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When Imperfection is Perfect:

The Value of Imperfect Landscapes in Ecotourism

Abstract: This study challenges the prevalent aesthetics bias in tourism research by examining the positive effects of imperfect landscapes in ecotourism. Through three experimental studies, this research investigates how and when imperfect (versus perfect) landscapes influence tourists' visit intentions. Results reveal that imperfect landscapes enhance tourists' visit intentions through increased perceived authenticity. This effect is strengthened by knowledge motivation while weakened by leisure motivation. This study is the first to empirically validate the positive effects of imperfect landscapes in ecotourism, offering a novel perspective contrasting the dominant perfection bias in tourism aesthetics research and practice.

Keywords: Imperfect landscapes; ecotourism; authenticity; visit motivation; visit intention

1. Introduction

Aesthetic experience has been recognized as a crucial factor influencing tourist behavior (Marder et al., 2021). According to aesthetic standards, perfection represents a universally pursued aesthetic inclination (Saito, 2017). Ancient Greek philosophers believed that perfection was embodied in classical aesthetics principles such as symmetry, harmony, balance, and regularity (Shi et al., 2021), while modern scholars have characterized this classical aesthetic notion of perfection through orderly, well-organized, clear, clean, and symmetrical features (Lavie & Tractinsky, 2004). These principles have profoundly influenced the aesthetic preferences of both designers and consumers and become the most used evaluation criteria (Hagen, 2021). Extensive research has indicated that landscape elements conforming to classical aesthetics standards have created positive tourism experiences and enhanced tourist satisfaction (Kirillova & Wassler, 2019; Tulasi et al., 2024; Wen et al., 2024). For instance, clean and orderly environments (Wen et al., 2024) and symmetrically balanced layouts (Kirillova et al., 2014) are considered perfect landscape elements that can strengthen tourists' visit intention, while landscape elements failing to meet the standard of symmetry or orderliness trigger tourists' negative attitudes (Breiby, 2014; Weber et al., 2008). However, ecotourism destinations often contain numerous elements that deviate from classical aesthetic standards – primitive landscapes without aesthetic modification, preserved architecture with time-worn appearance, and facilities with signs of use. Should the development and communication of ecotourism destinations adopt classical aesthetic standards of perfection and deliberately emphasize perfect elements, or should they shape and preserve their inherent imperfect elements? Answers to this question are vital for the development and promotion of ecotourism.

Existing research on imperfect elements in tourism remains notably underdeveloped (Kirillova, 2023; Nasiri et al., 2024). However, the limited emerging studies have yielded valuable insights. Scholars have begun to question the notion that

“perfection is better,” demonstrating that urban landscapes strictly conforming to standard aesthetics may compromise their distinctive characteristics (Speake & Kennedy, 2019). In addition, diverse types of imperfect experiences in tourism have been identified, including “ugly” and “ugbeaful” experience (Nasiri et al., 2024). Studies have further uncovered potential positive effects of imperfection. For instance, “ugbeaful” tourism attractions may stimulate tourist curiosity and delight (Nasiri et al., 2024); post-disaster dilapidated landscapes can generate positive tourism experiences (Martini & Sharma, 2022). However, gaps remain when contextualizing these insights into the field of ecotourism. Previous ecological aesthetics research has prioritized landscape evaluation through an environment-friendly lens (Gobster, 1999; Ji & Nie, 2024), which defines the value of ecological landscapes through environmental benefits rather than aesthetic contributions. This approach requires people to transcend or even sacrifice visual pleasure to understand nature’s essence and ecological functions. Ecological aesthetics essentially advocates accepting the “imperfection” through environmental conservation education. This leaves notable research gaps regarding the value of imperfection in ecotourism and how it can positively shape tourist perception and visit intention.

Through three experimental studies, this research finds that in ecotourism, compared with perfect landscape elements, imperfect ones may increase tourists’ willingness to visit. This is because the latter can evoke tourists’ stronger authenticity perceptions. In addition, this effect is influenced by tourists’ motivations. Specifically, knowledge motivation (exploration and learning) enhances the positive effect of imperfect landscape elements, while leisure motivation weakens this effect. This notion challenges common aesthetics biases in tourism and provides new insights into understanding the unique value of ecotourism. This study contributes to ecotourism in three ways. First, it presents empirical evidence and demonstrates the value of imperfection in ecotourism, challenging the aesthetics biases of classical aesthetics. Second, it examines the value of ecotourism from an aesthetic perspective, distinguishing from existing literature on environment protection. Finally, it identifies

the mediating role of authenticity perception and the moderating effect of visit motivations, articulating the underlying process about how imperfection creates value. These findings not only enrich ecotourism theories but also provide new insights into managing and developing ecotourism destinations.

2. Theory Development

2.1 The Ecological Value of Ecotourism

Ecotourism is a distinct form of tourism, which aims to protect and showcase local pristine natural and cultural value. It emphasizes minimizing negative environmental impacts while encouraging local authorities and residents to engage in development and conservation to preserve distinctive cultural customs (Thompson, 2022). Ecotourism destinations refer to specific geographical spaces or sites that host ecotourism activities (emphasizing the location). Compared to other tourist destinations, ecotourism destinations are characterized by minimal human interference and pollution (Cheng et al., 2014), protection of local ecology and biodiversity (Stronza et al., 2019), and respect for indigenous lifestyles (West & Carrier, 2004). Research demonstrates that ecotourism particularly attracts urban tourists who seek to escape from their daily life and desire to connect with nature (Juric et al., 2002). Scholars advocate that ecotourism development should follow the principles of ecological aesthetics (Erduran et al., 2012), which prioritizes ecological value in landscape appreciation, requiring people to transcend mere visual pleasure and appreciate nature's essence (Gobster, 1999; Ji & Nie, 2024). This aligns with the core values of ecotourism. From this perspective, the value of ecotourism destinations transcends mere visual appeal for tourists and prioritizes the conservation of intact ecosystems and biodiversity. For example, wetlands, as typical ecotourism destinations, exhibit visual characteristics that conflict with people's conventional aesthetic values (such as dirty and muddy water). However, they possess high

ecological aesthetic value. Therefore, tourists are encouraged to appreciate such landscapes (Lee, 2017).

Researchers have extensively examined factors affecting visit intention in ecotourism, and most studies emphasize the role of environmental protection, arguing that ecotourism destinations attract environmentally conscious tourists by avoiding excessive commercial development and modification to protect local ecosystems (Huang & Liu, 2017). For instance, Hultman et al. (2015) show that attitudes toward ecotourism destinations and environmental beliefs positively correlate with visit intention. Lu and Stepchenkova (2012) find that imperfect but environmentally friendly elements (e.g., dim lighting for energy conservation) are appreciated by tourists with environmental and ecological preservation concern, while perfect but environmentally harmful elements (e.g., levelled concrete roads that may damage local ecology) dissatisfy environmentally conscious tourists. However, this body of environment-centered research has its limitations. Ecotourism developers may overly target tourist groups with high environmental awareness, potentially underestimating the market opportunities of ecotourism and overlooking tourists' other motivations for ecotourism. In addition, previous research views "imperfect" elements in ecotourism as outcomes of environmental protection, while overlooking their potential positive impacts. Furthermore, little is known about how imperfect elements in ecotourism influence tourists' perception and experience.

2.2 Classical Aesthetics and Its Impact on Tourism

Classical aesthetics influences multiple domains. Perfection in classical aesthetics is often characterized by a high degree of order, symmetry, balance, harmony, cleanliness, and without noticeable traces of use (Lv et al., 2023; Handa, 2014; Suher et al., 2021). A large body of previous research has found that the design of tangible products generally pursues classical aesthetics, emphasizing aesthetic features such as order and symmetry. In architectural design, studies have shown that both ancient and

modern architectural practices emphasize harmonious proportions, coordinated scale, established order, and unified dimensions (Jiang, 2019). For instance, traditional Chinese residential areas have exhibited distinct orderliness in spatial design (Xu & Chiou, 2019). In product design, designs adhering to classical aesthetic standards enhance purchase intention. For example, green products (e.g., eco-friendly handbags and energy-saving lamps) featuring classical aesthetics with orderly and symmetric characteristics are more likely to be purchased compared to those with expressive aesthetics emphasizing creativity and distinctiveness (He et al., 2024). In packaging design, symmetrical information display is associated with higher aesthetics and purchase intention (Bigoin-Gagnan & Lacoste-Badie, 2018). In food consumption, items conforming to classical aesthetics are shown to evoke stronger perceptions of naturalness. In digital products, websites characterized by a clear design demonstrate higher perceived usability and trustworthiness compared to those lacking aesthetic appeal (Sonderegger et al., 2014).

Focusing on travel experiences as an intangible service, the aesthetic evaluation of landscapes has become a prominent research focus in tourism research (Tulasi et al., 2024). Aesthetic experiences are a crucial motivation in destination choice (Kirillova, 2023), and the aesthetics of natural and cultural landscapes critically influences the image of a destination (Chi & Qu, 2008).

Existing tourism research shows that tourists prefer perfect landscape elements that conform to classical aesthetic principles. Regarding cleanliness, Kirillova et al. (2014) employ “clean” and “dirty” as criteria for evaluating landscape aesthetics. Wen et al. (2024) have considered pureness (free from dust, dirt, or stain) as an integral component of high aesthetic quality. Wong et al. (2023) has identified environmental cleanliness and well-maintained facilities as essential components of hotel aesthetics. Concerning symmetry and order, research has indicated that hotels exhibiting classical aesthetic characteristics such as symmetry and clarity have stimulated booking intentions (Kirillova & Chan, 2018). Professionally designed photographs

with aesthetic appeal on review platforms enhance tourists' booking and visit intentions, while user-generated photos displaying "messy beauty" negatively impact booking intentions (Marder et al., 2021). In addition, intangible cultural heritage souvenirs featuring classical aesthetic characteristics of symmetry increase tourists' aesthetic enjoyment (Liu et al., 2022). Bertamini et al. (2019) has addressed that symmetry is irrelevant to aesthetics of natural scenery. However, it remains an important feature and aesthetic inclination in artificial landscapes. The pursuit of perfect landscape elements has extended to environmental protection. Nassauer (1995) has argued that though messy landscapes may contribute to ecological benefits, aesthetic pursuits of orderly landscapes should not be compromised. In particular, ecological improvements and environment conservation should be implemented in a way that maintains aesthetic orderliness and cleanness (Nassauer, 1995).

