

Special Issue Reprint

Tourist Satisfaction, Sustainability, and Sustainable Tourism Development

Second Edition

Edited by
Erdogan Koc

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**Tourist Satisfaction, Sustainability,
and Sustainable Tourism
Development: Second Edition**

Tourist Satisfaction, Sustainability, and Sustainable Tourism Development: Second Edition

Guest Editor
Erdogan Koc



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Guest Editor

Erdogan Koc
Department of Business
Administration
Bahcesehir University
Istanbul
Turkey

Editorial Office

MDPI AG
Grosspeteranlage 5
4052 Basel, Switzerland

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About the Editor

Erdogan Koc

Erdogan Koc is a Professor of Marketing at Bahçeşehir University within the Faculty of Economic, Administrative, and Social Sciences in Türkiye. His primary research interests focus on the human element—specifically both consumers and employees—within tourism, hospitality, and services marketing and management. Actively engaged in advancing scientific inquiry, his research projects explore under-researched consumer behaviors, service interactions, and the intersection of consumer psychology with contemporary industry shifts. As part of his academic achievements, he has published extensively in leading, high-impact journals and has authored and edited numerous books and book chapters with prominent academic publishers, including Routledge and CABI. Additionally, he contributes to the broader research community by serving on the Editorial Boards of several reputable international journals, such as *Current Psychology*, *Journal of Hospitality Marketing & Management*, and *International Journal of Intercultural Relations*. Professor Koc has published his research in top tier journals such as *Tourism Management*, *International Journal of Contemporary Hospitality Management*, *Journal of Hospitality Marketing & Management*, *Current Issues in Tourism*, *Tourism Management Perspectives*, *Journal of Travel and Tourism Marketing*, *Technology in Society*, *Current Psychology*, etc.

Editorial

Tourist Satisfaction, Sustainability, and Sustainable Tourism Development

Erdogan Koc

Faculty of Economics, Administrative and Social Sciences, Bahcesehir University, 34353 Istanbul, Türkiye; erdogan.koc@yahoo.com

Sustainability has become one of the most influential paradigms shaping contemporary tourism research and practice. This is due to the fact that tourism accounts for about 8% of all greenhouse gas/carbon emissions in the world [1]. Moreover, mass tourism results in the overuse and depletion of water and other resources, as well as the loss of natural habitats, increased contamination and pollution [2]. Also, tourism may have negative economic and social implications, such as causing harm to historical monuments and relics [3], as well as causing commercial gentrification, escalating property values and housing costs, as well as broadening the gender gap [4,5].

Based on the above, over the past two decades, tourism scholars, policymakers, destination managers, and hospitality practitioners have increasingly begun to recognize that the long-term success of tourism destinations depends not only on economic performance but also on environmental stewardship, socio-cultural preservation, and visitor well-being. At the same time, tourist satisfaction remains a central determinant of destination competitiveness, revisit intentions, positive word-of-mouth communication, and long-term sustainability. Consequently, understanding the relationship between tourists and sustainable tourism development has become one of the most important areas of inquiry within tourism and hospitality research.

The growing significance of sustainability in tourism has been driven by several developments. First, increasing environmental challenges, including climate change, biodiversity loss, resource depletion, food waste, and pollution, have highlighted the need for more sustainable tourism practices. Second, tourists themselves have become more environmentally conscious and socially responsible, creating pressure on tourism businesses to adopt sustainable business models. Third, rapid technological developments, including smart tourism systems, digital platforms, online travel agencies, artificial intelligence, and sustainability certification systems, have transformed how tourists search for information, make decisions, evaluate experiences, and communicate their satisfaction or dissatisfaction.

Despite substantial progress, important gaps remain in our understanding of how sustainability influences tourist experiences and satisfaction. While many studies have examined sustainability from managerial, environmental, or policy perspectives, fewer studies have investigated the psychological and behavioral mechanisms through which sustainability affects tourists. Similarly, research has often treated sustainability and tourist satisfaction as separate constructs rather than examining their dynamic interactions. Furthermore, emerging phenomena such as smart tourism technologies, digital servicescapes, sustainability communication, cultural identity, sustainable consumption behavior, and the role of consumer psychology in sustainability decisions remain underexplored.

This Special Issue, “Tourist Satisfaction, Sustainability, and Sustainable Tourism Development: Second Edition”, was developed to address these gaps. The Special Issue attracted

considerable international interest from researchers. The accepted papers represent diverse geographical contexts, theoretical perspectives, methodological approaches, and tourism settings. Collectively, they contribute to advancing our understanding of how sustainability, technology, culture, psychology, communication, and consumer behavior influence tourist experiences and sustainable tourism development.

The papers included in this Special Issue cover a broad spectrum of topics ranging from smart hotels and nighttime tourism to cultural heritage tourism, sustainability communication, sustainable restaurants, online travel platforms, place-making processes, and sustainable hotel consumption behaviors. Together, these studies demonstrate the increasingly interdisciplinary nature of sustainable tourism research and provide valuable insights for both scholars and practitioners.

The first paper is about *smart technologies, human interaction, and tourist satisfaction* and it investigates customer satisfaction in smart hotels. As smart technologies have become increasingly integrated into hospitality operations, hotel managers face the challenge of balancing technological efficiency with human interaction. Using online reviews from 42 smart hotels, the authors have developed a prioritization method for service improvement and identify key service attributes requiring managerial attention.

The findings of the study indicate that while guests generally appreciate smart technologies, technology alone cannot guarantee customer satisfaction. Long check-in waiting times, employee attitudes and competencies, and breakfast quality emerged as major sources of dissatisfaction. Perhaps most importantly, the study suggests that smart hotels should adopt hybrid service models that combine technological innovations with efficient and effective human interaction. The findings of the study can be said to contribute significantly to current debates regarding technology-driven tourism experiences. While technological solutions are often promoted as pathways toward greater efficiency and sustainability, the study reminds us that tourism remains fundamentally a human-centered service industry. Sustainable tourism development requires not only technological innovation but also the preservation of the interpersonal and cultural elements that create emotional resonance and enhance perceived experience quality to ensure lasting memories for visitors.

The second paper is on *nighttime tourism and urban sustainability* and it examines tourist satisfaction within nighttime urban tourism environments through a case study of the Daming Lake Scenic Area in China. Nighttime tourism has emerged as an increasingly important component of urban tourism development due to its potential to diversify tourism products, increase visitor spending, reduce daytime congestion, and improve destination competitiveness.

Having used the Expectancy-Disconfirmation Model and revised Importance–Performance Analysis, the study identifies the factors that increase and decrease tourist satisfaction. Positive influences include attractive lighting design, diverse entertainment opportunities, distinctive shopping experiences, affordable dining options, and efficient transportation systems. Conversely, excessive pricing, problems experienced in transportation, insufficient cultural content, and safety concerns tend to influence tourist satisfaction negatively. The study contributes to the sustainable tourism literature by demonstrating that nighttime tourism provides a viable pathway for extending tourism activity beyond traditional daytime periods, facilitating a more temporally balanced and sustainable distribution of visitor flows. However, achieving sustainable nighttime tourism requires careful management of infrastructure, pricing, safety, and cultural authenticity. The findings yield actionable insights for destination managers and tourism businesses seeking to balance economic vitality with long-term sustainability in the development of nighttime tourism economies.

The third paper is about *cultural heritage tourism, identity, and loyalty* and it engages with an increasingly pressing challenge in cultural tourism research: the tension between preserving authenticity and visitor engagement and the concurrent pressures of commercialization and cultural homogenization. Focusing on intangible cultural heritage (ICH) tourism, the authors employ the Stimulus–Organism–Response framework to examine the relationships among perceived authenticity, perceived vitality, tourism involvement, experiential value, cultural identity, and tourist loyalty. The findings show that authenticity and vitality positively influence loyalty of tourists both directly and indirectly through experiential value. Furthermore, cultural identity significantly moderates several relationships within the proposed framework. Based on these above findings, the study contributes to tourism and sustainability literature by emphasizing the crucial role of cultural identity in sustainable heritage tourism. As cultural resources are increasingly mobilized for tourism development, maintaining authenticity in cultural experiences appears to be a key determinant of long-term sustainability. The findings suggest that sustainable heritage tourism requires not merely preserving cultural assets but also facilitating meaningful identity-based connections between visitors and local culture.

A persistent challenge in sustainable tourism relates to the effectiveness of the communication of sustainability initiatives. Although organizations increasingly adopt environmentally responsible practices, tourists often tend to be unaware of these efforts. The fourth paper on *sustainability communication and consumer attention* addresses this issue through the application of eye-tracking technology as a psychophysiological tool. Using experimental methods, the study investigates how tourists visually process sustainability-related cues within tourism advertisements. The results of the study show that sustainability messages have to compete with visually dominant elements such as destination images and price information. While sustainability cues are noticed, they rarely receive primary attention unless consumers possess high levels of ecological awareness. This research contributes to sustainable tourism literature by providing objective evidence regarding attention allocation processes. The findings show that the simple dissemination of sustainability-related information is unlikely to be effective in cultivating sustainability attitudes and behaviors. Instead, tourism marketers need to strategically design and position sustainability messages to attract attention and influence tourists' decision-making processes.

The fifth paper is about *sense of place and sustainable destination development* and it explores the construction of sense of place within tourism spaces through a case study of Harbin Morning Market. Using grounded theory, the authors develop an analytical framework incorporating spatial, human, and material dimensions. The study challenges highly modernist approaches to destination development that prioritize standardization, control, and efficiency. Instead, it shows that place identity emerges through the interaction of spatial design, human actors, and material networks. Tourists become active participants rather than passive observers, contributing to the co-creation of place experiences. Hence, the findings offer important implications for sustainable tourism development. In an era characterized by increasing destination homogenization, preserving local uniqueness and encouraging spontaneous interactions become essential components of sustainability. The study demonstrates that sustainable tourism spaces should facilitate authentic participation and community vitality rather than relying exclusively on top-down planning approaches.

The sixth paper is about sustainability certification and tourist perceptions and it investigates how sustainability- and service-related cues influence perceptions of sustainability-certified hotels. Drawing upon Cue Utilization Theory, the authors analyze online reviews of sustainability-certified hotels collected from a major online travel platform over a twenty-year period. The findings reveal that guests primarily tend to focus on traditional service quality indicators such as employee performance, food quality, and accommodation facil-

ities. Sustainability-related themes appear less frequently and are often associated with nature-oriented tourism experiences. Furthermore, sentiment analysis demonstrates that emotional evaluations are largely driven by service quality rather than sustainability initiatives. Hence, the study draws parallels with the studies on smart hotels (first paper) and communication (sixth paper). Tourists tend to place the emotional evaluations at the center of the overall service experience evaluations. The findings of the study emphasize an important gap within the field of sustainability in tourism. While tourism businesses increasingly invest in sustainability certifications and environmental initiatives, several guests tend to continue to evaluate hotels primarily through conventional service dimensions, as in the case of the use of smart technologies above. The results suggest that sustainability communication strategies must be more emotionally engaging and better integrated into the overall guest experience as outlined in the fourth paper.

Digital technologies continue to transform tourism experiences before, during, and after travel. The seventh paper, on *Digital Tourism Experiences and E-Servicescapes*, investigates the influence of e-servicescapes on user experiences within online travel platforms. The study demonstrates that e-servicescapes significantly influence flow experience, positive affect, and trust, which subsequently affect website loyalty and electronic word-of-mouth behavior. Particularly noteworthy is the moderating role of e-familiarity. Highly familiar users tend to derive fewer experiential benefits from enhanced digital environments, suggesting diminishing returns associated with digital interface improvements. This study advances sustainable tourism research by recognizing the growing importance of digital tourism ecosystems. As tourism increasingly relies on online information search, booking systems, and virtual interactions, understanding digital experience formation becomes critical for sustainable tourism competitiveness.

