent years, the ESG framework has gained increasing recognition as a key paradigm for assessing the sustainability of the tourism industry (Back, 2024). Homestay A01 has embraced sustainable design principles, utilizing energy-efficient, eco-friendly, and renewable materials in its buildings. During project implementation, greywater and wastewater are treated and recycled, while renewable energy sources are harnessed. Innovative building management systems and electricity meters are installed in guest rooms to monitor energy consumption and enhance guests' awareness of energy use. The ecological design philosophy of Naked Stables continues to serve as a valuable reference in the field today.

Although Case A01 attracted the highest frequency of negative sentiment in online reviews, its overall ESG assessment revealed that the governance (G) dimension was not the weakest link. In this study, the governance (G) dimension was dissected into three specific, observable, and measurable indicators, rather than being treated as a generalized concept. The recurring complaints of "dilapidation" in online reviews provided direct and compelling evidence of a significant shortfall in the governance subdimension of Y14 (landscape maintenance). This finding not only confirmed the reliability of the text analysis but also precisely located the issue within a distinct branch of the governance dimension. Despite its deficiencies in hardware maintenance (Y14), "Naked Stables", as a pioneering project and recipient of international certification, may still excel in the other two governance indicators. For instance, in Y13 (service management), the professionalism of its service team and the effectiveness of its problem-response mechanisms remained robust, partially offsetting the negative experiences caused by physical deterioration. Moreover, as a LEED Platinum-certified project, its transparency and systematic practices in Y15 (disclosure of green performance data) continued to set an industry standard, with its achievements in energy efficiency, water conservation, and emissions reduction remaining exemplary.

Corporate disclosure of ESG information can significantly shape consumers' brand perception and behavioral intentions (Li & Huang, 2024). A positive experience can heighten tourists' willingness to stay and recommend the brand. Homestay A06 has garnered widespread acclaim from tourists for its traditional Chinese medicine culture experience. Its unique cultural memory points are seamlessly integrated with guests' sensory experiences and emotional resonances, creating an unforgettable "psychological imprint". This imprint not only fuels the desire to share but also infuses cultural tourism projects with enduring vitality, helping them distinguish themselves in the market. In contrast, Homestay A04 received negative feedback due to poor service management, including complaints about unclean rooms, disorganized public areas, and unreasonable charges. However, A04 has earned numerous positive reviews from families with children during holiday periods, thanks to its unique firefly science education experience and organic vegetable garden picking activities. Homestay A05 received a Silver rating in the 2024 Zhejiang Province Homestay Evaluation. Although its performance in environmental perception, cultural perception, and service management was not outstanding, its villa-style design and romantic, vintage ambiance attracted many tourists during holidays such as Christmas and New Year's Day, who sought to experience a "sense of ritual in life".

Overall, the analysis indicates a significant correlation between the frequency of positive ecological terms in reviews and official environmental ratings, while the frequency of culture-related descriptions is positively correlated with guest ratings. Prioritizing ecological and cultural benefits in homestay landscape design enhances market competitiveness and resilience.

4. CONCLUSION

As global awareness of sustainable development and environmental protection grows, the tourism industry faces an urgent imperative to transform and upgrade. The homestay industry, a pivotal component of rural ecotourism, should actively respond to the country's call for low-carbon transformation and sustainable development. This study selected six representative rural homestays in the Moganshan Scenic Area of Huzhou, Zhejiang Province, as research samples. Through the collection of visitor review data from Ctrip and Dianping, analysis of government policy documents, and consulting with experts, the empirical analysis reveals a significant correlation between environmental perception and

visitor satisfaction. In terms of influence, the integration of local culture affects visitors' willingness to return. Grounded in the integrated ESG evaluation framework and bolstered by empirical analysis of homestay landscape practices, this study puts forth a design guideline (Table 6) centered on the themes of "green technology, cultural empowerment, and social identity". The guideline is designed to enhance environmental performance through sustainable construction and low-carbon operations, aiming to strengthen spatial uniqueness and attractiveness by integrating and revitalizing local culture, and to foster sustainable social identity and value co-creation through community participation and the optimization of tourist experiences.