In summary, existing research generally holds that perfect landscape elements characterized by order, symmetry, and cleanliness enhance tourists' evaluations and positively influence their behavior, while viewing imperfect elements as negative. These studies present an aesthetic bias that "perfection is better" and associate imperfection with negative outcomes, overlooking the value of imperfection in specific contexts.

2.3 The Value of Imperfection

Scholars have recently begun to explore the positive influence of imperfection on consumer behavior. Imperfection refers to characteristics that deviate from classical aesthetic standards, often manifesting as disorder, asymmetry, imbalance, disharmony, uncleanliness, and traces of use (Lv et al., 2023; Handa, 2014; Suher et al., 2021). Research has shown that classical aesthetic characteristics (such as order, balance, and symmetry) align with superior patterns observed in natural organisms (He et al., 2024). Agricultural products deviating from current standards in shape, size, or color have typically been labeled as "suboptimal", "ugly", "unattractive" or "irregular". However,

associating these imperfect agricultural products with “sustainability”, “authenticity”, and “naturalness”, or attributing anthropomorphic characteristics to them, has enhanced consumer acceptance (Van Giesen & de Hooze, 2019; Kim et al., 2024; Chen et al., 2021; Wang et al., 2023). In addition, research has shown that consumers are attracted by products featuring imperfect appearances and textures because of their unique characteristics (Pedgley et al., 2018). In artificial intelligence literature, studies have shown that compared with perfect avatar endorsers, imperfect ones have increased customer purchase intention (Lv et al., 2023). Furthermore, Brady (2016) has contended that aesthetically displeasing objects may evoke curiosity and interest rather than boredom or insignificance. Research on tangible product domains has revealed that products with imperfect appearances may carry positive value, while similar value of imperfection in travel experiences requires further investigation.

Recent tourism research has begun to investigate how elements deviating from classical aesthetics shape tourist perception of destinations (Kirillova, 2023). Three key research trajectories have emerged. First, scholars have begun to challenge aesthetic standards. Knudsen et al. (2015) have advocated developing aesthetic evaluations beyond traditional beauty norms. Studies suggest that rigid adherence to standard aesthetics or conventional beauty paradigms may be counterproductive. For example, urban landscapes designed according to standardized aesthetics risk compromising their distinctiveness (Speake & Kennedy, 2019). Second, Nasiri et al. (2024) have categorized different types of imperfect experience in tourism, including ugly experiences (overpowering physical/emotional discomfort (e.g., disgust, anxiety) leading to post-visit regret and alienation), and “ugbeaful” experiences (predominantly positive engagement with non-normative aesthetics, blending cognitive fascination with manageable sensory discomfort). Third, a few qualitative studies have revealed the positive value of imperfection. Nasiri et al. (2024) demonstrate how “ugbeaful” experiences trigger unexpected tourist delight through aesthetic dissonance. Dovey et al. (2017) identify the paradoxical value of graffiti – initially deemed polluting by locals (i.e., imperfect landscape elements) but

reinterpreted as creative cultural expression by new urban populations. Martini and Sharma (2022) show that post-disaster damaged landscapes evoke sublime emotional responses and positive tourism experiences. These studies have contributed to research on imperfection in tourism, highlighting the significance of the emerging topic. However, systematic investigation on the value of imperfection remains scarce in tourism research (Kirillova, 2023; Nasiri et al., 2024), with empirical studies being particularly inadequate.

In environmental and ecological research domains, previous studies have found that some pristine ecological destinations no longer pursue perfection in destination development. For instance, in the ecotourism development of Borobudur Village in the Borobudur Sub-district, a few landscape constructions chose imperfect presentations, such as uneven and irregular paths paved with natural stones instead of neat roads paved with asphalt or concrete, and old bridges preserved with obvious signs of use rather than renovation to meet modern perfection aesthetics (Fatimah, 2015). These findings are supported by two perspectives. First, from an environmental protection perspective, research has indicated that compared with neat landscape designs, messy ones have contributed to maintaining biodiversity (Egerer & Philpott, 2022). Studies have suggested that traditional landscape aesthetics conflicts with forest system sustainability (Gobster, 1999), while natural restoration addressing climate change may impair aesthetic experiences (Wartmann & Lorimer, 2024). These studies primarily criticize the blind pursuit of perfect landscapes which undermines ecological value, while overlooking people's potential preferences for imperfection *per se*. Second, from a differentiated preference perspective, research finds that people with different professional backgrounds have shown varying preferences for perfect and imperfect landscapes (Zheng et al., 2011). For instance, students majoring in agricultural economics, horticulture, and social sciences have preferred neat residential environments, while wildlife science students have favored more natural, wild landscapes (Zheng et al., 2011). Messiness in specific contexts, such as moisture-loving weeds in arid lands, may be welcomed when viewed as

particular care efforts (Nassauer, 1988). Although these studies have recognized the environmental and ecological value of imperfection, they interpret such value from an environmental protection perspective rather than an aesthetic perspective. In addition, they focus on individual and contextual differences in landscape aesthetics rather than a consistent aesthetic preference for imperfection in a specific context (e.g., ecotourism).

In summary, while previous research on the value of imperfection has made important contributions, it has largely overlooked the positive effects of imperfection on tourists within the ecotourism context. Existing discussions of the value of imperfection in ecotourism have focused primarily on an environmental protection perspective, lacking an aesthetic perspective. Moreover, the mechanisms and boundary conditions underlying tourists' preference for imperfection remain underexplored. To address these gaps, this study investigates the positive effects of imperfection in the ecotourism context and reveals the underlying mechanisms and boundary conditions through which imperfect (vs. perfect) landscape elements influence tourists' visit intention.

2.4 Conceptual framework

To clarify the conceptual framework, we distinguish the roles of key constructs (see Table 1). In this research, ecotourism serves as a macro-level tourism context, rather than a focal variable. Ecotourism destinations refer to the physical settings where tourism activities take place. Within these destinations, ecological landscapes contain immediate objects. Our independent variable, aesthetic perfection versus imperfection, is operationalized as an attribute-level presentation of the same ecological landscape, rather than different landscapes.

Table 1. Conceptual Clarification

Concept	Conceptual Level	Role in This Study	Clarification
Ecotourism	Macro context	Research context	Define the value orientation (nature-based, low commercialization, authenticity-seeking) within which aesthetic cues are interpreted; not a variable
Ecotourism destination	Spatial level	Physical carrier / experimental setting	Concrete sites where ecotourism activities occur (e.g., an ecological village, grassland, forest)
Ecological landscape	Stimulus object	Object of perception	Landscapes within an ecotourism destination which tourists perceive and evaluate
Landscape aesthetics	Stimulus attribute	Perceptual characteristics of landscapes; the independent variable	Describes how ecological landscapes are visually and sensorially presented
Aesthetic perfection vs. imperfection	Attribute dimension	The two levels of the independent variable	Alternative aesthetic presentations of the same ecological landscape, drawing on classical aesthetic theory

This framework reveals a coherent theoretical path: in the context of ecotourism, how landscape aesthetics (perfection vs. imperfection) affects tourist behavioral intentions through psychological processes within the ecotourism destination.

It should be noted that ecotourism destinations are not equivalent to wilderness. Human intervention is required to meet tourists' basic needs, ensure safety and accessibility (Buhalis, 2000; Candrea & Hertanu, 2015). Therefore, the landscape elements examined in this study are those shaped by human intervention, rather than purely natural ones.

This study defines perfect and imperfect landscape elements based on classical aesthetics. Within this framework, perfect landscape elements refer to those that conform to the standards of classical aesthetics, including order, symmetry, cleanliness, smoothness, and no signs of use. Examples include flat and even roads, symmetrically arranged fences, and buildings with clean and smooth walls. In contrast, imperfect landscape elements deviate from these classical aesthetic standards. However, imperfect landscape elements in this study do not refer to visually hazardous conditions, severe environmental degradation, or a lack of maintenance. Instead, they represent a moderate aesthetic deviation. Specifically, imperfect landscape elements exhibit disorder, messiness, or irregularity (e.g., winding dirt paths, uneven stone-paved roads, and irregularly arranged bricks), asymmetry (e.g., staggered or asymmetrical fences), uncleanliness or dirtiness (e.g., muddy roads, buildings or facilities with dirt-attached surfaces), roughness or unevenness (e.g., branch fences with broken and uneven surfaces and deadwood trash bins with rough textures), and visible signs of wear, weathering, erosion, mottling, or aging (e.g., an old bridge with visible wear and aging, mottled and weathered walls). Appendix F provides description of these dimensions, corresponding experimental manipulation, and real-world examples.

Importantly, aesthetic imperfection in this study is not a single physical attribute, but rather a broader set of perceptual cues that influence tourists by signaling a lower degree of artificial beautification and a moderate deviation from classical aesthetic principles. We integrate various forms of non-normative aesthetics identified in previous literature—such as “messy”, “signs of use”, “irregular”, “roughness”, “ugly/ugbeaful”, and “damaged” (Egerer & Philpott, 2022; Fatimah, 2015; Kirillova & Wassler, 2019; Marder et al., 2021; Martini & Sharma, 2022; Nasiri et al., 2024; Nassauer, 1995)—and define “imperfect landscape elements” based on classical aesthetic principles. These elements all deviate from classical aesthetics of order, symmetry, cleanliness, and smoothness.