The eighth paper, on *Sustainability, Pricing, and Market Segmentation*, investigates whether sustainability practices generate economic value within the restaurant industry. Using approximately 4.4 million consumer reviews covering nearly 39,000 restaurants, the study provides one of the largest empirical investigations of sustainability-related pricing effects in hospitality. The findings demonstrate a relatively significant relationship between sustainability and pricing. Sustainability generates positive price premiums among lower-rated restaurants but negative premiums among higher-rated establishments. The findings point out that sustainability functions as a quality signal in lower-quality market segments but becomes an expected baseline feature in premium segments. This study contributes significantly to ongoing debates concerning the business case for sustainability. The findings demonstrate that the economic value of sustainability is context-dependent and influenced by market positioning, consumer expectations, and perceived quality levels. Consequently, sustainability strategies need to be customized to specific market segments rather than applied uniformly. Pricing in relation to sustainability is also investigated in the following paper (ninth) of the Special Issue.

The final paper, on *illusion of control and sustainable consumption*, introduces a novel psychological paradigm to sustainable tourism research by examining a psychological state called illusion of control caused by decisional control. Specifically, the authors investigate whether hotel guests' food consumption behaviors and evaluations of sustainable initiatives differ when these practices are framed as autonomous, voluntary choices rather than imposed, structural practices. The results of the study show that sustainable consumption behaviors positively influence perceived value, visitor satisfaction, and subsequent behavioral intentions [5]. More importantly, these relationships are significantly moderated and strengthened by decisional control. In other words, when guests perceive themselves as active agents in sustainability-related decisions, their psychological investment increases. This sense of agency directly translates into financial behavior, as guests demonstrate a

significantly higher willingness to pay a premium for sustainable hospitality experiences when they are granted the autonomy to choose them. Ultimately, this study makes a vital conceptual contribution by extending sustainable tourism scholarship beyond traditional environmental and managerial frameworks. By highlighting how decisional control triggers an illusion of control, the paper underscores the critical roles of psychological ownership, involvement, commitment, and value co-creation. The managerial implications are clear: sustainable tourism initiatives are profoundly more effective—and economically viable—when tourists are actively engaged in making choices as decision-makers rather than treated as passive recipients of prescriptive sustainability practices.

Several overarching themes tend to emerge across the nine papers included in this Special Issue. First, sustainability is increasingly recognized as a multidimensional phenomenon encompassing environmental, social, cultural, technological, and psychological dimensions. The studies collectively demonstrate that sustainable tourism cannot be understood solely through environmental indicators. Second, tourist perceptions and experiences remain central to sustainable tourism success. Whether examining smart hotels, cultural heritage destinations, sustainable restaurants, or sustainability-certified hotels, the studies consistently emphasize the importance of understanding tourists'/guests' perspectives.

Third, technology plays an increasingly important role in shaping sustainable tourism experiences. Smart hotel technologies, online travel platforms, sustainability communication systems, online reviews, and digital servicescapes all influence tourist decision-making and satisfaction. Fourth, several studies highlight the importance of psychological mechanisms. Particularly, it was demonstrated that illusion of control, a state caused by decisional control, may increase tourists' liking and involvement with the sustainability practices. Finally, the studies demonstrate the growing methodological sophistication of tourism research. Researchers employ online review analysis, sentiment analysis, text mining, eye-tracking technology, structural equation modeling, grounded theory, and large-scale data analytics to investigate increasingly complex tourism phenomena.

Although the contributions presented in this Special Issue advance our understanding of sustainable tourism, several important research opportunities remain. First, future research should further investigate the psychological mechanisms underlying sustainable tourist behavior. Concepts such as psychological ownership, perceived responsibility, moral emotions, self-determination, and behavioral nudges warrant greater attention. As in the case of illusion of control, other psychological theories and concepts such as the service recovery paradox, sunk-cost fallacy, Dunning Kruger Effect, and other cognitive biases may be investigated in relation with sustainability practices in tourism. Concepts such as cultural identity, cross-cultural differences [5], experiential value, trust [6], positive affect, ecological awareness, and illusion of control emerge as critical factors influencing sustainable tourism behaviors. Second, more longitudinal research is needed to understand how sustainability perceptions evolve over time. Most existing studies rely on cross-sectional designs, limiting our understanding of dynamic behavioral processes. Third, the interaction between artificial intelligence, smart tourism technologies, and sustainability deserves increased scholarly attention. Emerging technologies will likely reshape tourist experiences and sustainability management in unprecedented ways. Fourth, future studies can be recommended to explore cross-cultural differences in sustainability perceptions and behaviors. As tourism becomes increasingly globalized, understanding cultural variations becomes essential for effective sustainability strategies. Fifth, researchers are recommended to continue exploring innovative methodologies, including the use of psychophysiological tools/neuromarketing techniques other than eye-tracking [7], the use of influencers [8], big data analytics, machine learning approaches, and experimental designs. Such methods can provide deeper insights into tourist decision-making processes. Finally, future research

may adopt more integrative frameworks linking environmental sustainability, social sustainability, economic sustainability, and tourist well-being. A holistic understanding of sustainability remains necessary for addressing the complex challenges facing tourism destinations worldwide.

The papers included in this Special Issue demonstrate the richness, diversity, and continuing evolution of research on tourist satisfaction, sustainability, and sustainable tourism development. Collectively, the studies advance theoretical understanding while offering practical recommendations for tourism and hospitality businesses, destination managers, policymakers, and other stakeholders. The Special Issue illustrates that sustainable tourism development depends not only on environmental protection but also on technology management, cultural preservation, effective communication, consumer psychology, service quality, and visitor engagement. By integrating these diverse perspectives, the contributions provide valuable insights into how tourism destinations and businesses may achieve sustainability while simultaneously enhancing tourist satisfaction. It is hoped that the findings presented in this Special Issue will stimulate further scholarly inquiry and encourage researchers to explore the many unanswered questions that remain at the intersection of sustainability, tourist satisfaction, and sustainable tourism development. As tourism and hospitality continue to evolve in response to environmental challenges, technological innovation, and changing consumer expectations, research in this field is expected to remain both timely and essential.

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References

1. Campos, C.; Laso, J.; Cristóbal, J.; Albertí, J.; Bala, A.; Fullana, M.; Fullana-i-Palmer, P.; Margallo, M.; Aldaco, R. Towards more sustainable tourism under a carbon footprint approach: The Camino Lebaniego case study. *J. Clean. Prod.* **2022**, *369*, 133222. [CrossRef]
2. MacAskill, S.; Legg, S.; Newman, S.; Weaver, D. Smart-meter insights into ecolodge guests' water and energy behaviours in a field quasi-experiment. *J. Sustain. Tour.* **2026**, *34*, 1102–1123.
3. Khater, M.; Muhammad Zeki Mahmood Al-Leheabi, S.; Faik, M. Navigating the challenges of over-tourism: Comparative insights and solutions from Petra and Karnak. *J. Herit. Tour.* **2025**, *20*, 282–313. [CrossRef]
4. Xu, Y.; Yao, Z.; Zhang, Y.; Zheng, S.; Wang, R.; Wang, N. Does Tourism Gentrification in Urban Areas Affect Tourists' Value Co-Creation Behavior? *Land* **2025**, *14*, 1778. [CrossRef]
5. Koc, E. *Cross-Cultural Aspects of Tourism and Hospitality: A Services Marketing and Management Perspective*; Routledge: Abingdon, UK, 2025; pp. 352–365.
6. Cavusoglu, M.; Nanu, L.; Mistry, T.G.; Kement, U.; Ali, F. Examining the impact of greenwashing and greenhushing on consumer trust and behavior in the restaurant industry. *Int. J. Contemp. Hosp. Manag.* **2026**, *38*, 1927–1952. [CrossRef]
7. Büyükçelebi, A.; Taheri, B.; King, B.E.M.; Sengoz, A. From attention to emotion: Neuroscientific approaches in tourism advertising—A systematic review. *Worldw. Hosp. Tour. Themes* **2026**, 1–23. [CrossRef]
8. Polat, E.; Celik, F.; Ibrahim, B.; Gursoy, D. Past, present, and future scene of influencer marketing in hospitality and tourism management. *J. Travel Tour. Mark.* **2024**, *41*, 322–343. [CrossRef]

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Article

The Influence of the Illusion of Control in Sustainable Hotel Practices on Hotel Guests' Behaviours

Erdogan Koc ¹, Tugrul Ayyildiz ², Muhammed Baykal ^{2,*} and Ahu Yazici Ayyildiz ²

¹ Faculty of Economics, Administrative and Social Sciences, Bahcesehir University, Istanbul 34488, Türkiye; erdogankoc@yahoo.com

² Tourism Faculty, Aydin Adnan Menderes University, Aydin 09400, Türkiye; tayyildiz@adu.edu.tr (T.A.); ayazici@adu.edu.tr (A.Y.A.)

* Correspondence: muhammed.baykal@adu.edu.tr; Tel.: +90-5308200923

Abstract

Sustainable tourism practices increasingly aim to reduce food waste and promote responsible consumption among hotel guests. However, the psychological mechanisms influencing guests' responses to sustainability initiatives have not been sufficiently investigated. This study investigates whether hotel guests' food consumption behaviours and assessments regarding food waste differ in buffet settings due to the illusion of control, and whether guests are willing to pay more when sustainability practices are perceived as their own choice. A quantitative and scenario-based research design was used. Data were collected from 307 guests staying in four and five-star hotels in Kuşadası, Türkiye. The findings show that the cognitive, affective, and behavioural dimensions of sustainable consumption positively influence perceived value, customer satisfaction, and behavioural intentions. These relationships are significantly strengthened when guests have decision-making control over sustainability initiatives, leading to the psychological state known as the illusion of control. Furthermore, guests show a higher willingness to pay for sustainable hotel services when they perceive themselves as participating in sustainability-related decisions. The results highlight the importance of incorporating guest participation into sustainability strategies in hotel operations.

Keywords: consumer behaviour; food waste management; illusion of control; sustainable consumption

1. Introduction

Sustainability has become a critical priority in the hotel industry, as in many other sectors, due to its implications for long-term development and organisational performance. Despite its economic contributions, the rapid growth of the hospitality sector has generated substantial environmental pressures and sustainability concerns [1]. In response, key stakeholders—including investors, governments, and hotel guests—are increasingly urging hotel operators to integrate sustainability practices into their operations to mitigate these impacts, while at the same time demanding greater awareness and accountability regarding sustainability issues [2]. In recent years, sustainability awareness within the tourism sector has increased markedly. According to 2024 data, a substantial majority of global tourists (over 80%) believe that sustainability should be prioritised in travel [3]. Growing environmental consciousness among tourists has been shown to positively influence attitudes toward sustainable products and to reinforce a sense of individual responsibility [4].

Consequently, demand for sustainable products and services in the hotel industry has risen, prompting hotels to adopt and expand their sustainability practices [1,5].

From a sustainability perspective, hotels constitute a critical leverage point for mitigating food-related environmental impacts. Key operational elements, including menu design, procurement policies, portion sizing, buffet configuration, and waste monitoring, are largely under managerial control, thereby enabling the implementation of targeted, operations-level interventions [6,7]. Accordingly, a comprehensive understanding of food consumption patterns and food waste practices in hotel settings is essential for advancing sustainability in the hospitality sector and for contributing to global policy objectives such as SDG 12 (Responsible Consumption and Production) and SDG 13 (Climate Action) [8].