Table 6: Framework for Homestay Landscape Design Evaluation and Guideline

Primary Dimension	Secondary Aspect	Factors	Design Strategy
Environmental	Landscape Design	Spatial Layout	Adapt to the natural topography by optimizing circulation routes and signage, facilitating natural ventilation, maximizing daylight utilization, and ensuring a rational spatial layout.
		Landscape Facilities	Prioritize eco-friendly materials in the construction of landscape facilities aligned with the character of the homestay; create multifunctional spaces that accommodate leisure and social interaction.
	Ecological Conservation	Plant Diversity	Select native plant species to establish tree–shrub–herb stratified communities, thereby fostering a vibrant and resilient natural garden.
		Ecological Protection Measures	Implement rain gardens to capture stormwater and channel it into dry streams or irrigation systems; design wildlife-friendly habitats to conserve biodiversity and enhance ecological functionality.
	Green Architecture	Sustainable Materials	Utilize locally available renewable materials such as bamboo and reclaimed timber, and adopt certified eco-friendly wood products and coatings.
		Green Building	Employ solar power and other clean energy sources to reduce long-term energy consumption。
	Carbon Emissions	Carbon Emission	Configure bike lanes, promote electric vehicles as shuttle buses for homestays, and encourage low-carbon travel.
	Pollution Control	Pollution Control	Establish waste separation stations; incorporate small-scale wastewater treatment systems and vegetated noise barriers.
Social	Integration of Local Culture	Regional Culture	Integrate local cultural elements into architecture, interior design, and gastronomy, positioning the homestay as a window for cultural display.
	Community Participation	Community Participation	Source food ingredients from local farmers and engage residents in village environment maintenance.
		Social Activities	Provide shared courtyards and social platforms to strengthen community bonds.
	Visitor Experience	Tourist Experience	Design immersive cultural experiences by incorporating lighting installations and interactive performances to enhance cultural perception among visitors.
Governance	Service Management	Service Management	Provide ESG-focused training for staff, encouraging them to communicate eco-conscious values to guests; establish clear green service protocols to ensure high-quality and easily managed.
		Landscape Maintenance	Develop systematic vegetation maintenance schedules and facility upkeep mechanisms, while regularly collecting user feedback for timely improvements.
	ESG Assessment	Disclosure of Green Performance Data	Create an online disclosure platform to regularly publish data on energy use, water consumption, and carbon emissions, thereby enhancing transparency.

This study underscores the intricate link between the landscape value of homestays and the ESG framework. The results reveal that an outstanding homestay experience stems not merely from ecological design but from the synergy of environmentally sustainable (E) practices, socially and culturally beneficial (S) interactive experiences, and efficient, transparent (G) operational governance. As illustrated in the case of Naked Stables, the project excelled during its initial construction and mid-term operation, earning high ratings. However, due to its early establishment, subsequent maintenance investments failed to keep pace with the physical infrastructure's aging, leading to a decline in user experience and a divergence between "ratings" and "real-time word-of-mouth". Conventional ESG ratings often focus on enterprise-level strategic governance and management frameworks, whereas negative user reviews frequently point out shortcomings in project-level operational maintenance. This study contends that, for the homestay sector and the broader hospitality industry, a truly effective ESG evaluation system must integrate micro-level user experience feedback as a vital supplementary indicator for assessing governance (G) effectiveness, thereby ensuring that top-level design excellence translates into positive end-user experiences.

Despite its contributions, this study has limitations that also suggest avenues for future research. First, all case studies were conducted in Zhejiang Province, and the applicability of the findings to other regions with varying ecological conditions and policy environments remains to be validated. Future research could broaden the geographic

scope and undertake cross-regional comparative analyses. Second, the data sources were primarily limited to experts and tourists, neglecting the perspectives of other stakeholders such as local residents and suppliers. Subsequent studies could adopt a more holistic stakeholder analysis approach to construct a diversified ESG evaluation model. Finally, this study did not track the long-term impacts of ESG practices over time. Future longitudinal studies could monitor the dynamic evolution of environmental performance, user reputation, and business outcomes following the implementation of ESG-oriented enhancements, providing stronger evidence of the long-term returns on ESG investment. When ESG practices transition from mere slogans to tangible, participatory experiences, rural homestays can evolve from traditional farmhouse accommodations into diversified homestay clusters. Through the deep integration of "homestay clusters + ecological conservation + cultural experience", and under the combined influence of policy guidance, market forces, and public participation, rural homestays in China can better adapt to changing visitor preferences while embracing innovation and sustainable operations.

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