We acknowledge that aesthetic judgment is inherently subjective and influenced by cultural context. Thus, the categories of “perfect” and “imperfect” in this study are not absolute or universally applicable objective standards, but rather a theoretical analytical framework grounded in classical aesthetic norms. This framework holds particular value in ecotourism research. Unlike traditional tourism settings where perfection is often highly appealing, ecotourism emphasizes naturalness, primitiveness, modest commercialization, and ecological conservation. In this context, a moderate deviation from classical aesthetic norms—i.e., what we define as “imperfection”—may present value to tourists, leading to the investigation of the current research.

2.5 Landscape Aesthetics and Perceived Authenticity

Unlike mass tourism, which primarily focuses on comfort and entertainment, ecotourism emphasizes experiences of nature and local culture that are more pristine and less commercialized (Cheng et al., 2014; Thompson, 2022; West & Carrier, 2004). In this context, tourist judgment of whether an experience is “authentic”—that is, their perceived authenticity—becomes a crucial element in evaluating the value of ecotourism. The concept of authenticity was originally

introduced in ecotourism by MacCannell (1973), who argued that tourists seek to enter the authentic “backstage” of indigenous life rather than visit areas with “performative” characteristics. Authenticity encompasses three core components: genuineness, reality, and truth (Akhoondnejad, 2016).

Prior research indicates that visitors of ecotourism destinations are often driven by the pursuit of authenticity, which is gained through perceived closeness to nature and local lifestyles (Yang et al., 2023). This implies that tourists’ evaluation of a destination’s authenticity is subjective, depending on their perceived authenticity—the belief that they have gained a genuine experience of local landscapes and culture (Yang et al., 2023; Kolar & Zabkar, 2010). Furthermore, ecotourists’ assessment of the authenticity and value of a destination is shaped by the congruity between environmental and visual cues and their pre-existing mental schemas. As Schema Congruity Theory posits, consumers evaluate products depending on pre-existing knowledge structures in their minds (i.e., mental schemas), and use them to understand and evaluate new information (Aggarwal & McGill, 2007; Huang et al., 2026). When new information stimuli align with internal schemas, it triggers smoother information processing, thereby producing higher perceived authenticity (Huang et al., 2026) and more positive evaluations (Aggarwal & McGill, 2007). Therefore, the aesthetic presentation of landscapes provides a critical basis for visitors to assess perceived authenticity and value.

Previous research on ecotourism planning indicates that different aesthetic strategies convey different symbolic meanings to visitors (Xu & Fox, 2014; Fatimah, 2015). Specifically, two contrasting aesthetic paradigms are identified in ecotourism development. When a destination adopts perfection-oriented aesthetics, it emphasizes comfort and controllability by introducing modern elements and artificial order (Imani & Alavi, 2022; Xu & Fox, 2014). This approach is characterized by visually ordered, tidy, symmetrical, and well-maintained landscape elements. Examples include paving flat asphalt roads, building modern hotels, and introducing non-native landscaping

plants in ecotourism areas. While such designs enhance functional comfort, they may also signal modernization and commercialization, which conflicts with tourists' inherent schemas of ecotourism destinations as pristine and non-modernized, thereby triggering negative perceived authenticity and evaluations (Yang et al., 2023).

In contrast, when a destination adopts imperfection-oriented aesthetics, it focuses on preserving or imitating nature's primitive rhythms and temporal traces (Kontogeorgopoulos, 2004; Xu & Fox, 2014). This paradigm features landscape elements that are irregular, asymmetrical, with visible signs of use and not meticulously manicured. Examples include retaining the mottled texture on building walls and building winding dirt paths. Landscapes presenting visual features such as naturalness, ecological integrity, and the absence of commercial elements signal experiential authenticity to visitors (Porya et al., 2024; Wang et al., 2024), which in turn enhances their visit intention (Cheng et al., 2025; Kolar & Zabkar, 2010).

Thus, perceived authenticity serves as an underlying process linking visual cues of ecotourism landscapes to tourist visit intentions. Accordingly, we propose:

H1: Imperfect (vs. perfect) landscape elements in ecotourism destinations evoke stronger visit intention.

H2: Perceived authenticity mediates the relationship between landscape aesthetics (imperfect vs. perfect landscape elements) and visit intention.

2.6 The Moderating Effect of Visit Motivation

Visit motivation is tourists' internal needs and driving forces that guide their destination choices (Phelan et al., 2018). The activation of motivation typically occurs before reaching the destination, influencing not only tourists' decision-making but also their experiences about the destination (Pearce & Lee, 2005). Previous research identifies key motivations for ecotourists, including being close to and enjoying

nature, self-development, escape from daily life, and relaxation (Carvache-Franco et al., 2019; Carvache-Franco et al., 2021; Holden & Sparrowhawk, 2002). These motivations can be categorized into knowledge motivation and leisure motivation (Correia et al., 2007). Knowledge motivation reflects tourists' desire to acquire knowledge and experiences by exploring natural environments and local culture and custom (Correia et al., 2007; Mehmetoglu & Normann, 2013). Leisure motivation, in contrast, reflects tourists' need for relaxation, stress relief, entertainment, comfort and safety assurances (Correia et al., 2007; Zou & Meng, 2020).

Motivational Matching Theory suggests that the persuasiveness of external information depends on its match with an individual's intrinsic motivation. When information matches an individual's motivation, it can promote the individual's cognition and behavioral intention. Conversely, if information mismatches with motivation, it can weaken persuasiveness or even trigger resistance (Clary et al., 1994; Joyal-Desmarais et al., 2025). This theory helps explain how different motivations drive varying tourist preferences for external information conveyed by landscape aesthetics.

For visitors with knowledge motivation, imperfect landscape elements, as external information, reflect the natural characteristics of ecotourism destinations and embody authentic local lifestyles (Mehmetoglu, 2007). These are typically viewed by visitors as “pristine and uncommercial”. These imperfect landscapes not only cater to their expectations of authenticity in ecological landscapes but also provide opportunities to explore, understand, and acquire new knowledge. In this way, imperfect landscapes match visitors' motivation to a high degree, thereby stimulating strong perceived authenticity and visit intention. In contrast, perfect landscape elements are likely to be viewed by these visitors as “artificial” or “overdeveloped”, mismatching with their knowledge motivation, thus weakening perceived authenticity and visit intention.

By comparison, for visitors with leisure motivation, imperfect landscape elements provide limited value in terms of comfort and enjoyment (Ezebilo, 2014). Imperfect landscape elements are likely to be perceived by these visitors as uncomfortable and inconvenient. Conversely, perfect landscapes may cater to their needs. In addition, these visitors' higher leisure needs reduce their sensitivity to the perceived authenticity of destinations (Chambers, 2009; Weaver, 2002). The “authentic but uncomfortable” experience may be unattractive to them because it does not fully match their core motivation. In this way, imperfect landscapes, as external information, have a lower degree of match with their leisure motivation, leading to a decrease in these visitors' intention to visit imperfect landscapes. Specifically, knowledge motivation has a high degree of match with imperfect landscape elements, strengthening the impact of imperfect landscape elements on perceived authenticity and visit intention, while leisure motivation has a lower degree of match with imperfect landscape elements, weakening the latter effect. Thus, tourist's visit motivation provides a boundary condition for the influence of landscape aesthetics on visit intention.

H3: The positive effect of imperfect (vs. perfect) landscape elements on visit intention is moderated by visit motivation. This effect is more pronounced under knowledge motivation (vs. leisure motivation).

The research framework is shown in Fig. 1.

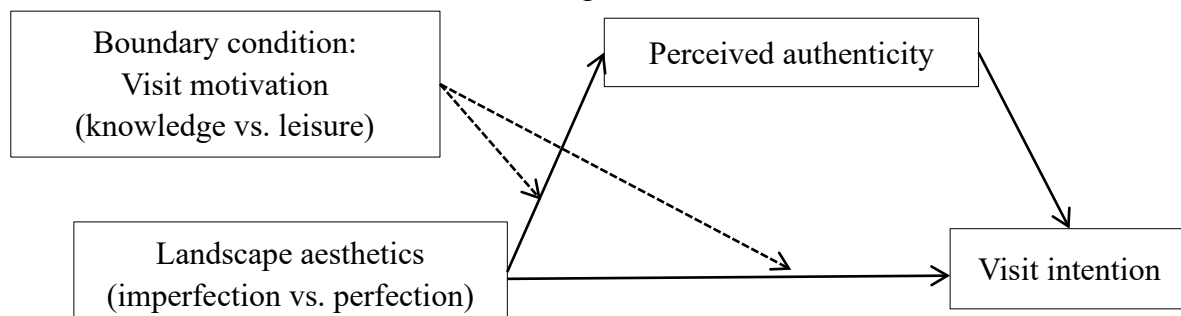


Fig. 1. Theoretical Framework

3. Overview of studies

This research employs three experiments to test the hypotheses. Study 1 uses images and descriptions of an ecological village as stimuli to examine the positive effect of imperfect (vs. perfect) landscape elements on visit intention. Study 2 employs image and text materials featuring a grassland to investigate the mediating role of perceived authenticity. Study 3 utilizes text materials of an ecological forest to examine how visit motivation moderates the influence of landscape aesthetics on visit intention.

4. Study 1

Study 1 examines the effect of landscape aesthetics (perfect vs. imperfect) on visit intention to verify H1.