Similarly, sustainability has emerged as an increasingly salient aspect of hotel choice decisions. A substantial proportion of guests report a preference for environmentally responsible hotels as a means of reducing their ecological footprint. Environmental responsibility is identified as a primary motivation by approximately 41% of guests, while social responsibility accounts for an additional 31% [3]. Consistent with broader shifts toward environmentally responsible consumption [9], more than 40% of tourists indicate a willingness to pay a price premium for sustainable accommodation [10]. However, despite this growing demand, guests often face difficulties in identifying hotels that genuinely implement sustainability practices—particularly with respect to food-related initiatives such as waste reduction, responsible sourcing, and portion management [11]. As seen, the recognition of the importance of sustainable practices in hotel enterprises plays a significant role in the hotel selection process [12]. Therefore, in order to remain competitive, hotel enterprises need to analyse their guests' perceptions regarding sustainability characteristics [5]. When evaluating sustainable practices, individuals are not guided solely by rational choices; they are also influenced by perceptual and psychological mechanisms. For this reason, sustainability practices need to be addressed not only from a technical or operational perspective but also within the framework of guests' attitudes and behaviours [13].

Guests' perceptions of sustainable consumption, perceived value, satisfaction, image, and purchase intention may vary due to the illusion of control, a cognitive bias resulting in increased satisfaction with an individual's own choices [14]. The illusion of control increases hotel guests' trust and self-efficacy beliefs, leading them to attribute greater meaning and importance to their choices [15,16]. Therefore, this concept stands out as a key psychological mechanism shaping how sustainability practices are perceived [17,18]. Understanding this psychological mechanism is important for designing more effective sustainability strategies that not only implement green practices but also actively engage customers in the decision process. For example, a hotel guest's ability to determine the characteristics of the hotel they choose during a holiday may lead to a more positive attitude toward that hotel [14]. For this reason, this study positions the illusion of control as a central variable in explaining sustainable consumption behaviour.

Although prior research has extensively examined sustainability attitudes, environmental concern, knowledge, and social norms within tourism and hospitality contexts [19–22], sustainable food behaviour has largely been conceptualised as a function of rational decision-making or moral obligation. In contrast, limited attention has been devoted to cognitive biases, particularly perceived decisional control mechanisms (e.g., illusion of control) that may shape food consumption and waste behaviours in hospitality settings. Empirical studies explicitly examining the illusion of control in relation to food waste remain scarce, are largely confined to hotel buffet contexts, and seldom incorporate post-consumption outcomes such as perceived value, satisfaction, corporate image, and willingness to pay [23,24].

Based on the above, the primary objective of this study is to investigate whether hotel guests' food consumption intentions and food waste-related evaluations vary as a function of their perceived illusion of control in buffet settings. A secondary objective is to assess whether guests exhibit a greater willingness to pay when food-related sustainability practices are perceived as self-determined. By addressing these objectives, the study is believed to provide novel insights into how perceived control embedded within buffet systems can be strategically leveraged to reduce food waste intentions while simultaneously enhancing guest experience and sustainability performance in hotel operations.

2. Theoretical Framework

2.1. *The Impact of Sustainable Consumption on Perceived Value in the Hotel Industry*

Sustainable consumption refers to patterns of consumption that consider the needs of future generations while meeting basic human needs and improving quality of life. It emphasises minimising the use of natural resources, environmentally harmful waste, polluting emissions, and toxic substances throughout the product or service life cycle [25]. To explain sustainable consumption behaviour, Hilgard's [26] frequently adopted "trinity of mind" framework conceptualises attitudes through three interrelated dimensions: cognitive, affective, and behavioural [27]. Building on this attitudinal perspective, understanding how these three dimensions interact is essential for explaining why consumers adopt and maintain sustainable behaviours in service contexts such as hotels.

For consumers to develop a strong commitment toward a particular behaviour, the three dimensions of attitude need to operate together at the cognitive, affective, and behavioural levels [28]. The cognitive dimension refers to consumers' awareness of an object and includes their accumulated knowledge, beliefs, opinions, and the attributes they associate with it. These elements collectively form the attitudinal structure based on views and beliefs. Prior research suggests that consumers' knowledge and beliefs about sustainability enhance sustainable consumption behaviours [27]. However, knowledge and beliefs alone are often insufficient to fully explain consumer decision-making. Emotional reactions to consumption experiences may also play a critical role in shaping attitudes and behaviours.

The affective dimension relates to consumers' emotional responses and feelings toward objects or experiences [29]. Emotional influences on decision making can be explained through Decision Affect Theory [30,31]. According to this theory, consumers anticipate the emotional consequences associated with choosing or rejecting particular behaviours. When evaluating alternatives, they tend to select the option expected to provide the greatest emotional benefit [31]. In the hospitality context, hotel guests may anticipate feelings such as pride or, conversely, guilt when deciding whether to engage in sustainable behaviours [32]. These emotional expectations frequently translate into concrete behavioural outcomes during service experiences. In other words, affective responses often motivate or reinforce actual behaviour.

Following emotional experiences, consumers often develop behavioural responses. The emotions generated by service experiences can therefore lead to behavioural outcomes such as continued sustainable consumption and green engagement [29]. This corresponds to the behavioural dimension of sustainable consumption, which reflects the level of commitment consumers demonstrate through the effort and energy they invest in achieving their goals. In the hospitality context, greater effort by hotel guests to adopt environmentally responsible behaviours is expected to strengthen their sustainable consumption practices [27]. Taken together, the cognitive, affective, and behavioural dimensions provide a comprehensive framework for understanding how sustainable consumption attitudes develop and translate into actual guest behaviour in hotel settings.

While these three dimensions are conceptually related, they can influence consumer evaluations through different psychological mechanisms. Cognitive evaluations are primarily based on rational beliefs and information [27], while emotional responses reflect emotional reactions, and behavioural components represent inclinations toward action [29]. Therefore, these dimensions may have different effects on perceived value.

Furthermore, in situations of perceived control, particularly in the context of the illusion of control, these dimensions may elicit different responses. Perceived control may have a stronger influence on emotional and behavioural responses because it allows individuals to actively participate in the process and feel empowered when making decisions [33,34]. In contrast, cognitive evaluations, based more on information and beliefs, may be relatively less influenced by such situations and may remain stable [35].

Growing environmental concerns associated with hotel operations have intensified tourists' and guests' interest in sustainable practices, making sustainability as a critical area within hospitality research. For hotel firms, sustainability is no longer merely an ethical obligation but a strategic imperative simultaneously reflecting both responsible management and enhancing long-term competitiveness [36,37]. Empirical evidence across several countries, such as Canada, Europe, Thailand, the United States, and Austria, indicates that guests/tourists increasingly adopt sustainability-oriented behaviours, such as supporting local businesses, conservation of natural resources, avoiding environmentally harmful holiday activities, and using reusable products [38]. These behavioural shifts reflect a broader transformation in consumer value systems, wherein environmental considerations are progressively integrated into consumption-related decision-making processes.

Notwithstanding the increasing prevalence of such practices, a central theoretical and managerial question concerns how sustainability initiatives influence guests' evaluative judgments of hotel services. Within the services marketing literature, perceived value constitutes a foundational construct for explaining such evaluations. Grounded in equity theory and means–end frameworks, perceived value can be conceptualised as a cognitive trade-off between perceived benefits and perceived sacrifices. In hospitality contexts, this evaluative mechanism is particularly salient due to the experiential and intangible nature of services, where value perceptions are co-created through interactions between the provider and the customer. Consequently, for hotel firms to achieve sustainable performance, their value propositions need to ensure alignment between organisational benefit–cost structures and customers' subjective value perceptions [39]. In line with service-dominant logic, value is not embedded in the service itself but emerges through the customer's experiential interpretation, thereby underscoring the importance of managing sustainability-related experiences rather than merely implementing sustainability practices.

Perceived value also tends to play a pivotal role in shaping relational outcomes, including stakeholder commitment and long-term organisational performance [40]. From a strategic perspective, value creation can be understood through resource-based and stakeholder-oriented frameworks, which emphasise that firms must deliver superior experiential and symbolic benefits to sustain a competitive advantage. Consistent with this view, KPMG [41] highlights that organisations must generate strong perceived value by delivering superior experiences to both internal and external stakeholders, thereby facilitating long-term value creation.

In sustainability contexts, the salience of perceived value is further amplified, as environmentally responsible practices can simultaneously influence both benefit perceptions (e.g., moral satisfaction, quality signals, and experiential enrichment) and cost perceptions (e.g., inconvenience, effort, or price premiums). Drawing on consumption value theory, sustainability-related value may encompass functional, emotional, social, and epistemic dimensions, each contributing to the overall evaluation of the service experience. Prior

research confirms the critical role of perceived value in shaping consumer responses to environmentally friendly products and services [42]. Accordingly, to effectively leverage sustainability initiatives, hotel managers need to enhance the perceived environmental quality and symbolic value of their offerings [43]. When consumers perceive that the multi-dimensional benefits of sustainable services outweigh those of conventional alternatives, they are more likely to engage in pro-environmental consumption behaviours [44].

As sustainability initiatives become increasingly embedded within hospitality services, guests are more frequently exposed to environmentally responsible practices during their service encounters. From an experiential consumption perspective, these encounters function as critical touchpoints through which guests construct and reinterpret value. Heightened environmental awareness further amplifies the cognitive accessibility of sustainability cues, thereby influencing evaluative judgments. Experiencing sustainability-oriented services tend to allow guests to have both utilitarian and hedonic benefits while also reinforcing perceptions of the organisation's ethical positioning [29]. Moreover, the integration of environmental, social, and governance (ESG) principles into service delivery can strengthen both perceived value and brand-related outcomes, including loyalty and trust [45], by signalling authenticity and long-term commitment to responsible practices.

Consistent with the "trinity of mind" framework, value perceptions emerge from the dynamic interplay of cognitive evaluations, affective responses, and behavioural engagement. This perspective aligns with dual-process and appraisal theories, which posit that consumer judgments are shaped by both rational assessments and emotional reactions. Importantly, perceived value extends beyond immediate evaluative judgments and serves as a key antecedent of post-consumption outcomes, particularly customer satisfaction. Drawing on expectancy–disconfirmation theory, satisfaction arises when perceived performance, enhanced by sustainability-related benefits, meets or exceeds prior expectations. In turn, satisfaction may influence higher-order outcomes such as corporate image and behavioural intentions, including repurchase and word-of-mouth.

Accordingly, the subsequent section examines the role of customer satisfaction in shaping hotel image and purchase intentions. Furthermore, engagement with sustainability initiatives may be contingent upon underlying psychological mechanisms that influence decision-making processes. One such mechanism is the illusion of control, a concept rooted in cognitive psychology, which refers not only to individuals' tendency to overestimate their ability to influence outcomes but also to a post-decisional bias whereby perceived control enhances affective attachment to one's choices. Specifically, when individuals believe that they have actively influenced an outcome, i.e., by choosing an option, they are more likely to evaluate that outcome more favourably, experience greater satisfaction, and exhibit increased liking and stronger commitment to their decisions [14,15]. Perceived control strengthens self-attribution by linking outcomes to one's own agency, which enhances perceived value and encourages individuals to evaluate their choices more positively. At the same time, consistency-based mechanisms such as cognitive dissonance reduction and self-justification, together with the experience of autonomy, foster increased liking, positive affect, and more favourable evaluations of the selected option. In hospitality settings, enabling guests to actively select or customise sustainability options (e.g., choosing towel reuse programs or energy-saving preferences) can heighten perceived agency and ownership over the experience [14]. This, in turn, may lead guests to evaluate both the chosen options and the overall service more positively, irrespective of the objective outcomes. Consequently, the illusion of control may amplify key post-consumption outcomes, including perceived value, satisfaction, and behavioural intentions, by fostering a sense of personal involvement and psychological ownership. The following section therefore explores the role of the illusion of control in shaping hotel guests' responses to sustainability initiatives.

2.2. *The Impact of Perceived Value on Customer Satisfaction*

The preceding discussion established that sustainable consumption practices shape hotel guests' cognitive, affective, and behavioural evaluations, which in turn influence the perceived value of the service experience. However, perceived value does not constitute the final outcome of the evaluation process; rather, it serves as a key antecedent of post-consumption responses, most notably customer satisfaction. Perceived value is commonly conceptualised as consumers' overall assessment of a service based on a comparison between the benefits received and the sacrifices made [46]. In highly competitive service markets, the ability to create superior value represents a fundamental mechanism for differentiation and sustained competitiveness [47]. When consumers perceive that the benefits of a service outweigh its costs, their overall evaluations become more favourable [48]. Consequently, organisations must develop a nuanced understanding of customer expectations and needs in order to deliver superior value and achieve high levels of satisfaction [49]. Within tourism research, customer satisfaction is typically defined as a positive evaluative judgment or emotional response arising from the consumption of tourism-related services [50]. A widely accepted theoretical explanation of satisfaction formation is provided by Oliver's [51]. Expectation–Disconfirmation Theory, which posits that satisfaction results from a comparison between perceived performance and prior expectations. When perceived performance meets or exceeds expectations, positive disconfirmation occurs, leading to higher levels of satisfaction.

In the context of sustainable hospitality services, guests evaluate not only the functional attributes of the service but also the environmental and ethical benefits associated with sustainability initiatives. Accordingly, practices that meet guest expectations, justify the price paid, and align with customers' environmental values are likely to enhance satisfaction [52,53]. When guests perceive that sustainable practices deliver meaningful environmental benefits without compromising service quality or comfort, the perceived value of the experience is strengthened, which in turn leads to higher satisfaction. Importantly, customer satisfaction is not only an outcome of perceived value but also a key determinant of subsequent attitudinal and behavioural responses. In hospitality contexts, satisfied guests are more likely to develop favourable perceptions of the hotel and to exhibit stronger behavioural intentions. The following section therefore examines the impact of customer satisfaction on hotel image and purchase intention.

2.3. *The Impact of Customer Satisfaction on Hotel Image and Purchase Intention*

Customer satisfaction plays a pivotal role in shaping customers' long-term perceptions and behavioural responses toward service providers. In hospitality contexts, satisfied guests are more likely to develop favourable evaluations of the hotel's image and exhibit stronger intentions to repurchase its services, highlighting the central role of satisfaction in relationship development and retention. Corporate image refers to the total of perceptions, beliefs, and associations that customers hold about an organisation [54,55]. These perceptions are formed through the cumulative interaction of both tangible and intangible elements of the service experience, including service quality, employee behaviour, the physical environment, and symbolic brand values [56,57]. Over time, repeated service encounters contribute to the development of a holistic and relatively stable impression of the organisation, which constitutes its corporate image. Customer experiences are central to this image formation process. Drawing on experiential and evaluative frameworks, positive service encounters reinforce favourable perceptions of service quality, organisational credibility, and service variety [58].

Accordingly, hotel firms must effectively manage service interactions to enhance satisfaction and, in turn, strengthen their corporate image. When guests perceive the hotel

as a customer-oriented organisation that consistently delivers high-quality experiences, their image perceptions become more positive [59]. Achieving such outcomes requires not only improvements in the physical environment but also the effective management of guest–employee interactions and service delivery processes [60]. Beyond its influence on corporate image, customer satisfaction is also a key determinant of future behavioural intentions. Within hospitality research, purchase intention represents one of the most critical behavioural outcomes, reflecting the likelihood that consumers will purchase or repurchase a service. It is widely regarded as a strong predictor of actual behaviour [61]. In the context of sustainable hospitality, purchase intention refers to guests' willingness to choose environmentally responsible products and services offered by hotels [62,63]. As such, satisfaction derived from sustainable service experiences can play a crucial role in promoting both repeat patronage and the adoption of environmentally responsible consumption behaviours.

2.4. The Influence of the Illusion of Control on Hotel Guests' Behaviour and Intentions

This research is grounded in Illusion of Control Theory, which provides a useful lens for understanding how perceived agency influences consumer evaluations and behaviours. In hospitality contexts, hotel guests frequently encounter situations in which they are offered choices regarding their service experiences, such as selecting sustainable options, customising room features, or deciding whether to participate in environmentally responsible practices. These opportunities for choice may shape guests' perceptions and behaviours through a psychological mechanism known as the illusion of control. The illusion of control refers to individuals' tendency to overestimate their ability to influence outcomes that are, in reality, determined by external factors or chance [64]. Beyond this misperception of causality, the illusion of control also entails a post-decisional evaluative bias, whereby individuals assign greater value to, and develop a stronger liking for, outcomes they perceive as self-determined [14]. Thus, perceived control not only affects beliefs about influence but also systematically enhances the subjective evaluation of chosen options.

When applied to sustainable consumption, this perspective suggests that guests' perceptions of sustainability practices as self-determined can intensify both cognitive and affective evaluations of their own behaviour. This is consistent with the broader psychological premise that individuals are motivated to predict and control their environment in order to reduce uncertainty and manage perceived risks [65–67]. According to Averill [68], perceived control can be achieved through three interrelated mechanisms: cognitive control, behavioural control, and decisional control.

Cognitive control refers to individuals' ability to interpret and frame information in ways that facilitate adaptation to their environment [69]. Behavioural control reflects the perception that one can directly influence outcomes through actions or behavioural responses [70]. Decisional control, in contrast, denotes the perception that one can choose among alternatives and thereby influence outcomes through one's decisions [68]. Among these, decisional control is particularly salient in hospitality settings, where service customisation and choice provision are central elements of the guest experience. These forms of perceived control are closely linked to underlying motivational processes that shape human behaviour.

Hence, Self-Determination Theory provides a complementary explanatory framework by emphasising the role of autonomy in fostering intrinsic motivation. According to this theory, individuals are more motivated and experience greater satisfaction when their actions are perceived as self-directed and aligned with their internal values rather than externally imposed [71]. From a sustainable consumption perspective, when hotel guests perceive sustainability-related actions as voluntary, i.e., chosen by themselves, rather than

obligatory, they are more likely to internalise these behaviours and engage more meaningfully with them. This internalisation process enhances not only behavioural engagement but also the affective and evaluative outcomes associated with those behaviours [14,15]. For instance, allowing guests to choose room features or sustainability options may strengthen their sense of autonomy and perceived control, thereby increasing their involvement and liking for their choices and enriching their overall service experience.

Despite the well-established role of perceived control in psychological research, its application within consumer behaviour and hospitality contexts, especially in relation to illusion of control, remains relatively underexplored [23,24,72–74]. Nevertheless, emerging evidence suggests that perceived control can significantly influence key consumer outcomes, including perceived value, satisfaction, and behavioural intentions [14].

For example, Bendapudi and Leone [75] argue that customer participation and the provision of choice can enhance satisfaction by increasing perceived involvement and control. Similarly, Koc [15,76] demonstrates that open buffet experiences in all-inclusive hotels create a sense of decisional control, leading guests to assign greater value to the food items they personally select. These findings point out that perceived control may bias evaluative judgments of guests upward, even when objective service attributes remain constant. Beyond its influence on satisfaction and behavioural responses, perceived control may also shape guests' economic evaluations of service offerings.

In the context of sustainable hospitality, the effectiveness of green practices and certifications depends not only on their implementation but also on tourists' demand for such initiatives and their willingness to pay for them. Encouraging hotels, especially the ones that do not benefit from immediate cost advantages, to adopt environmentally responsible practices requires clear evidence that consumers value sustainability and that this valuation influences their purchase decisions [77]. Willingness to pay refers to the maximum amount consumers are prepared to spend on products or services that align with their expectations or values [78]. Perceived control may increase willingness to pay by strengthening psychological ownership and perceived value of self-selected sustainable options.

Taken together, these theoretical arguments suggest that the illusion of control may function as a key psychological mechanism through which sustainable consumption behaviours translate into perceived value, satisfaction, and subsequent behavioural intentions. Specifically, when guests perceive that they have actively chosen sustainability options, they are more likely to value these choices, maintain attitudinal consistency with them, and exhibit stronger positive post-consumption responses. Accordingly, the illusion of control is conceptualised as a moderating mechanism within the proposed research model.

3. Hypothesis Development

As stated above, this study is primarily based on Illusion of Control Theory [64] and complemented by Self-Determination Theory [71]. Together, these theoretical perspectives suggest that when hotel guests perceive sustainability-related actions as self-determined, the relationships proposed in the research model are likely to be strengthened. Specifically, perceived control enhances individuals' sense of agency and autonomy, which in turn amplifies evaluative and behavioural responses.

Hotel guests' cognitive, affective, and behavioural perceptions of sustainable consumption may provide the key antecedents of perceived value. From a cognitive perspective, guests tend to evaluate sustainable practices in terms of their functionality and service performance. When such practices maintain high standards of comfort, hygiene, and safety, guests are more likely to develop favourable evaluations of sustainability initiatives [79–81]. Accordingly, cognitive perceptions of sustainable consumption are expected to positively

influence perceived value. This relationship may be further strengthened when guests believe that their individual consumption choices contribute meaningfully to environmental outcomes. In such cases, a heightened illusion of control reinforces the perceived significance of cognitive evaluations, thereby increasing perceived value [82,83]. Accordingly, the following hypothesis is proposed:

H1a. *The effect of cognitive sustainable consumption on perceived value is moderated by the illusion of control.*

Affective sustainable consumption can be understood through Decision Affect Theory, which posits that emotional responses to decisions influence overall evaluations [31]. Engaging in environmentally responsible behaviours may generate positive emotions, such as moral satisfaction and a sense of doing the “right thing,” which contribute to enhanced perceived value. In addition, interactions with environmentally friendly or natural elements can elicit positive affective responses [84], while green practices may reduce feelings of guilt and increase ethical fulfilment [85]. These emotional benefits may strengthen perceived value and support positive attitudes toward the hotel [39]. Importantly, the strength of this relationship is likely to depend on perceived control. When guests perceive their choices as self-determined, they are more likely to internalise these emotional rewards as part of the service experience, leading to higher perceived value. Conversely, when perceived control is low, sustainable actions may be viewed as externally imposed, thereby weakening the translation of affect into value perceptions [83,86]. Accordingly, the following hypothesis is proposed:

H1b. *The effect of affective sustainable consumption on perceived value is moderated by the illusion of control.*

Behavioural engagement with sustainability initiatives may also play an important role in shaping perceived value. Sustainable practices experienced at a hotel may foster continued pro-environmental behaviours in the future [29]. However, the perceived value of these practices may vary depending on their impact on guest comfort. For instance, while initiatives such as energy efficiency and water conservation may enhance value perceptions, practices such as linen reuse or waste management may reduce perceived value if they are perceived to compromise comfort. Therefore, hotel managers need to balance environmental objectives with service quality considerations to optimise perceived value [87,88]. The extent to which these behavioural experiences translate into perceived value is likely to depend on perceived control. When guests believe that their actions meaningfully influence environmental outcomes, behavioural engagement becomes more valuable and meaningful. In contrast, low perceived control may attenuate this relationship [82,89,90]. Accordingly, the following hypothesis is proposed:

H1c. *The effect of behavioural sustainable consumption on perceived value is moderated by the illusion of control.*

Perceived value is widely recognised as a fundamental antecedent of customer satisfaction [48,49]. This relationship can be explained through Expectation–Disconfirmation Theory, which posits that satisfaction arises when perceived performance meets or exceeds prior expectations [51]. In the context of sustainable hospitality, guests evaluate the utility and value derived from sustainability initiatives relative to their expectations. When perceived value exceeds expectations, satisfaction increases. Empirical research consistently supports a strong positive relationship between perceived value and satisfaction across

hospitality and tourism contexts [39,48,91,92]. However, the strength of this relationship may vary depending on perceived control. When guests perceive a higher degree of control over their choices, they are more likely to incorporate value perceptions into their satisfaction judgments, thereby strengthening this relationship [93,94]. Accordingly, the following hypothesis is proposed:

H2. *The effect of perceived value on customer satisfaction is moderated by the illusion of control.*