4.1 pretest

To avoid interference from manipulation check measurements on dependent variable measurements, we conducted a pretest to examine the manipulation of the independent variable (Hauser et al., 2018; Perdue & Summers, 1986). Data was collected through Credamo, a professional research platform for data collection widely used in psychology, management, sociology, and environment sciences (Jin et al., 2020). Sixty participants (42 females, $M_{age} = 31.23$, $SD = 7.28$) were recruited and randomly allocated to two groups to view a picture and description of an ecological village and ecological grasslands, featuring either perfect or imperfect landscape elements. Using a seven-point Likert scale (1 = “strongly disagree”, 7 = “strongly agree”), we assessed participants’ aesthetic perceptions of the ecological village and ecological grasslands through three items: “The landscape is absolutely perfect”; “The landscape is flawless”; “The landscape is aesthetically attractive” (Lv et al., 2023; village Cronbach’s $\alpha = 0.886$). The results showed that for both the

ecological village, participants' aesthetic perceptions in the perfect landscape condition were significantly higher than those in the imperfect landscape condition (ecological village: $M_{\text{imperfect}} = 2.61$, $SD = 0.96$ vs. $M_{\text{perfect}} = 4.46$, $SD = 4.33$; $t(58) = 6.155$, $p < .001$, Cohen's $d = -1.589$). These results confirmed that the manipulation of landscape aesthetics was successful.

4.2 Participants

Study 1 employed a single-factor (landscape aesthetics: perfect vs. imperfect) between-subjects design. Participants were recruited via Credamo and randomly assigned to one of the two conditions. G*Power analysis indicates a minimum sample size of 128 participants ($\alpha = 0.05$, $d = 0.5$, $1 - \beta = 0.8$; Faul et al., 2009). In total, 150 participants passed attention check questions and were considered valid sample for subsequent analysis (109 females, $M_{\text{age}} = 26.5$, $SD = 6.61$). Sample demographic are shown in Appendix A.

4.3 Procedure

In Study 1, an ecological village, featuring traditional village houses as the primary landscape elements, was used as the destination for two reasons. First, traditional houses in ecological villages, distinct from modern urban buildings, represent characteristic elements of ecotourism destinations. Second, in ecotourism practice, some ecological villages maintain their original rustic architecture while others have renovated their historic buildings, making them appropriate real-world examples of ecotourism destinations featuring imperfect and perfect landscapes, enhancing external validity of the study. To control for potential confounds from different architectural styles, we digitally processed images of the same ecological village buildings to create both perfect and imperfect landscape conditions. In the perfect landscape condition, the picture featured renovated smooth village house walls, while in the imperfect landscape condition, the house walls were primitive and

weathered (Appendix B).

We first presented participants with information about the ecological village: “Imagine that in the upcoming vacation, you want to find a place where you can appreciate ecological village architecture and experience local culture. While browsing travel destinations online, you find an advertisement featuring scenery from an ecological village.” Participants in the two conditions viewed images and descriptions of village buildings featuring either renovated and smooth walls (perfect condition) or primitive and weathered walls (imperfect condition). Their visit intention was measured using three items on a seven-point Likert scale (1 = “strongly disagree”, 7 = “strongly agree”): “I want to visit this ecological village”; “I am interested in visiting this ecological village”; “This ecological village is very appealing to me” (Im & Chon, 2008; Seo et al., 2021; Cronbach’s $\alpha = 0.933$). We used seven-point Likert scale items (1 = “strongly disagree”, 7 = “strongly agree”) to further measure participants’ preference for ecological villages (How much do you like ecological villages?) and familiarity (How familiar are you with ecological villages?). We used a single-choice question (A = Yes, B = No) to measure prior experience (Have you ever visited an ecological village?). Finally, we included attention check questions, and collected their demographic information.

4.4 Results

An independent sample t-test on visit intention shows that participants have higher visit intention for the imperfect vs. perfect landscapes ($M_{\text{imperfect}} = 5.49$, $SD = 0.95$ vs. $M_{\text{perfect}} = 4.69$, $SD = 1.33$; $t(133.695) = 4.232$, $p < .001$, Cohen’s $d = 0.691$; see Fig. 2). This effect remains significant when controlling for familiarity, preference, and prior experience in one-way ANCOVA ($F(1, 145) = 11.922$, $p < .001$, $\eta^2 = 0.076$), supporting H1 that imperfect (vs. perfect) landscape elements in ecotourism destinations evoke stronger visit intention.

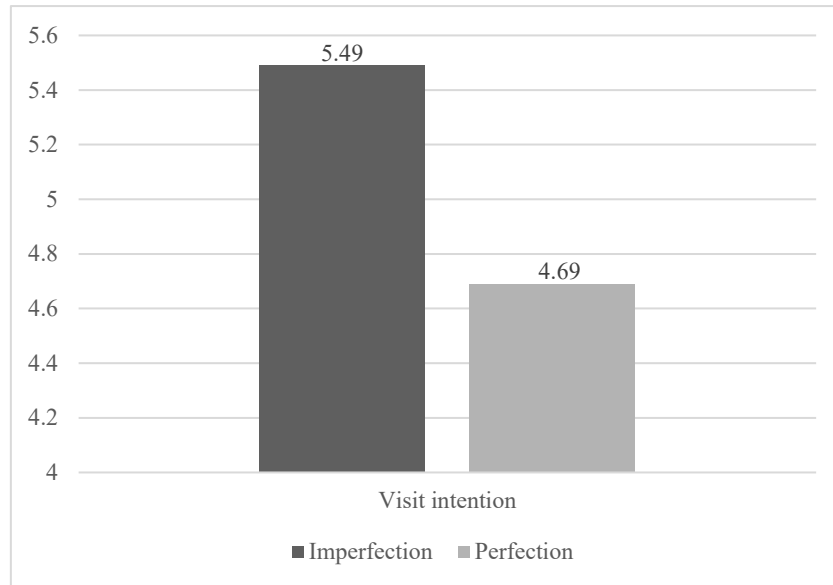


Fig. 2. Visit intention as a function of landscape aesthetics

5. Study 2

Study 2 aims to revalidate the effect of landscape aesthetics (perfect vs. imperfect) on visit intention (H1) and further examines the mediating role of perceived authenticity (H2).

5.1 Participants

Study 2 employed a single-factor (landscape aesthetics: perfect vs. imperfect) between-subjects design. Participants were recruited via Credamo and randomly assigned to one of the two conditions. A total of 212 participants passed the attention check questions, whose responses were used for later analysis (143 females, $M_{\text{age}} = 31.63$, $SD = 10.21$).

5.2 Procedure

In Study 2, a grassland was selected as the destination, where the paths, fences, and yurts were manipulated to create perfect vs. imperfect landscape elements. Both

conditions can be found in ecotourism practice. Identical backgrounds were used in both conditions to control for potential confounds.

Participants first viewed information about the grassland (see Appendix C). Visit intention was measured using the same scale as Study 1 (Cronbach's $\alpha = 0.761$). Perceived authenticity was measured by a scale adapted from Park et al. (2019): "This grassland displays authentic local custom", "This grassland shows genuine and local life", and "By visiting this grassland, I can truly understand its ecology and culture" (Cronbach's $\alpha = 0.808$). We assessed landscape aesthetics following the same procedure and using the items as in the pretest of Study 1. The control variables, preference, familiarity and prior experience, were measured using the same measures as in Study 1. To rule out alternative explanations, adventure-seeking was measured by four items: "This destination makes me feel like seeking adventure", "This destination evokes a desire to experience something adventurous", "I feel motivated to explore this destination because it seems adventurous", and "This destination lets me feel exciting and thrilling" (Cronbach's $\alpha = 0.948$), and curiosity was measured by two items: "I am curious about this ecological grassland" and "I have a strong desire to learn about this ecological grassland", adapted from Wang and Huang (2018) (Cronbach's $\alpha = 0.793$). Finally, attention check questions and demographic information were collected.

5.3 Results

Manipulation Check: The results show that participants' perceived landscape aesthetics in the perfect landscape condition is significantly higher than those in the imperfect landscape condition ($M_{\text{imperfect}} = 3.40$, $SD = 1.36$ vs. $M_{\text{perfect}} = 5.59$, $SD = 0.80$; $t(181.526) = -13.909$, $p < .001$, Cohen's $d = -1.911$), confirming successful manipulation of landscape aesthetics.

Visit Intention: An independent sample t-test shows significantly higher visit intention in the imperfect vs. perfect landscape condition ($M_{\text{imperfect}} = 6.10$, $SD = 0.53$ vs. $M_{\text{perfect}} = 5.68$, $SD = 0.80$; $t(210) = 4.539$, $p < .001$, Cohen's $d = 0.623$), again supporting H1. This effect remains significant when controlling for familiarity, preference, prior experience, adventure-seeking and curiosity in bootstrap one-way ANCOVA ($F(1, 205) = 11.884$, $p < .001$, $\eta^2 = 0.055$).

Perceived Authenticity: Participants have higher perceived authenticity for the imperfect vs. perfect landscapes ($M_{\text{imperfect}} = 5.84$, $SD = 0.60$ vs. $M_{\text{perfect}} = 5.08$, $SD = 1.05$; $t(167.049) = 6.434$, $p < .001$, Cohen's $d = 0.884$), suggesting that tourists perceive the imperfect landscape elements reflect authentic local scenery and custom. This effect persists when controlling for familiarity, preference, prior experience, adventure-seeking and curiosity in bootstrap one-way ANCOVA ($F(1, 205) = 37.017$, $p < .001$, $\eta^2 = 0.153$). The results are shown in Fig. 3.

Adventure-seeking: Adventure-seeking does not differ between the imperfect and perfect landscape conditions ($M_{\text{imperfect}} = 5.18$, $SD = 2.15$ vs. $M_{\text{perfect}} = 5.13$, $SD = 2.05$; $t(210) = 0.174$, $p = .862$, Cohen's $d = 0.024$). This effect remains nonsignificant when controlling for familiarity, preference, prior experience and curiosity in bootstrapping ANCOVA ($F(1, 206) = 0.270$, $p = 0.604$, $\eta^2 = 0.001$). Thus, the results rule out adventure-seeking as an alternative explanation.