Customer satisfaction is a key determinant of corporate image in hospitality contexts. Prior research consistently shows a positive relationship between satisfaction and hotel image [58,95–98]. Satisfied guests are more likely to develop positive perceptions of the hotel, strengthening its overall image. However, the strength of this relationship may depend on perceived control. When guests experience a high level of illusion of control, they may tend to attribute their positive experiences to their own choices, thereby amplifying favourable evaluations of the hotel [14,99]. Accordingly, the following hypothesis is proposed:

H3. *The effect of customer satisfaction on hotel image is moderated by the illusion of control.*

Customer satisfaction is also a well-established predictor of purchase intention. Extensive research indicates that satisfied guests are more likely to revisit and recommend hotels [100–102]. Satisfaction functions as a key mechanism through which behavioural loyalty and repurchase intentions are developed. In the context of sustainable hospitality, satisfaction with environmentally responsible practices further strengthens these intentions [101]. The role of perceived control is again critical. When guests perceive greater autonomy and control—particularly in digitally mediated or choice-rich environments, they may be more likely to translate satisfaction into behavioural intentions [103,104]. Accordingly, the following hypothesis is proposed:

H4. *The effect of customer satisfaction on purchase intention is moderated by the illusion of control.*

Finally, willingness to pay represents an important economic outcome associated with sustainable consumption. Prior research indicates that guests are willing to pay a premium for environmentally responsible hotels [77,105]. In this study, willingness to pay is conceptualised as a stated behavioural intention under hypothetical conditions rather than an observed economic behaviour. Within this framework, perceived control is expected to influence evaluative judgments and increase expressed willingness to pay. When guests believe that their choices contribute to environmental outcomes, they are more likely to assign higher value to sustainable services and demonstrate a greater willingness to pay [83,106]. This effect is consistent with the concept of perceived consumer effectiveness, whereby individuals believe their actions can make a meaningful difference. Accordingly, the following hypothesis is proposed:

H5: *Hotel guests' willingness to pay more is moderated by the illusion of control.*

Following the development of the hypotheses, the overall research model incorporating all hypotheses is presented in Figure 1.

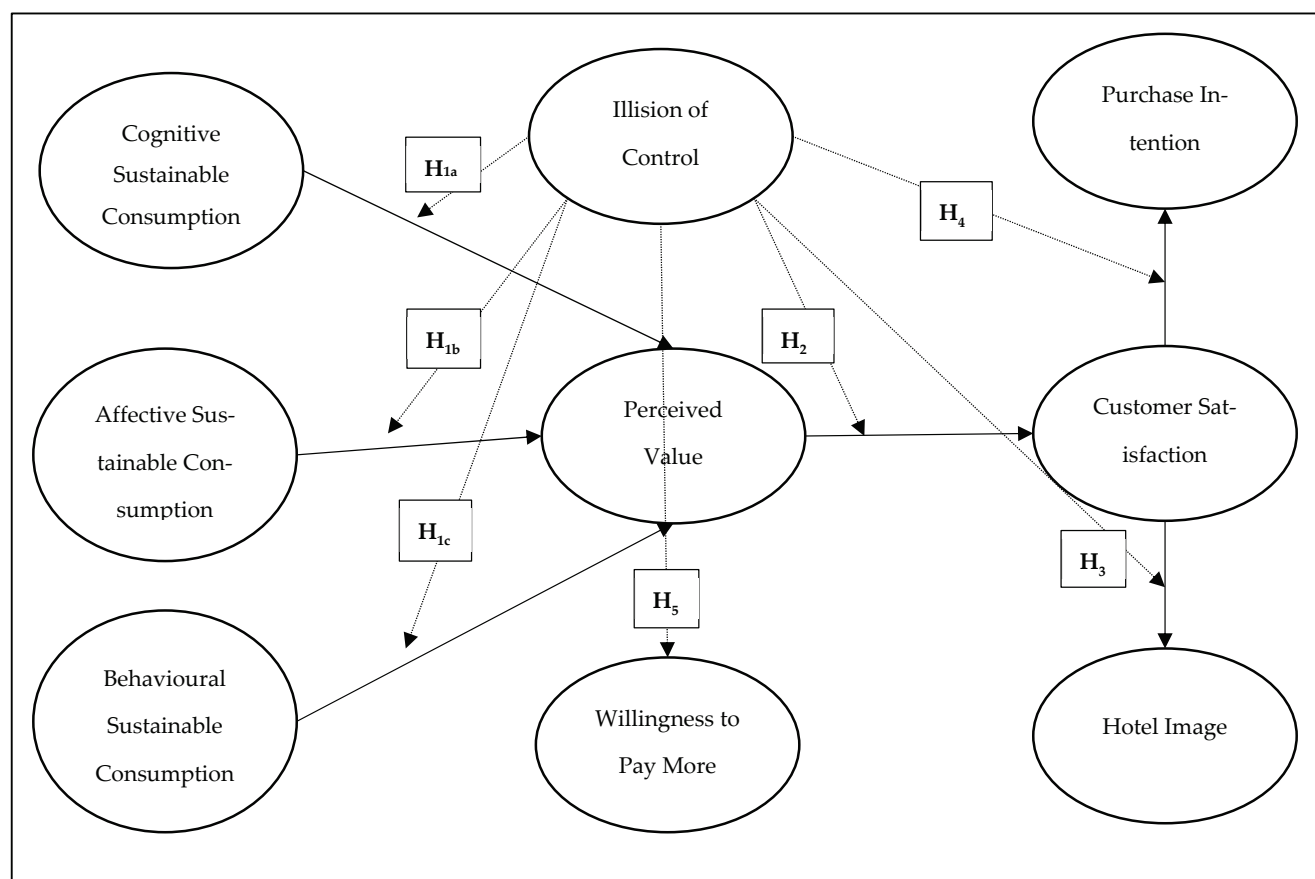


Figure 1. Research Model.

4. Materials and Methods

4.1. Research Design

The study adopts a quantitative research design to examine the relationships between sustainable consumption practices and customer responses in the hotel context. Quantitative approaches are widely employed to measure individuals' attitudes, perceptions, and behavioural intentions and allow researchers to produce statistically generalisable findings [107]. To increase the realism of the research setting and capture potential differences in respondents' perceptions and behavioural intentions, the study employed a scenario-based research design. In this study, scenario-based design refers to the use of hypothetical yet realistic written vignettes in which respondents are invited to assume themselves to be in predefined decision-making contexts and to report their attitudes and behavioural intentions accordingly. Scenario-based methods are frequently used in hospitality and consumer research to investigate decision-making processes and perceptual evaluations under controlled conditions [14,108]. By presenting respondents with structured scenarios that reflect alternative sustainability decision contexts, the design enables a controlled comparison of participants' responses. While such designs enhance experimental control, they tend to rely on self-reported evaluations rather than observing actual behaviour.

Specifically, the study compares two scenarios: one in which sustainability practices are determined by hotel management and another in which these practices are determined by hotel guests themselves, i.e., allowing decisional control, which may be expected to result in illusion of control. The study does not directly measure actual food waste behaviour; rather, it examines participants' attitudes and behavioural intentions under hypothetical conditions. This design allows the study to examine the potential influence of the illusion

of control, a psychological phenomenon whereby individuals exhibit more favourable attitudes or behavioural intentions when they perceive that they have influence over decision outcomes.

4.2. Population and Sample

The target population of this study comprises guests staying in four- and five-star hotels in Kuşadası, Türkiye, one of the country's major international tourism destinations. Data were collected from hotel guests staying in 46 hotels operating in Kuşadası during July and August 2025, which corresponds to the peak tourism season. Given the inherent constraints in accessing hotel guests due to operational limitations and guest availability, convenience sampling, a widely used non-probability sampling technique in hospitality and tourism research, was employed [109,110].

Prior to data collection, hotel managers were contacted to obtain the necessary permissions to approach guests. The surveys were administered through face-to-face interactions with hotel guests in participating properties. However, due to the unwillingness of some hotels to participate in the study, data collection was ultimately conducted in 23 cooperating hotels. A total of 600 questionnaires were distributed to potential respondents. After screening for incomplete or improperly completed responses, 307 usable questionnaires were retained for analysis. Regarding sample adequacy, methodological guidelines suggest a minimum ratio of five respondents per measurement item [111,112]. Based on the number of measurement items in this study, a minimum sample size of approximately 145 respondents would be considered sufficient. Accordingly, the final sample of 307 respondents exceeds this threshold and is deemed adequate for the statistical analyses performed in this study.

4.3. Data Collection Instrument

Data were collected using a structured questionnaire comprising three main sections. The first section collected information on participants' demographic characteristics, including gender, age, education level, income level, and frequency of hotel stays. The second section presented Scenario A, in which sustainability practices were determined solely by hotel management. Participants were then asked to evaluate a series of statements reflecting their perceptions and behavioural intentions within this scenario. The third section comprised two stages. First, respondents were presented with a list of the ten most commonly implemented sustainability practices in hotel operations and were asked to select the five practices they considered most important. Subsequently, Scenario B was introduced, in which the implementation of sustainability practices was determined by hotel guests rather than hotel management. Participants then evaluated the same set of statements used in Scenario A. This within-subject comparison allows the study to examine whether perceived decisional control over sustainability-related choices influences customers' cognitive, affective, and behavioural responses.

The measurement items used in both scenarios were adapted from previously validated scales. The complete list of measurement items is presented in Appendix A (Table A1). Sustainable consumption behaviour was measured using a 16-item scale comprising three dimensions (cognitive, affective, and behavioural), developed by Akgün and Kortunay [113]. Perceived value was assessed using a four-item scale developed by Chitty et al. [114]. Customer satisfaction was measured using a three-item scale developed by Han and Ryu [115]. Purchase intention was operationalised using a three-item scale originally developed by Coyle and Thorson [116] and later refined by Moon et al. [117]. Hotel image was measured using a three-item scale developed by Nguyen and LeBlanc [118]. All constructs were measured using a five-point Likert-type scale ranging from 1 (strongly

disagree) to 5 (strongly agree). To ensure clarity and content validity, the questionnaire was pilot-tested with 30 hotel guests prior to main data collection. Based on participant feedback, minor wording revisions were made to improve clarity and comprehension. In the final part of the questionnaire, respondents were asked to indicate the percentage premium they would be willing to pay if the hotel implemented the sustainability practices they had personally selected, compared with Scenario A.

4.4. Data Analysis

Analyses were conducted using SmartPLS 4 software. The use of Partial Least Squares Structural Equation Modelling (PLS-SEM) in this study is justified on several methodological grounds. First, the research model includes multiple latent constructs measured through multiple indicators and aims to explain variance in key endogenous variables. Second, the data do not fully satisfy the assumption of multivariate normality. Third, PLS-SEM provides a robust and widely accepted framework for multigroup analysis (PLS-MGA), which is central to the analytical strategy of this study [107].

The data analysis followed the two-step procedure recommended in the structural equation modelling literature, involving first the assessment of the measurement model and subsequently the evaluation of the structural model [107]. In the first stage, confirmatory factor analysis (CFA) was conducted to examine the reliability and validity of the measurement model. Internal consistency reliability was assessed using Cronbach's alpha and composite reliability (CR). Convergent validity was evaluated using the average variance extracted (AVE), while discriminant validity was examined through the Fornell–Larcker criterion and the heterotrait–monotrait ratio (HTMT).

In addition to the structural model evaluation, descriptive statistics and frequency analyses were performed to profile participants' demographic characteristics, identify the most preferred sustainability practices, and examine respondents' willingness to pay for sustainability initiatives. To ensure that the measurement model functioned equivalently across experimental conditions, measurement invariance was assessed using the Measurement Invariance of Composite Models (MICOM) procedure, which is recommended for PLS-SEM-based multigroup comparisons.

Finally, the research hypotheses were tested using multigroup analysis (PLS-MGA) to identify potential differences in structural relationships across the two scenario conditions. To mitigate the risk of common method bias, several procedural remedies were implemented, including assuring respondents of anonymity, emphasising that there were no right or wrong answers, and separating questionnaire sections to reduce evaluation apprehension.

In addition, statistical diagnostics was used to assess the presence of common method bias. Harman's single-factor test indicated that a single factor accounted for 28.266% of the total variance, which is below the recommended threshold of 50% [119]. Furthermore, variance inflation factor (VIF) values ranged between 1.000 and 1.034, well below the critical threshold of 3.3 [120]. Taken together, these results suggest that common method bias is not a concern in this study.

5. Results

5.1. Demographic Characteristics

The demographic profile of the respondents is presented in Table 1. Male participants constituted 54.7% of the sample, while female participants accounted for 45.3%. With respect to age distribution, the largest proportion of respondents fell within the 18–25 age group (36.5%), followed by those aged 26–35 (25.7%), 36–45 (22.5%), and 46–55 (9.1%). Participants aged 56 and above represented a relatively small proportion of the sample

(6.2%). In terms of educational attainment, the majority of respondents were high school graduates (39.7%) or held a bachelor's degree (33.2%). This was followed by associate degree holders (19.2%) and respondents with postgraduate qualifications (7.8%). Regarding income levels, the majority reported a middle-income status (52.1%), followed by high (20.5%), low (16.6%), very low (8.5%), and very high (2.3%) income categories. Regarding travel behaviour, most respondents reported staying in hotels one to two times per year (59.9%). This was followed by those staying three to four times annually (29.3%), five to ten times (7.2%), and eleven or more times per year (3.6%).

Table 1. Demographic Characteristics of The Participants.

Demographic Characteristics		n	%	Demographic Characteristics		n	%
Gender	Female	139	45.3	Age	18–25 years old	112	36.5
	Male	168	54.7		26–35 years old	79	25.7
Education Level	High School	122	39.7		36–45 years old	69	22.5
	Associate Degree	59	19.2		46–55 years old	28	9.1
	Bachelor's Degree	102	33.2		56 years and older	19	6.2
	Postgraduate Degree	24	7.8	Income Level	Very Low	26	8.5
Frequency of Hotel Stays	1–2 times a year	184	59.9		Low	51	16.6
	3–4 times a year	90	29.3		Medium	160	52.1
	5–10 times a year	22	7.2		High	63	20.5
	11 times a year or more	11	3.6		Very High	7	2.3

n: Number of participants.

5.2. Preferred Sustainable Practices in Hotels

Table 2 presents the sustainable practices most preferred by participants in hotel settings. The results indicate that the most frequently preferred sustainable practice is the availability of recycling bins in guest areas (23.7%). Participants also expressed strong support for initiatives such as sharing leftover food with individuals in need (16.1%), reducing single-use plastic products (12.6%), changing towels and linens upon guest request (10.9%), and offering menu options prepared using organic and locally sourced ingredients (9.6%). These findings indicate that hotel guests primarily evaluate sustainability initiatives from the perspective of waste reduction, environmental responsibility, and social welfare. Such preferences reflect growing consumer awareness regarding environmental protection and socially responsible consumption within tourism contexts [121,122].

Table 2. Sustainable Practices Participants Wanted to See in Hotels.

Rank	Sustainable Practices	n	%
1	Recycling bins in guest areas	364	23.7
2	Sharing leftover food with those in need	247	16.1
3	Reducing single-use plastic products (shampoo, water bottles, etc.)	193	12.6
4	Changing towels and linens upon guest request	168	10.9
5	Menu options prepared with organic and local products	147	9.6

5.3. Measurement Model Evaluation

To assess the reliability and validity of the measurement model and to determine whether the measurement scales were consistent with the theoretically proposed factor

structure, confirmatory factor analysis (CFA) was conducted [123]. As presented in Table 3, the factor loadings of the measurement items ranged between 0.717 and 0.920 across both scenarios. All factor loadings exceeded the recommended threshold of 0.70, indicating strong item reliability and eliminating the need to remove any measurement items from the analysis [123]. The goodness-of-fit statistics indicated acceptable model fit for both scenarios. Specifically, Scenario A ($N = 307$; $\chi^2 = 731.837$; $NFI = 0.843$; $SRMR = 0.049$) and Scenario B ($N = 307$; $\chi^2 = 755.938$; $NFI = 0.872$; $SRMR = 0.043$) demonstrated satisfactory levels of model fit according to recommended thresholds [124,125]. These results indicate that the measurement models are consistent with the proposed theoretical framework.

Table 3. Construct Reliability and Convergent Validity Results.

Scales and Dimensions	Items	Scenario A					Scenario B				
		Factor Loadings	AVE	CR	rho_A	Cronbach's Alpha	Factor Loadings	AVE	CR	rho_A	Cronbach's Alpha
CSC	S1	0.813	0.645	0.927	0.917	0.908	0.850	0.670	0.934	0.920	0.918
	S2	0.813					0.755				
	S3	0.785					0.829				
	S4	0.827					0.819				
	S5	0.856					0.802				
	S6	0.717					0.824				
	S7	0.811					0.844				
BSC	S8	0.828	0.664	0.922	0.904	0.899	0.827	0.661	0.921	0.898	0.897
	S9	0.793					0.801				
	S10	0.830					0.793				
	S11	0.834					0.815				
	S12	0.775					0.812				
	S13	0.827					0.830				
ASC	S14	0.899	0.780	0.914	0.866	0.859	0.859	0.803	0.924	0.914	0.879
	S15	0.859					0.913				
	S16	0.891					0.915				
PV	PV1	0.849	0.704	0.905	0.866	0.860	0.877	0.769	0.930	0.900	0.900
	PV2	0.865					0.882				
	PV3	0.825					0.867				
	PV4	0.817					0.880				
CS	CS1	0.818	0.635	0.839	0.718	0.713	0.863	0.744	0.897	0.829	0.828
	CS2	0.765					0.862				
	CS3	0.806					0.863				
PI	PI1	0.896	0.752	0.901	0.844	0.833	0.865	0.753	0.902	0.844	0.837
	PI2	0.779					0.888				
	PI3	0.920					0.850				
HI	HI1	0.789	0.667	0.857	0.755	0.751	0.899	0.779	0.913	0.862	0.858
	HI2	0.836					0.897				
	HI3	0.824					0.850				

CSC: Cognitive Sustainable Consumption, **BSC:** Behavioural Sustainable Consumption, **ASC:** Affective Sustainable Consumption, **PV:** Perceived Value, **CS:** Customer Satisfaction, **PI:** Purchase Intention, **HI:** Hotel Image, **AVE:** Average Variance Extracted, **CR:** Composite Reliability.

Convergent validity was assessed using the average variance extracted (AVE). As shown in Table 3, the AVE values for all constructs exceeded the recommended threshold of 0.50. Furthermore, composite reliability indicators (CR, rho_A, and Cronbach's alpha) were above the recommended thresholds. These findings confirm the reliability and convergent validity of the measurement model.

5.4. Discriminant Validity

Discriminant validity was evaluated using the Fornell–Larcker criterion and the heterotrait–monotrait ratio (HTMT) (Table 4). According to the Fornell–Larcker criterion, the square roots of the AVE values for each construct were greater than the correlations between that construct and other constructs in the model [123]. Additionally, all HTMT values were below the recommended threshold of 0.85 [126]. These results demonstrate that discriminant validity was established for both scenarios.

Table 4. Discriminant Validity.

Fornell Larcker	Scenario A							Scenario B						
	ASC	BSC	CSC	CS	HI	PV	PI	ASC	BSC	CSC	CS	HI	PV	PI
ASC	0.883							0.896						
BSC	0.079	0.815						0.057	0.813					
CSC	0.069	0.112	0.803					0.126	0.138	0.818				
CS	0.143	0.131	0.169	0.797				0.277	0.316	0.394	0.863			
HI	0.098	0.093	0.177	0.471	0.817			0.375	0.398	0.485	0.674	0.883		
PV	0.193	0.237	0.294	0.343	0.570	0.839		0.367	0.469	0.531	0.616	0.782	0.877	
PI	0.062	0.087	0.109	0.263	0.396	0.312	0.867	0.265	0.313	0.297	0.518	0.630	0.585	0.868
HTMT	Scenario A							Scenario B						
	ASC	BSC	CSC	CS	HI	PV	PI	ASC	BSC	CSC	CS	HI	PV	PI
ASC														
BSC	0.097							0.081						
CSC	0.080	0.125						0.136	0.153					
CS	0.183	0.161	0.220					0.320	0.367	0.451				
HI	0.143	0.116	0.210	0.641				0.424	0.452	0.549	0.798			
PV	0.221	0.266	0.324	0.433	0.709			0.399	0.520	0.583	0.714	0.889		
PI	0.072	0.099	0.128	0.334	0.504	0.371		0.298	0.360	0.340	0.619	0.741	0.673	

CSC: Cognitive Sustainable Consumption, BSC: Behavioural Sustainable Consumption, ASC: Affective Sustainable Consumption, PV: Perceived Value, CS: Customer Satisfaction, PI: Purchase Intention, HI: Hotel Image.

5.5. Bootstrapping Results

Figure 2 shows the structural model estimated in the study. The results indicate that the cognitive, affective, and behavioural dimensions of sustainable consumption positively influence perceived value. In turn, perceived value positively influences customer satisfaction, which also affects hotel image and purchase intention.

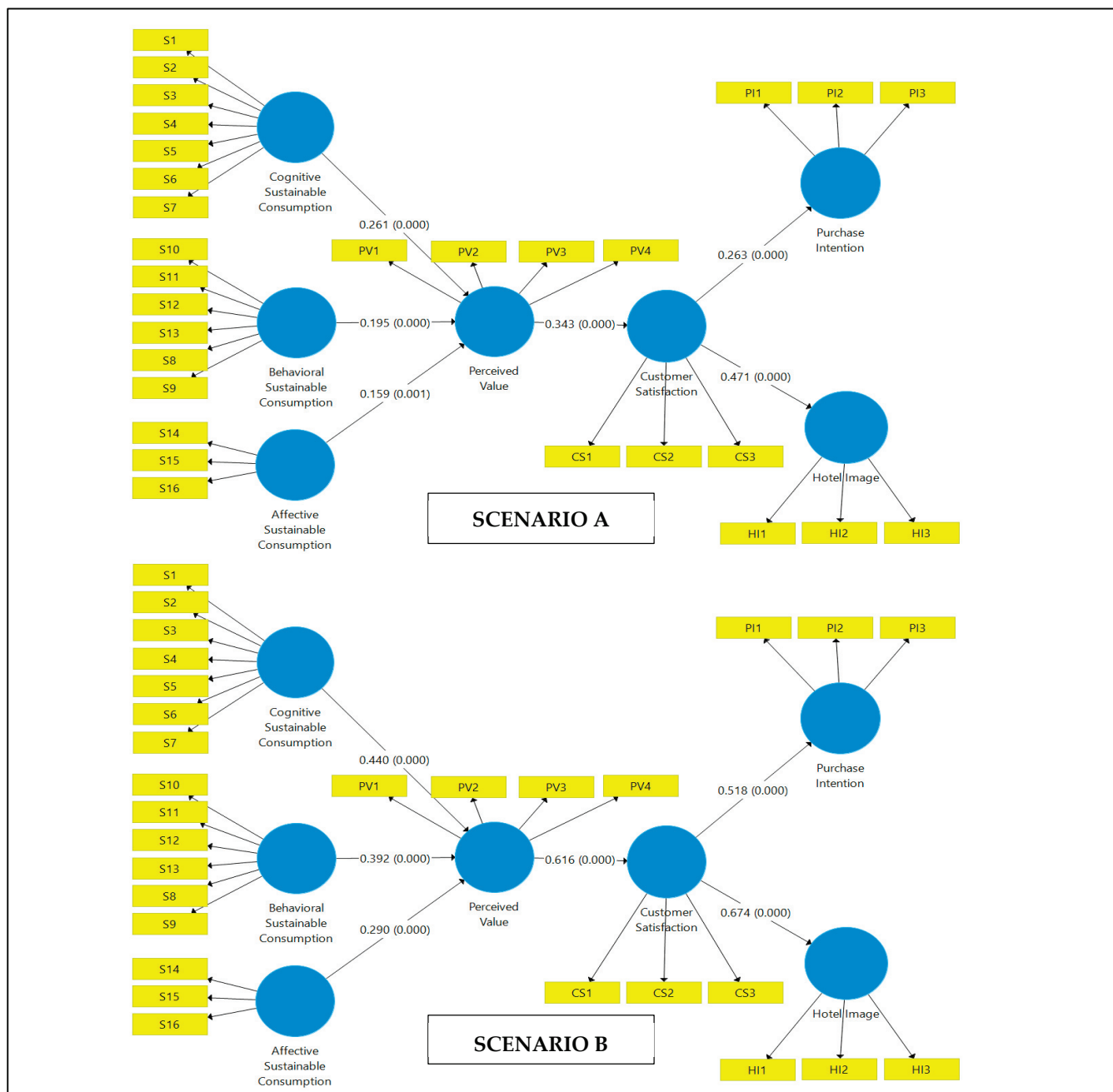


Figure 2. Structural Models.