Curiosity: Participants have higher curiosity for the imperfect vs. perfect landscape condition ($M_{\text{imperfect}} = 5.84$, $SD = 0.78$ vs. $M_{\text{perfect}} = 5.53$, $SD = 1.05$; $t(210) = 2.491$, $p = 0.013$, Cohen's $d = 0.342$). However, this effect is not significant when controlling for familiarity, preference, prior experience and adventure-seeking in bootstrapping ANCOVA ($F(1, 206) = 2.723$, $p = 0.100$, $\eta^2 = 0.013$). This result preliminarily rules out curiosity as an alternative explanation.

Parallel Mediation Analysis: Using Process Model 4 with 5000 bootstrap resamples, landscape aesthetics as the independent variable (0 = imperfect, 1 = perfect), visit intention as the dependent variable, and perceived authenticity and curiosity as the mediator. The results support the mediating effect of perceived authenticity ($\beta_1 = -0.1475$, $SE = 0.0583$, $95\%CI = [-0.2682, -0.0392]$), and curiosity ($\beta_2 = -0.1261$, $SE = 0.0602$, $95\%CI = [-0.2612, -0.0274]$).

The mediating effect of perceived authenticity is qualified when controlling for familiarity, preference, prior experience and adventure-seeking ($\beta_1 = -0.1202$, $SE = 0.0548$, $95\%CI = [-0.2360, -0.0212]$). Thus, H2 is supported such that perceived authenticity mediates the effect of landscape aesthetics on visit intention. However, after controlling for the same covariates, the mediating effect of curiosity is not qualified ($\beta_2 = -0.0754$, $SE = 0.0491$, $95\%CI = [-0.1847, 0.0077]$). The results further rule out curiosity as an alternative explanation.

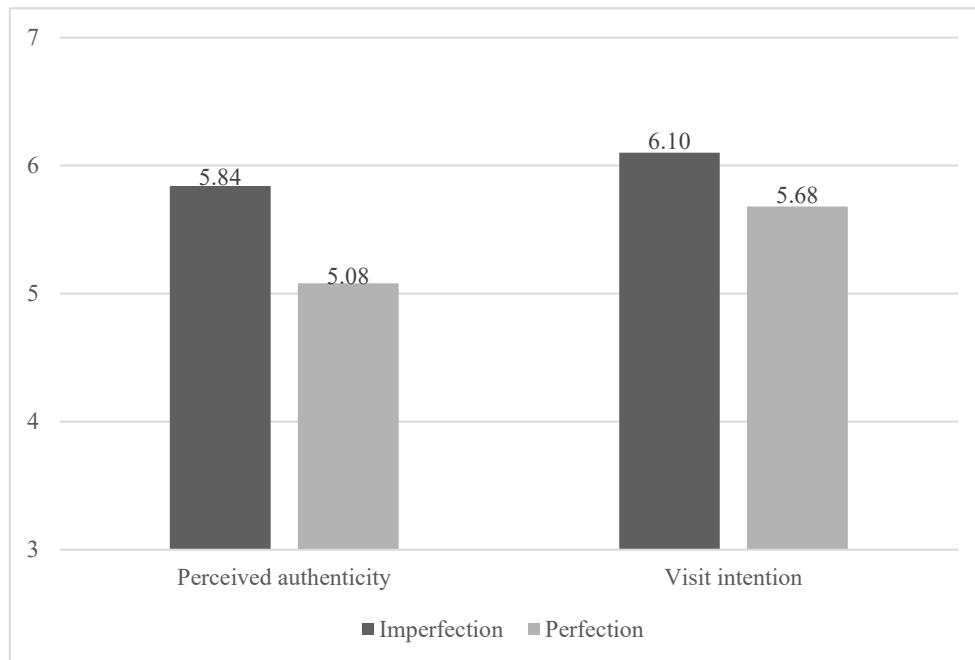


Fig. 3. Visit intention and perceived authenticity as a function of landscape aesthetics

6. Study 3

Study 3 aims to examine the interaction effects between visit motivation and landscape aesthetics on tourists' perceived authenticity and visit intention, specifically testing the moderating role of visit motivation (H3).

6.1 Pretest

We recruited 60 participants from Credamo (38 female, $M_{\text{age}} = 29.67$, $SD = 8.23$) to test the manipulation of perfect vs. imperfect landscapes. Using the same procedure and items as the pretest in Study 1, an independent sample t-test shows that participants rate the perfect landscapes significantly higher on landscape aesthetics (Cronbach's $\alpha = 0.960$) than imperfect ones ($M_{\text{imperfect}} = 2.39$, $SD = 0.78$ vs. $M_{\text{perfect}} = 5.91$, $SD = 0.49$; $t(58) = 20.823$, $p < .001$, Cohen's $d = -5.376$), confirming successful manipulation of landscape aesthetics.

6.2 Participants

Study 3 employed a 2 (visit motivation: leisure vs. knowledge) $\times$ 2 (landscape aesthetics: perfect vs. imperfect) between-subjects design. Participants were recruited via Credamo and randomly assigned to one of the four conditions. G*Power analysis ($\alpha = 0.05$, $d = 0.5$, $1 - \beta = 0.8$) indicated a minimum sample size of 128 participants. In total, 240 participants (145 female, $M_{\text{age}} = 31.76$, $SD = 7.91$) passed the attention check questions and their responses were used for subsequent analysis.

6.3 Procedure

Study 3 selected an ecological forest as the destination. While Study 1 and 2 used image and text materials, Study 3 employed text-only materials to eliminate potential confounds from image processing.

Visit motivation was manipulated following Li et al. (2019) and Correia et al. (2007). To prompt a leisure motivation, participants in the leisure condition read, “you want to escape routine life to relax in a natural environment and relieve study/work pressure” and “seek leisure activities”. To prompt a knowledge motivation, those in the knowledge condition read, “you want to adventure and explore different landscapes during vacation” and “seek natural exploration”. Participants then read messages about the ecological forest (see Appendix D).

Visit intention (Cronbach’s $\alpha = 0.818$) and perceived authenticity (Cronbach’s $\alpha = 0.791$) were measured using the same scales as Study 2. To ensure that participants’ motivation was successfully activated, participants rated their knowledge motivation (“learning and exploring different landscapes”) and leisure motivation (“relaxing and enjoying leisure”) on 7-point scales (1 = “strongly disagree”, 7 = “strongly agree”) for subsequent manipulation check. We measured the same control variables as in Study 1. In addition, we assessed perceived challenge as a new control variable using two items: “Walking on this trail is challenging to me” and “Completing this trail requires considerable physical effort” (Cronbach’s $\alpha = 0.869$). This was followed by attention check questions and demographic information.

6.4 Results

Manipulation Check: The results of independent sample t-test shows significantly higher knowledge motivation scores in the knowledge motivation condition ($M_{\text{knowledge condition}} = 6.01, SD = 1.10$) than in the leisure motivation condition ($M_{\text{leisure condition}} = 3.12, SD = 1.87; t(193.195) = 14.611, p < .001, \text{Cohen's } d = 1.886$), while the reverse is true for the leisure motivation scores ($M_{\text{leisure condition}} = 6.51, SD = 0.69; M_{\text{knowledge condition}} = 3.85, SD = 2.25; t(140.900) = -12.372, p < .001, \text{Cohen's } d = -1.597$), indicating successful manipulation of visit motivation.

Visit Intention: A bootstrap two-way ANOVA shows a significant effect of landscape aesthetics on visit intention ($F(1, 236) = 29.201, p < .001, \eta^2 = 0.110$), supporting H1. This effect remains significant when controlling for preference, familiarity, prior experience and perceived challenge ($F(1, 232) = 12.595, p < .001, \eta^2 = 0.051$). However, visit motivation has no significant effect on visit intention ($F(1, 256) = 3.284, p = 0.053 > 0.05, \eta^2 = 0.016$). The interaction between landscape aesthetics and visit motivation is significant ($F(1, 236) = 14.308, p < .001, \eta^2 = 0.057$) and remains significant after controlling for the covariates ($F(1, 232) = 17.575, p < .001, \eta^2 = 0.070$). Specifically, Welch's ANOVA indicates that, under knowledge motivation, visit intention is stronger for the imperfect (vs. perfect landscapes) ($M_{\text{imperfect}} = 6.12$ vs. $M_{\text{perfect}} = 5.17$; Welch's $F(1, 73.155) = 30.341, p < .001, \eta^2 = 0.205$). Under leisure motivation, there was no significant difference in visit intention between imperfect and perfect landscapes ($M_{\text{imperfect}} = 5.93$ vs. $M_{\text{perfect}} = 5.76$; Welch's $F(1, 117.997) = 2.157, p = 0.145, \eta^2 = 0.018$; see Fig. 4). Thus, the results support H3 and show that the positive effect of imperfect landscape elements on visit intention is moderated by tourists' visit motivation.

Perceived Authenticity: A bootstrap two-way ANOVA shows a significant effect of landscape aesthetics on perceived authenticity ($F(1, 236) = 40.700, p < .001, \eta^2 = 0.147$), which persists when controlling for the covariates ($F(1, 232) = 21.292, p < .001, \eta^2 = 0.084$). However, visit motivation has no significant effect on perceived authenticity ($F(1, 256) = 3.853, p = 0.051 > 0.05, \eta^2 = 0.016$). The interaction between landscape aesthetics and visit motivation is significant ($F(1, 236) = 10.175, p = .002, \eta^2 = 0.041$) and remains significant after controlling for the covariates ($F(1, 232) = 10.366, p = 0.001, \eta^2 = 0.043$). Specifically, Welch's ANOVA indicates that under knowledge motivation, perceived authenticity is stronger for the imperfect vs. perfect landscapes ($M_{\text{imperfect}} = 5.98$ vs. $M_{\text{perfect}} = 4.90$; Welch's $F(1, 74.844) = 34.384, p < .001, \eta^2 = 0.226$). Under leisure motivation, perceived authenticity is stronger for the imperfect landscapes ($M_{\text{imperfect}} = 5.84$ vs. $M_{\text{perfect}} = 5.48$; Welch's $F(1, 112.997) =$

7.612, $p = .007$, $\eta^2 = 0.061$), but the effect size has dropped significantly (as shown by the decrease in the value of η^2).