5.6. Measurement Invariance Assessment

To determine whether the structural relationships differ across the two experimental scenarios, measurement invariance of composite models (MICOM) was assessed prior to conducting a multi-group analysis [127]. The MICOM procedure consists of three steps: configural invariance, compositional invariance, and equality of composite means and variances. Configural invariance was established because the same measurement items and model specifications were used across both scenarios.

The results of the compositional invariance analysis and the equality of composite means and variances are presented in Table 5. The findings indicate that the original correlation values were greater than or equal to the 5% quantile for all constructs, confirming compositional invariance. Regarding the equality of composite means and variances, the results show that the original mean differences for most constructs were within the

2.5% and 97.5% confidence intervals. Variance differences were also within these intervals. Consequently, partial measurement invariance was established, allowing for meaningful comparisons between groups [127].

Table 5. Measurement Invariance of Composite Models (MICOM).

STEP 2					
	Original Correlation	Correlation Permutation Mean	5.0%	Permutation <i>p</i> -Values	
ASC	0.995	0.998	0.994	0.082	
BSC	1.000	0.999	0.997	0.925	
CSC	0.998	0.999	0.998	0.081	
CS	1.000	0.999	0.998	0.557	
HI	0.999	0.999	0.998	0.089	
PV	1.000	1.000	0.999	0.304	
PI	0.997	0.999	0.995	0.147	
STEP 3					
	Mean-Original Difference (A-B)	Mean-Permutation Mean Difference (A-B)	2.5%	97.5%	Permutation <i>p</i> -Values
ASC	0.057	0.002	−0.165	0.161	0.511
BSC	−0.113	−0.003	−0.158	0.155	0.150
CSC	0.113	0.000	−0.156	0.157	0.165
CS	0.040	0.001	−0.170	0.160	0.631
HI	0.239	−0.001	−0.166	0.164	0.006
PV	−0.202	−0.003	−0.168	0.160	0.010
PI	−0.024	−0.000	−0.150	0.171	0.771
	Variance-Original Difference (A-B)	Variance-Permutation Mean Difference (A-B)	2.5%	97.5%	Permutation <i>p</i> -Values
ASC	0.018	0.004	−0.241	0.241	0.913
BSC	0.046	−0.002	−0.214	0.216	0.696
CSC	−0.027	0.004	−0.207	0.224	0.804
CS	−0.060	−0.005	−0.237	0.233	0.631
HI	−0.021	0.002	−0.227	0.219	0.850
PV	−0.019	0.004	−0.216	0.253	0.880
PI	0.014	−0.003	−0.222	0.225	0.894

5.7. Multi-Group Analysis (MGA) Results

PLS-based multi-group analysis (PLS-MGA) was conducted to examine whether structural relationships differed across the two scenarios. The results are presented in Table 6. The findings indicate that the effects of cognitive, affective, and behavioural sustainable consumption on perceived value differ depending on the presence of the illusion of control. Similarly, the relationship between perceived value and customer satisfaction varies across the two scenarios. In addition, the effects of customer satisfaction on both hotel image and purchase intention differ depending on whether guests experience a sense of control over sustainability-related decisions.

Table 6. Partial Least Squares Multi-Group Analysis Results.

PLS- MGA			
	Path Coefficients-Diff (A-B)	<i>p</i> -Value Original 1-Tailed (A vs. B)	<i>p</i> -Value New (A vs. B)
ASC-> PV	−0.130	0.989	0.022
BSC -> PV	−0.196	1.000	0.001
CSC -> PV	−0.179	0.999	0.002
CS -> HI	−0.204	1.000	0.000
CS -> PI	−0.255	1.000	0.000
PV -> CS	−0.273	1.000	0.000

These findings demonstrate that the illusion of control functions as a critical contextual mechanism that strengthens the relationships between sustainable consumption perceptions and customer responses. When hotel guests are given the opportunity to select sustainability initiatives themselves, i.e., when they are given decisional control, they tend to experience a stronger sense of psychological ownership and involvement in the service process [128], i.e., the feeling of illusion of control. Accordingly, hypotheses H_{1a}, H_{1b}, H_{1c}, H₂, H₃, and H₄ were supported.

5.8. Willingness to Pay More Under the Illusion of Control

Table 7 presents the findings regarding participants' willingness to pay higher prices when their preferred sustainability practices are implemented in hotels. The results show that 91.5% of respondents are willing to pay a higher price under such circumstances. The majority of respondents (N = 154) reported that they would be willing to pay 20–39% more. Only 8.5% of participants indicated that they would not be willing to pay a higher price. These findings suggest that perceived decision-making control over sustainability practices enhances consumers' willingness to pay, possibly because such control increases perceived personal relevance and psychological ownership toward the service experience [128,129]. Accordingly, hypothesis H₅ was supported.

Table 7. Willingness to Pay More under the Illusion of Control.

Willingness to Pay More (%)	N	%
0	26	8.5
1–19	71	23.1
20–39	154	50.2
40–59	28	9.1
60–79	7	2.3
80–99	13	4.2
100+	8	2.6
Total	307	100.0

6. Discussion

This study contributes to the hospitality and tourism literature by examining how sustainable consumption perceptions interact with psychological mechanisms of control, particularly decisional control, in shaping hotel guests' evaluations and behavioural intentions. More specifically, the study integrates the concepts of sustainable consumption,

perceived value, customer satisfaction, and behavioural intentions with the psychological concept of the illusion of control. The findings indicate that hotel guests particularly value sustainability initiatives related to recycling, waste reduction, and socially responsible practices. These results are consistent with prior studies suggesting that contemporary tourists increasingly expect tourism providers to engage in environmentally and socially responsible practices [121,122,130].

However, more importantly, the results of the study show that the cognitive, affective, and behavioural dimensions of sustainable consumption positively influence perceived value, particularly when guests are given the opportunity to choose among sustainability initiatives themselves. This finding supports Langer's [64] theory of the illusion of control, which suggests that individuals often perceive greater control over outcomes when they are actively involved in decision-making processes. Hotel guests' cognitive perceptions of sustainable consumption positively influence perceived value. These findings support previous research by Assaker [79] and Kim and Kim [80]. Furthermore, this relationship is strengthened when the illusion of control is high. Evaluating sustainable practices in hotel businesses in terms of performance, functionality, and service quality enhances guests' perceptions of value. For example, in hotels implementing energy-efficient sustainability practices, guests are more likely to perceive higher value when they believe that such practices do not compromise their comfort. This effect becomes even stronger when guests perceive that their individual choices meaningfully contribute to environmental outcomes.

Hotel guests' affective perceptions of sustainable consumption also positively influence perceived value. This finding is consistent with the results reported by Paulose and Shakeel [39]. The illusion of control moderates this relationship. Participation in sustainable practices within hotel settings may generate positive emotions among guests, including satisfaction, pride, and ethical fulfilment. For instance, guests who voluntarily participate in towel and linen reuse programmes may experience positive emotions by believing that they are contributing to environmental sustainability. These emotional responses become stronger, and perceived value increases, when guests perceive such behaviours as resulting from their own choices.

Hotel guests' behavioural perceptions of sustainable consumption similarly exert a positive effect on perceived value. This result is consistent with the findings of Kumar et al. [87] and Saraç [88]. The illusion of control again plays a moderating role in this relationship. Guests' value perceptions may vary depending on how they interpret sustainable practices. For example, low-pressure showerheads designed to conserve water may be perceived negatively by some guests. However, when guests believe that such practices benefit the environment and perceive their participation as voluntary, they are more likely to evaluate these practices positively. Consequently, guests derive greater perceived value from sustainability initiatives.

Perceived value also positively influences hotel guest satisfaction. This finding is consistent with the studies conducted by Paulose and Shakeel [39,131,132] and Rasoolimanesh et al. [48] and aligns with Expectation–Confirmation Theory. According to this theory, hotel guests compare the benefits they receive with their prior expectations, and satisfaction increases when expectations are met or exceeded. For example, guests staying at hotels with sustainable practices may experience higher satisfaction when they perceive that the benefits received justify the price paid. Higher levels of illusion of control further increase the likelihood of guest satisfaction. When guests perceive sustainable practices as an integral part of their self-determined accommodation experience, their satisfaction is further enhanced.

Hotel guests' satisfaction with sustainable practices positively influences the hotel's image. This finding is consistent with the studies of Kandampully and Suhartanto [96,97]

and Kandampully and Hu [95]. The illusion of control moderates this relationship. Guests who perceive sustainable practices as aligned with their own choices and who are satisfied with these practices are more likely to evaluate the hotel as environmentally responsible. As a result, they tend to develop a stronger and more favourable image of the hotel brand. Hotel guest satisfaction also positively affects purchase intention. This finding supports previous research by Berezan et al. [101] and Aluri et al. [100]. Guests who are satisfied with a hotel are more likely to revisit the hotel and recommend it to others. This relationship varies according to the level of illusion of control. For example, guests who are satisfied with a hotel's sustainability initiatives and perceive these experiences as resulting from their own choices are more likely to revisit and recommend the hotel.

Finally, hotel guests demonstrate a stronger preference for hotels that implement sustainable practices. These preferences may vary depending on the illusion of control. For example, guests who choose environmentally friendly hotels and perceive this decision as their own choice, while also believing that their choices contribute positively to environmental sustainability, exhibit a greater willingness to pay premium prices. This finding is consistent with previous studies conducted by Nelson et al. [77] and Yadav et al. [105]. This finding suggests that perceived decisional control and the ensuing state of illusion of control not only influences cognitive evaluations but also affects economic behaviour.

6.1. Theoretical Implications

This study offers several important theoretical contributions. First, the study advances the sustainable tourism literature by conceptualising sustainable consumption as a multidimensional construct encompassing cognitive, affective, and behavioural components. Previous research has often examined sustainable behaviour primarily from an attitudinal perspective. By incorporating multiple dimensions of sustainable consumption, the present study provides a more comprehensive understanding of how sustainability perceptions influence hospitality consumption [121,130].

Second, this study contributes to the literature on perceived decisional control and consumer decision-making by demonstrating that the illusion of control may function as a moderating psychological mechanism in hospitality contexts. Although the concept of illusion of control has been widely studied in psychology, it has received relatively limited attention in tourism and hospitality research [64,133]. The findings indicate that even when the actual influence of guests over sustainability practices may be limited, the mere perception of decision-making authority (decisional control) may significantly influence their evaluations of the service experience [14,76]. Third, the study contributes to self-determination theory [71] by demonstrating that autonomy in sustainability-related decision-making enhances perceived value and satisfaction. According to self-determination theory, individuals experience higher levels of motivation and satisfaction when they perceive themselves as autonomous actors in decision-making processes. Fourth, the findings extend service-dominant logic by demonstrating that consumer participation in sustainability decisions can be interpreted as a form of value co-creation [132,134]. Allowing guests to choose sustainability initiatives, i.e., giving them decisional control, may transform them from passive recipients of service offerings into active participants in value creation processes. Finally, the study contributes to perceived value theory and expectation-disconfirmation theory by demonstrating that perceived value is influenced not only by service attributes but also by psychological perceptions of control and participation [51,135,136].