Moderated Mediation: Following Zhao et al. (2010), we conducted a bootstrap analysis (Process Model 8, 5,000 samples, 95% CI) with landscape aesthetics as the independent variable (0 = imperfect, 1 = perfect), visit intention as the dependent variable, perceived authenticity as the mediator, and visit motivation as the moderator (0 = knowledge, 1 = leisure). The results support the moderated mediation model (index = 0.3965, SE = 0.1562, 95% CI = [0.1234, 0.7267]). Specifically, the indirect effects of both knowledge motivation (effect 1 = -0.5947, SE = 0.1628, 95% CI = [-0.9252, -0.3015]) and leisure motivation (effect 2 = -0.1982, SE = 0.0754, 95% CI = [-0.3503, -0.0535]) are qualified.

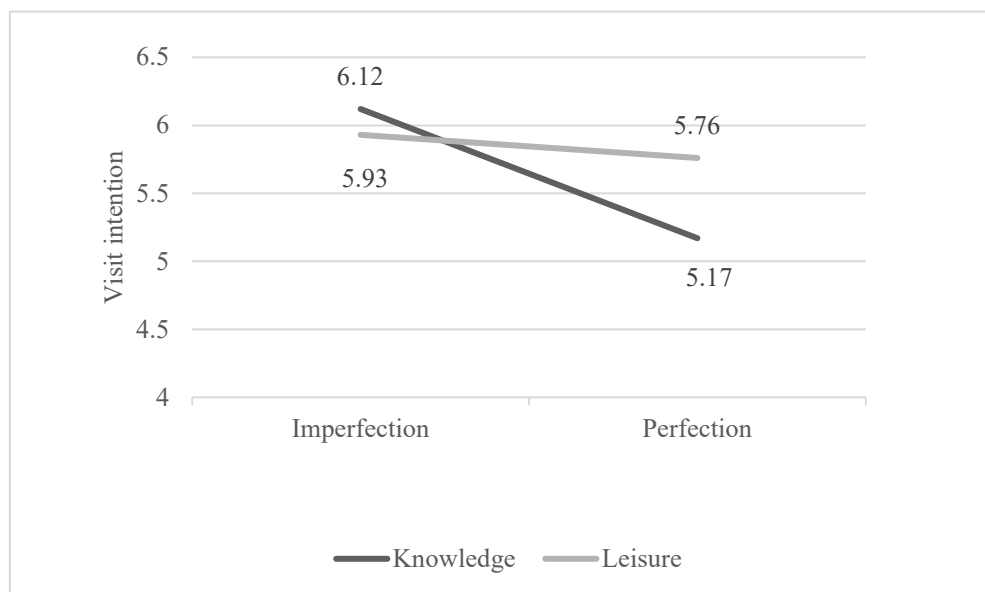


Fig. 4. Visit intention as a function of landscape aesthetics and visit motivation

The hypotheses are tested in three studies. Using an ecological village as the ecotourism destination, the results of Study 1 show that imperfect (vs. perfect) landscapes enhance tourists' visit intention, supporting H1. Study 2 replicates this finding and further reveals the mediating role of perceived authenticity (H2) in the context of a different type of ecotourism destination (an ecological grassland),

enhancing external validity and rule out potential confounds of particular types of destinations. Study 3 revalidates the findings of Study 1 and 2 and further examines the moderating role of visit motivation (H3). The use of a different ecological tourism destination (an ecological forest) and text-only materials further ensures external and internal validity. The hypothesized effects were found in different types of destinations (ecological villages, ecological grasslands and ecological forests), and from different types of stimuli (images and text stimuli, and text-only stimuli), thus enhancing external validity. Through experimental control, we established the reliability of the causal relationships to enhance internal validity.

7. General discussion

7.1 Conclusion

Through three studies, this research investigates how landscape aesthetics in ecotourism influences tourists' visit intention, along with its underlying process and boundary conditions. The findings show that compared to landscapes featuring perfect elements, those featuring imperfect elements enhance tourists' intention to visit the destination (Study 1). This effect is mediated by perceived authenticity (Study 2) and is more pronounced when tourists are driven by knowledge motivation rather than leisure motivation (Study 3).

7.2 Theoretical Implications

This research challenges the classical aesthetics bias in tourism. Prior research has suggested that tourists prefer perfect landscape elements aligned with classical aesthetics, such as symmetrical layouts (Nassauer, 1995) and tidy environments (Wen et al., 2024). Under this dominant view, imperfect landscape elements have been considered to elicit negative attitudes (Breiby, 2014). However, our research shows a reverse effect in ecotourism contexts – imperfect landscape elements surprisingly

enhance visit intention. The findings echo a few qualitative studies questioning the value of perfection (Nasiri et al., 2024) and align with the notion that tourists apply different aesthetics standards across destination types (Kirillova et al., 2014). Our research extends these preliminary qualitative studies and provides the very first empirical evidence of the positive impact of imperfect landscapes.

In addition, this research revisits ecotourism from an aesthetic perspective, contributing to both tourism aesthetics and ecotourism research. Previous ecotourism studies have primarily adopted two approaches: one focusing on environmental protection, suggesting that ecotourism destinations mainly attract environmentally conscious tourists (Hultman et al., 2015; Huang & Liu, 2017); the other emphasizing ecological aesthetics, arguing that to appreciate natural landscapes, one must understand their ecological value, even when they do not align with conventional aesthetic preferences (Gobster, 1999; Ji & Nie, 2024). While these studies affirm ecotourism's value, they constrain it within environmental orientations, overlooking ecotourism's appeal to broader tourist markets. Our research transcends these limitations and shows that imperfect landscapes in ecotourism are preferred to perfect ones. Our results indicate that tourists prefer landscapes with imperfect elements, and this preference is driven by aesthetics perception rather than environmental consciousness. This finding aligns with research on the value of imperfection in other consumption fields, such as agricultural products (Suher et al., 2021) and avatar endorsers (Lv et al., 2023). Thus, our research enriches ecotourism literature by showing that the preservation of ecotourism destinations fulfills tourists' need for authentic experiences.

This research further elaborates the underlying process about how imperfection creates value in ecotourism, that is, through tourists' authenticity perception. Previous research has revealed other mechanisms through which imperfection creates value across consumption domains, including environmental consciousness for agricultural products (Van Giesen & de Hooze, 2019) and uniqueness signaling for luxury goods

(Cesareo et al., 2023). Our research empirically validates perceived authenticity as the key mediating mechanism through which imperfect landscape elements influence visit intention. It indicates that the value of imperfection is context-dependent, inspiring study on unique mechanisms across different consumption contexts. Moreover, this research identifies landscape aesthetics as an important antecedent of tourists' authenticity perception.

Finally, this research reveals the moderating role of visit motivation. We find that in ecotourism, knowledge motivation enhances the positive effects of imperfect landscape elements by strengthening the pursuit of authenticity, while leisure motivation weakens these effects due to its focus on the need for comfort experiences. This moderation effect is important as it reveals how identical landscape features can elicit varying tourist responses based on their different motivations, providing new insights into understanding individual differences in tourism experiences and enriching research on tourism motivation.

7.3 Practical implications

This research provides important insights for developing and managing ecotourism destinations. Traditional wisdom of destination management biased toward creating and displaying perfect landscape elements, such as artificial beautification of natural landscapes (Tulasi et al., 2024). However our research demonstrates that ecotourism destinations should not be over-commercialized and incorporated with perfect elements, as landscapes with imperfect elements prove more attractive to tourists. For instance, structures or facilities with signs of residents' use can be preserved in their original imperfect state while ensuring safety through minimal restoration. This approach is cost-efficient as much fewer maintenance resources are required compared to creating or restoring perfect landscapes, achieving both ecological and economic benefits.

Our research highlights the critical value of perceived authenticity in ecotourism destination marketing. The findings show that imperfect landscape elements enhance visit intention by strengthening tourists' perceived authenticity. Managers can enhance perceived authenticity through preserving and developing imperfect landscapes. Specifically, landscape maintenance should preserve naturally formed imperfect features, such as naturally growing moss and diverse tree forms, and avoid excessive artificial grooming. When installing facilities, managers should use raw materials like natural wood and rough stone, adopting irregular rather than perfect geometric designs. Trail design should follow natural terrain rather than forced excavation. Vegetation should prioritize local plant communities in their natural growth state rather than pursuing perfect garden-style layouts. In addition, our research provides new insights into ecotourism marketing, particularly emphasizing perceived authenticity as a key factor to stimulate tourists' visit intention. For example, communication and advertising messages can emphasize "authentic natural states", "pristine local features", and "unrefined beauty", associating ecotourism destinations and imperfect landscapes with tourists' authenticity perception. This marketing strategy, highlighting authenticity through imperfect landscape elements, further differentiates ecotourism destinations from commercial resorts, contributing to sustainable competitive advantage of ecotourism.

In addition, to enhance the appeal of imperfect landscapes, managers can first attempt to stimulate tourists' knowledge motivation (exploration and learning). Our findings indicate that in ecotourism, knowledge motivation facilitates tourists' preference for imperfect landscapes. Specifically, communication efforts (e.g., promotion materials, signage, and tour guides' introduction) can address messages like "exploring nature" and "learning local custom" to spark tourists' exploratory and learning desires. On-site activities can be designed to encourage tourists' exploration of the destination. For natural destinations, managers can establish nature observation stations and organize conservation volunteer activities. For cultural destinations, managers can offer immersive experiences such as trying out traditional costumes and

cooking and tasting local foods to stimulate knowledge motivation. For tourists with strong leisure motivation, we recommend incorporating activities that align with leisure and relaxation while maintaining imperfect landscape features, for example, offering ethnic handicraft-making activities or setting up observation platforms and resting areas that align with primitive and natural “imperfect” environments. This approach considers tourists’ preference for “imperfection” in ecotourism destinations and caters to different tourist motivations.

Finally, our research provides important implications for cultural and ecological preservation. Previous approaches to developing ecotourism destinations focus on two approaches: one is human-centered and emphasizes tourist satisfaction through perfect landscapes and commercial development; the other is nature-centered which emphasizes preservation of primeval ecological features through minimally modified imperfect landscapes (Xu & Fox, 2014). Our research indicates that the two approaches are not conflicting in ecotourism, since imperfect landscapes meet both nature-centered preservation needs and human-centered tourist satisfaction requirements. More importantly, this “imperfection-centered” development approach significantly reduces environmental damage from commercial development aiming at perfection.

7.4 Limitations and future research

We acknowledge limitations in this research. First, while internal and external validity of the experiments are ensured to the best of our efforts, future research could employ more realistic experimental settings and field studies to validate our findings. Second, we employ text-and-image and text-only stimuli in the experiments. Future research could explore emerging communication tools and channels, such as VR/AR technology and short video content marketing, to verify tourists’ preference for imperfection in ecotourism. Third, the scope and degree of imperfect elements require more detailed investigation. Our experiments primarily focus on physical imperfect

elements in facilities and structures, while imperfection in ecotourism destinations may encompass other components. For instance, imperfect elements displayed in inhabitants' lifestyle (e.g., work-stained or faded traditional clothing) and their influence on perceived authenticity and visit intention merit further investigation. Finally, future research can explore other underlying processes for the influence of landscape aesthetics on tourists' perceptions and behavioral intentions.

Appendix A - Sample Demographics

		Study 1 (N=150)	Study 2 (N=212)	Study 3 (N=240)
Mean age		26.5	31.63	31.76
Gender	Male	41(27.3%)	41(32.5%)	95(39.5%)
	Female	109(72.6%)	143(67.5%)	145(60.5%)
	Rather not to say	0	0	0
Education	High School and below	4(2.7%)	8(3.8%)	7(2.9%)
	Vocational School	9(6.0%)	21(9.9%)	23(9.6%)
	Undergraduate	101(67.3%)	149(70.3%)	172(71.7%)
	Postgraduate	36(24.0%)	34(16.0%)	38(15.8%)
Occupation	Student	67(44.7%)	42(19.8%)	30(12.5%)
	Company	62(41.3%)	144(67.9%)	165(68.7%)
	Public institution	15(10.0%)	19(9.0%)	36(15.0%)
	Government sector	6(4.0%)	7(3.3%)	9(3.8%)
Monthly income	≤¥2000	37(24.7%)	27(12.7%)	19(7.9%)
	¥2001-¥5000	48(32.0%)	43(20.3%)	41(17.1%)
	¥5001-¥8000	31(20.7%)	56(26.4%)	71(29.6%)
	¥8001-¥10000	17(11.3%)	33(15.6%)	43(17.9%)
	>¥10000	17(11.3%)	53(25.0%)	66(27.5%)

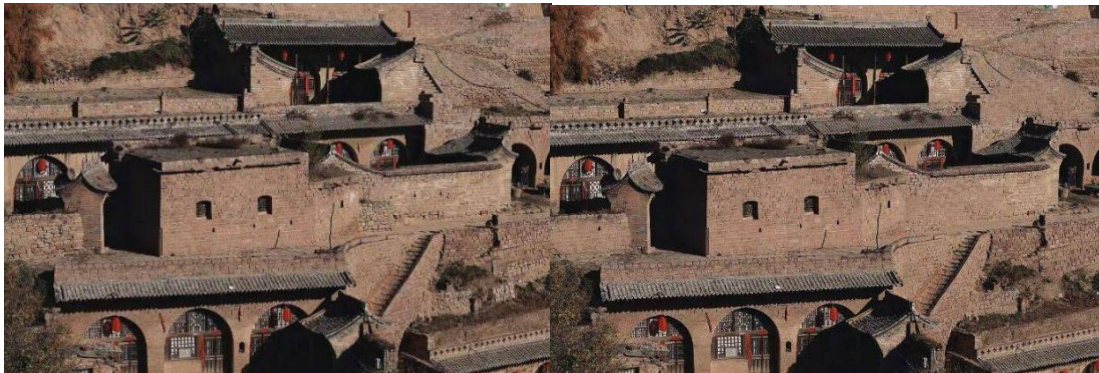
Appendix B - Study 1 stimuli

Text prompts: Imagine that in the upcoming vacation, you want to find a place where you can appreciate ecological village architecture and experience local culture. While browsing travel destinations online, you find an advertisement featuring scenery from an ecological village.

Picture stimuli

Imperfection condition: weathered walls

Perfection condition: smooth walls



Appendix C - Study 2 stimuli

Text prompts: Imagine that in the upcoming vacation, you want to find a place where you can enjoy nature and experience local beauty. While browsing travel destinations online, you find an advertisement for a self-driving tour of an ecological grassland, showcasing the scenery along the driving route.

The advertisement shows the route, rest areas, and service facilities. Visitors can follow this designated route for a self-drive tour. The tour does not involve exploration or uncertain activities.

Picture stimuli

Imperfection condition:

The stimuli depict a slightly irregular road with moderately smooth surface, wooden fences that are not symmetrical in arrangement and show signs of usage, and a yurt with an unrefined exterior and visible natural wear.



Perfection condition:

The stimuli depict a straight road with smooth surface, neatly aligned, symmetrical wooden fences with polished surface, and a well-maintained yurt with a refined and clean exterior.



Appendix D - Study 3 stimuli

Participants first read the same text prompts, “Imagine that in the upcoming vacation, you want to find a place where you can enjoy nature and experience local beauty.”

The next sentence manipulates visit motivation:

In the knowledge motivation condition, participants read, “*Imagine that you want to seek adventure and explore different landscapes, so you plan to find a place where you can explore nature and experience ecological beauty.*”

In the leisure motivation condition, participants read, “*Imagine that you want to escape daily environment and relax in nature settings, so you plan to find a place where you can enjoy leisure activities and experience ecological beauty.*”

Then participants in all conditions read the same sentences, “A trail guides you into a dense grove of trees. The path is flanked by tall arbors, with exposed rocks and low-lying shrubs scattered across the forest floor.”

The last sentences manipulate landscape aesthetics:

In the imperfect landscape condition, participants read, “*The trail was paved with stone slabs, with wild grass growing between the seams, presenting a somewhat messy appearance. The railings along the trail were crisscrossed and irregular. The trash bins were made from irregularly shaped tree stumps.*”

In the perfect landscape condition, participants read, “*The trail was built with a wooden platform, forming a clean and tidy path that was separated from the vegetation. The railings along the trail were straight and symmetrical. The trash bins were made from tree stumps polished into regular cubes.*”

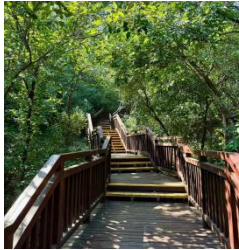
Appendix E - Structured literature review

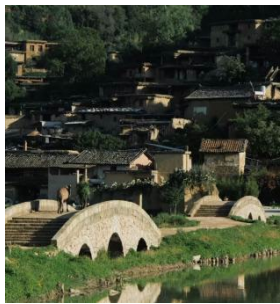
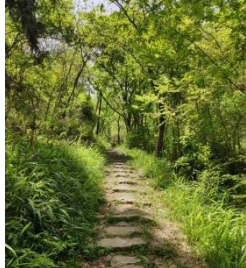
Theme	Author	Context / Subject	Topic	Method	Key Findings	Relevance and Distinction	Synthesis
The definition/value of beautiful landscapes	Kirillova & Cai (2014)	Aesthetic judgment of tourism destinations (both nature-based and urban)	Exploring the dimensions and themes of tourists' aesthetic judgments	Qualitative: interviews	It identified 9 aesthetic themes: Scale, Time, Condition, Sound, Balance, Diversity, Novelty, Shape, and Uniqueness. It proposed a two-dimension framework (Concrete-Abstract and Subjective-Objective). The assessment of beauty goes beyond visual aspects and engages all senses.	Relevance: It provides a multi-dimensional framework for assessing tourism aesthetics, including "Clean-Dirty", "under the theme of "Condition". Distinction: The positive and negative influences of different aesthetic dimensions were not revealed.	These studies explore the definition of landscape aesthetics but do not categorize landscapes as perfect or imperfect based on classical aesthetic principles, nor do they examine the value of landscape aesthetics.
	Knudsen et al. (2015)	Tourism aesthetics, with a focus on landscape semiotics and ideology	The role of the beautiful, sublime, and picturesque in tourist experience, and how they naturalize ideology through touristic judgment	Literature review and conceptual analysis	Aesthetics functions as ideology in tourism, naturalizing power relations. Aesthetic categories provide paradigms of visibility that shape tourists' interpretations of landscapes.	Relevance: It focuses on developing aesthetic evaluations beyond traditional beauty norms. Distinction: It has not used empirical methods to investigate non-normative aesthetics.	
	Kirillova & Wassler (2019)	The role of aesthetics in tourism experience design	Proposing a three-level framework for aesthetic experience design	Conceptual: theoretical framework	The first level is atmospherics based on aesthetic features of destinations. The second level deals with multisensory atmospherics, transcending the mere visual focus of tourists. The third level deals with the human factor in atmospherics, particularly focusing on the role of residents.	Relevance: It reveals multidimensions of aesthetic experiences, and notes that "picturesque" includes irregularity and roughness. Distinction: It does not focus on the value of "imperfect" elements.	
The value of perfect landscapes	Marder et al. (2021)	Photograph aesthetics on online review sites in hotel booking contexts	Comparing the effects of professional vs. amateur aesthetics on a destination's visual appeal and booking intentions; Moderators include risk aversion, review valence, order, and quantity.	Empirical research (experiments)	Professional aesthetics enhance visual appeal and booking intentions compared with amateur aesthetics. The negative effects of amateur aesthetics (e.g., "messy beauty" in traveler-generated photos) are mitigated for risk-averse tourists, with positive reviews, or when a greater number of professional photos are present.	Relevance: It shows that amateur aesthetics (related to imperfection, such as messiness) have negative effects in tourist decision-making. Distinction: It is not about destination aesthetics. The positive impact of imperfection is not investigated.	These studies focus on the value of what this research defines as "perfect landscapes" based on classical aesthetics, but not on the value of imperfect landscapes.
	Nassauer (1995)	Ecological landscape design in human-inhabited areas	How to use design ("orderly frames" or "cues to care") to make ecologically functional but "messy"-looking ecosystems acceptable and appreciated by the public	Theoretical argumentation and case study	Ecologically functional landscapes are often perceived as lacking care due to their "messy" appearance. Incorporating "cues to care" (e.g., mowed edges, flowering plants, and bold patterns) can frame messy ecosystems within an "orderly frame", signaling human intention and care, thereby enhancing their aesthetic acceptability and perceived beauty.	Relevance: It explores the aesthetics of ecological landscapes. Distinction: The research conclusion indicates people's preference for perfection (order), while the value of imperfection is not explored.	

	Wen et al. (2024)	Zhangjiajie National Forest Park (nature-based tourism)	The impact of aesthetic expectations and aesthetic experiential qualities of the natural/humanistic/economic environment on tourist satisfaction	Empirical study: survey	Aesthetic expectations have a direct, negative impact on satisfaction. Aesthetic experiential qualities have a direct positive impact on satisfaction. Aesthetic expectation confirmation mediates these effects.	Relevance: It regards cleanness/pureness (a perfect aesthetic element) as an integral component of high aesthetic quality. Distinction: It does not investigate the positive impact of imperfect landscape elements.	
The value of imperfect landscapes	Martini & Sharma (2022)	Post-disaster tourism in Tohoku, Japan after the 2011 earthquake and tsunami	Framing the sublime as an affect in dark tourism, exploring its experiential and transformative potential in post-disaster contexts.	Qualitative methods (ethnographic fieldwork and interviews)	Dilapidated and abandoned landscapes evoke the sublime-as-affect, which have transformative potential and enhance empathy and positive experiences.	Relevance: It challenges the classical aesthetics bias by highlighting the positive value of imperfect elements (e.g., dilapidated landscapes). Distinction: It does not define landscapes as perfect vs. imperfect from a classical aesthetics perspective. It is not about ecotourism. The impact of imperfect elements on visit intention and its underlying processes are not examined.	These studies initiate discussion on the value of landscapes that align with this research's definition of "imperfect landscapes" based on classical aesthetic principles, but they are outside the area of ecotourism.
	Nasiri et al. (2024)	Aesthetic experiences in tourism, specifically negative and borderline experiences of first-time tourists in Hong Kong	Revealing the "ugly" aesthetic experience and categorizing two types of borderline aesthetic experiences – the "beaugly" and the "ugbeaful"	Qualitative methods (Descriptive Phenomenological Method, face-to-face interviews)	It challenges the dichotomy of aesthetic experiences, and demonstrates that borderline aesthetics (the uglybeaful and the beaugly) do not necessarily lead to negative experiences.	Relevance: Challenging the aesthetics bias by revealing the positive potential of imperfect elements (e.g., dilapidation, messiness) in specific contexts. Distinction: It does not empirically validate the value of imperfection.	
	Nassauer (1988)	Aesthetic perceptions in agricultural and residential landscapes	Neatness as an expression of care in landscape aesthetics	Qualitative methods (interviews)	Neatness is a primary predictor of landscape attractiveness. However, landscapes exhibiting ecological care (e.g., native plantings and minimum tillage) are perceived as attractive despite a lack of neatness when their ecological intent is understood or labeled with horticulture.	Relevance: It shows the influence of "neatness" as a classical aesthetic element and proposes that "messy" landscapes have value when the ecological intent is recognized. Distinction: It investigates non-neat landscapes from the perspective of "care". It does not empirically examine the aesthetic value of "messiness" (a form of imperfection). It is not about ecotourism.	
Review of aesthetics research	Kirillova (2023)	A systematic review of aesthetics and research in tourism	Identifying trends, reviewing theory and development, and proposing future research directions	Systematic literature review	It categorized literature into two meta-themes: Consuming Aesthetic Value (Aesthetic Judgements & Experiences, Effects of Tourism Aesthetics, and Aesthetics & Sustainability) and Producing Aesthetic Value (Foundational Issues in Aesthetics Management, and Management of Destination Aesthetics). It proposed six future research directions.	Relevance: It notes the overlook of non-classical aesthetic categories like "ugliness". Distinction: No empirical test has been conducted on the value of "ugliness" or "imperfection" that contrasts traditional aesthetics.	This is a systematic review of past literature, aligning with the notion of this research: a lack of in-depth study on "ugly" or "imperfect" landscapes. The current research further extends the discussion on future

							research directions suggested by it.
The environmental value of imperfect landscapes in ecotourism	Ji & Nie (2024)	Application of the ecological aesthetics concept	Exploring the importance of integrating ecological aesthetics with sustainable design in ecological rural areas	Literature review and case study analysis	It outlines the theoretical foundations of ecological aesthetics and sustainable design. Through case studies on the application of ecological aesthetics in sustainable design for rural revitalization, specific design and implementation strategies are proposed. It further identifies the challenges, issues, and future development needs in rural revitalization.	Relevance: It discusses landscape aesthetics of ecotourism destinations. Distinction: It focuses primarily on ecological values rather than the aesthetic needs of tourists toward the landscape.	In the context of ecotourism, these studies address the concept of ecological aesthetics or environmental protection perspectives, accepting imperfect landscapes by emphasizing environmental beliefs. They do not explore the value of imperfect landscapes in ecotourism from an aesthetic perspective.
	Lee (2017)	Advocacy for the perspective of ecological aesthetics	Within the context of ecological wetlands, it elaborates on the benefits of ecological aesthetic perspectives for wetland health	Literature review	It reviews the application of evolutionary theory and the information-seeking preference hypothesis in the study of wetland ecological aesthetics, and emphasizes the importance of three aspects of ecological aesthetics.	Relevance: It discusses landscape aesthetics of ecological destinations. Distinction: It emphasizes the concept of ecological aesthetics, which appreciates landscapes from the perspectives of environmental and ecological protection—considering landscapes with environmental benefits as more favorable	

Appendix F - Aesthetic dimensions, experimental presentations and real-world examples

	Perfection		Imperfection	
Aesthetic Dimension	Experimental Presentations (This Study)	Real-World Destination Examples	Experimental Presentations (This Study)	Real-World Destination Examples
Order	Orderly: Landscape layout is planned, neat, and well-organized. Study 2: A straight road with smooth surface Study 3: A trail built with a wooden platform, forming a clean and tidy path that was separated from the vegetation; Trash bins made from tree stumps polished into regular cubes	 Clearly planned paths at Qinglong Lake Wetland Park, Chengdu, Sichuan  Regular railings on the Beijing West Mountain Trail	Disorderly: Landscape layout is natural and unordered. Study 2: A slightly irregular road with moderately smooth surface. Study 3: A trail paved with stone slabs, with wild grass growing between the seams, presenting a somewhat messy appearance; trash bins made from irregularly shaped tree stumps	 A winding, gravel path with weeds at Wutai Mount, Shanxi  Irregular railings on a trail at Taihang Mountain Grand Canyon, Shanxi

Symmetry	Symmetrical: Landscape layout is symmetrical and balanced. Study 2: Neatly aligned, symmetrical wooden fences Study 3: Straight and symmetrical railings along the trail  Symmetrical and balanced thatched houses at Chubao Village, Wuzhishan, Hainan	Asymmetrical: Landscape layout is asymmetrical and unbalanced. Study 2: Wooden fences that are not symmetrical in arrangement Study 3: Crisscrossed and irregular railings along the trail  Scattered, asymmetrically arranged houses at Chengzi Village, sipsongpanna, Yunnan
Cleanliness	Clean: Landscapes are clean and well-maintained. Study 3: A trail built with a wooden platform, forming a clean and tidy path that was separated from the vegetation  Smooth and clean asphalt road around Zhangzehu Wetland, Changzhi, Shanxi	Unclean: Landscapes are dirty or stained. Study 3: A trail paved with stone slabs, with wild grass growing between the seams, presenting a somewhat messy appearance  A weed-overgrown trail at Qijialing Ancient Path, Jinhua, Zhejiang

Smoothness	Smooth: Landscape surfaces are smooth and even. Study 2: Smooth walls	 Smooth and even building walls at Liqiao Ancient Town, Tongling, Anhui  Smooth road surface at Xixi Wetland, Hangzhou, Zhejiang	Rough: Landscape surfaces are rough and uneven. Study 2: Weathered walls  Mottled, uneven walls in Ancient City of Pingyao, Shanxi  Uneven road at Nanhua Miao Village, Kaili, Guizhou
Traces of use	No obvious traces of use: Landscapes show no significant wear, weathering, or signs of age. Study 2: A well-maintained yurt with a refined and clean exterior	 A brand-new yurt at the Chilechuan Grassland, Hohhot, Inner Mongolia	Obvious traces of use: Landscapes show clear wear, weathering, or signs of age. Study 2: A yurt with an unrefined exterior and visible natural wear  A yurt with obvious traces of use at Xilinguole Grassland, Inner Mongolia

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