6.2. Practical Implications

The findings of this study offer several important implications for hotel managers and tourism practitioners. Firstly, the results suggest that hotels should prioritise sustainability

initiatives that are highly visible and directly relevant to guests, such as recycling systems, waste reduction programs, and socially responsible initiatives. For example, hotels may introduce in-room recycling facilities, clearly labelled waste separation bins, and visual cues that enhance the salience of sustainability practices for guests. Such practices not only contribute to environmental sustainability but also enhance guests' perceived value of the hotel experience. Secondly, the findings highlight the importance of incorporating guest participation in the sustainability initiatives. Rather than implementing sustainability practices solely as operational policies, hotel managers may provide guests with choices and opportunities to influence sustainability-related decisions. This can be achieved by incorporating structured decision points into mobile applications or self-service kiosks during the booking or check-in processes.

For example, hotels could allow guests to select preferred sustainability practices through digital platforms or mobile applications prior to their arrival. Guests may also be given options regarding linen reuse programs, waste reduction practices, or sustainable dining choices. Additionally, interactive technologies such as in-room tablets or QR code-based systems can enable guests to modify these preferences throughout their stay. Such initiatives may strengthen guests' perceptions of control, decisional control, and increase their engagement with sustainability initiatives [128,129] due to the feeling of illusion of control [14]. Thirdly, hotels are recommended to communicate sustainability initiatives in a manner that emphasises guest involvement and empowerment. Marketing communications need to highlight that guest are active contributors to sustainability efforts rather than passive observers. This can be supported through personalised messaging, visual dashboards, or progress indicators that illustrate how individual guest choices contribute to environmental outcomes. Finally, the integration digital technologies and artificial intelligence into sustainability decision interfaces may further enhance guests' sense of control. For example, hotels could implement personalised sustainability dashboards that enable guests to customise sustainability options during their stay and monitor their environmental impact in real time, thereby reinforcing engagement and perceived control [137,138].

6.3. Limitations and Directions for Future Research

Despite its contributions, this study has several limitations that need to be acknowledged. Firstly, the empirical data were collected from hotel guests at a single tourist destination (Kuşadası). Although this destination represents a major tourism market, particularly within Türkiye, the findings should be interpreted within its specific socio-cultural and tourism context and may not be directly generalisable to destinations with different cultural, institutional, or service environments. In addition, as data were collected from a single destination, unobserved contextual and cultural factors specific to Kuşadası may have influenced respondents' perceptions, particularly with regard to sustainability attitudes and perceived control. Secondly, the study relied on a scenario-based experimental design. While such designs allow researchers to isolate causal relationships, actual consumer behaviour in real hotel environments may differ. Future studies could employ field experiments or longitudinal research designs to examine how perceived control influences behaviour in real service settings [136]. Thirdly, the study focused primarily on decisional control and the illusion of control as psychological mechanisms. However, other psychological constructs may also influence consumers' responses to sustainability initiatives. Future research may seek to incorporate other variables such as environmental identity, perceived consumer effectiveness, self-efficacy, and moral obligation to develop a more comprehensive model of sustainable tourism behaviour [121,139]. Fourth, future research may explore cross-cultural differences in perceived control and sustainability perceptions,

as cultural values may influence how individuals interpret autonomy and participation in decision-making processes.

Finally, the role of emerging technologies such as artificial intelligence, digital nudging, and personalised sustainability interfaces in shaping tourists' perceptions of control and sustainable behaviour together with the role of human and AI influencers represents a promising direction for future research [137,138,140].

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Institutional Review Board Statement: The study was conducted in accordance with the Declaration of Helsinki, and approved by the Ethics Committee for Tourism and Gastronomy Research of Aydın Adnan Menderes University (protocol code 2026/10-01 and date of approval: 24 March 2026).

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: The data presented in this study are available on reasonable request from the corresponding author. The data are not publicly available due to privacy and ethical restrictions.

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Appendix A

This section presents the measurement items used in the study (see Table A1). The scale items were adapted from prior studies in the relevant literature to measure the constructs included in the research model. Since including these detailed items in the main text would disrupt its flow, they are provided here to enhance the clarity and reproducibility of the study.

Table A1. Measurement items used in the study.

Scales and Dimensions	Items
Cognitive Sustainable Consumption [113]	I believe it is unethical to waste food and other consumable materials.
	I am aware that overconsumption can lead to the depletion of natural resources.
	I believe using environmentally friendly products and services is important.
	I believe individuals should consider future generations.
	I believe protecting the natural environment is everyone's responsibility.
	I know that natural resources are decreasing at an alarming rate.
	I do not like wasting food and drinks.

Table A1. Cont.

Scales and Dimensions	Items
Behavioural Sustainable Consumption [113]	I prefer to buy only what I need.
	I am happy to prioritize environmental well-being.
	I will avoid consumption activities that cause environmental pollution.
	I will spend my money consciously to prevent waste and over-purchasing.
	I will continue contributing to environmental well-being in every way.
Affective Sustainable Consumption [113]	I will not engage in any purchase that has a negative impact on the environment.
	I prefer to buy organic products because they are environmentally friendly.
	I am willing to pay more to buy environmentally friendly products.
	I will continue buying environmentally friendly products even if they are somewhat expensive.
Perceived Value [114]	The service I received at the hotel was worth the price I paid.
	The quality of services offered by the hotel was good for the price.
	The hotel's price was balanced with the benefits it provided.
	Overall, I am satisfied with the service I received at this hotel.
Customer Satisfaction [115]	I felt very happy at the hotel.
	Overall, I have positive feelings about the hotel.
	I will come back to this hotel in the future.
Purchase Intention [116,117]	My likelihood of staying at this hotel is very high.
	I will choose this hotel for my next stay.
	I will definitely try staying at this hotel.
Hotel Image [118]	I have a positive impression of the hotel.
	I think other customers also have a positive image of the hotel.
	This hotel has a better image compared to other hotels.

References

1. Popşa, R.E. Importance of Sustainability in the Hotel Industry. *Expert. J. Bus. Manag.* **2023**, *11*, 183–188.
2. Aragon-Correa, J.A.; Martin-Tapia, I.; de la Torre-Ruiz, J. Sustainability Issues and Hospitality and Tourism Firms' Strategies: Analytical Review and Future Directions. *Int. J. Contemp. Hosp. Manag.* **2015**, *27*, 498–522. [CrossRef]
3. Statista. Available online: <https://www.statista.com/statistics/1339443/reasons-global-travelers-used-sustainable-accommodation/> (accessed on 10 January 2026).
4. Chi, T.; Ganak, J.; Summers, L.; Adesanya, O.; McCoy, L.; Liu, H.; Tai, Y. Understanding Perceived Value and Purchase Intention toward Eco-Friendly Athleisure Apparel. *Sustainability* **2021**, *13*, 7946. [CrossRef]
5. Babu, D.E.; Kaur, A.; Rajendran, C. Sustainability Practices in Tourism Supply Chain: Importance Performance Analysis. *Benchmarking* **2018**, *25*, 1148–1170. [CrossRef]
6. Filimonau, V.; Chiang, C.C.; Wang, L.E.; Muhialdin, B.J.; Ermolaev, V.A. Resourcefulness of chefs and food waste prevention in fine dining restaurants. *Int. J. Hosp. Manag.* **2023**, *108*, 103368. [CrossRef]
7. Juvan, E.; Grün, B.; Dolnicar, S. Waste production patterns in hotels and restaurants: An intra-sectoral segmentation approach. *Ann. Tour. Res. Empir. Insights* **2023**, *4*, 100090. [CrossRef]
8. UNEP. Available online: <https://www.unep.org/resources/publication/food-waste-index-report-2024> (accessed on 10 January 2026).
9. Camilleri, M.A.; Cricelli, L.; Mauriello, R.; Strazzullo, S. Consumer perceptions of sustainable products: A systematic literature review. *Sustainability* **2023**, *15*, 8923. [CrossRef]
10. Statista. Available online: <https://www.statista.com/topics/1916/green-tourism/#topicOverview> (accessed on 10 January 2026).

11. Rahman, I.; Reynolds, D. The influence of values and attitudes on green consumer behavior: A conceptual model of green hotel patronage. *Int. J. Hosp. Tour. Adm.* **2019**, *20*, 47–74. [CrossRef]
12. Preziosi, M.; Acampora, A.; Lucchetti, M.C.; Merli, R. Delighting hotel guests with sustainability: Revamping importance-performance analysis in the light of the three-factor theory of customer satisfaction. *Sustainability* **2022**, *14*, 3575. [CrossRef]
13. Olya, H.; Altinay, L.; Farmaki, A.; Kenebayeva, A.; Gursoy, D. Hotels' sustainability practices and guests' familiarity, attitudes and behaviours. In *Sustainable Consumer Behaviour and the Environment*; Routledge: Abingdon, UK, 2021; pp. 43–61. [CrossRef]
14. Ayyildiz, T.; Ayyildiz, A.Y.; Koc, E. Illusion of control in service failure situations: Customer satisfaction/dissatisfaction, complaints, and behavioural intentions. *Curr. Psychol.* **2024**, *43*, 515–530. [CrossRef]
15. Koc, E. Food consumption in all-inclusive holidays: Illusion of control as an antecedent of inversionary consumption. *Gastron. Tour.* **2016**, *2*, 107–116. [CrossRef]
16. Weiner, B. Intrapersonal and interpersonal theories of motivation from an attributional perspective. *Educ. Psychol. Rev.* **2000**, *121*, 1–14. [CrossRef]
17. Akel, G.; Noyan, E. Exploring the criteria for a green and smart hotel: Insights from hotel managers' perspectives. *J. Hosp. Tour. Insights* **2024**, *7*, 2992–3012. [CrossRef]
18. Güler, O.; Tufan, E. Yeşil Bankacılık ve Yeşil Krediler: Antalya'daki 4–5 Yıldızlı Otel İşletmelerinin Bakış Açıları Üzerine Bir Araştırma. *Anatolia* **2015**, *26*, 80–96. [CrossRef]
19. Han, H. Consumer behavior and environmental sustainability in tourism and hospitality: A review of theories, concepts, and latest research. *J. Sustain. Tour.* **2021**, *29*, 1021–1042. [CrossRef]
20. Nguyen, N.; Johnson, L. Consumer behaviour and environmental sustainability. *J. Consum. Behav.* **2020**, *19*, 539–541. [CrossRef]
21. Yusliza, M.; Amirudin, A.; Rahadi, R.; Athirah, N.; Ramayah, T.; Muhammad, Z.; Mas, D.; Massaro, M.; Saputra, J.; Mokhlis, S. An Investigation of Pro-Environmental Behaviour and Sustainable Development in Malaysia. *Sustainability* **2020**, *12*, 7083. [CrossRef]
22. Zeng, Z.; Zhong, W.; Naz, S. Can Environmental Knowledge and Risk Perception Make a Difference? The Role of Environmental Concern and Pro-Environmental Behavior in Fostering Sustainable Consumption Behavior. *Sustainability* **2023**, *15*, 4791. [CrossRef]
23. Botha, E.; Wiese, M. Modelling zero waste behavioural intent: The moderating role of perceived behavioural control and Socio-Demographic factors. *Clean. Responsib. Consum.* **2024**, *12*, 100177. [CrossRef]
24. Cedrún-Vázquez, E.; Núñez-Ríos, J.; Sánchez-García, J.; Sosa-Gómez, G.; Rojas, O. Structural Equation Modeling for Analyzing Pro-Environmental Behavior in Switzerland. *Sustainability* **2025**, *17*, 3624. [CrossRef]
25. Joshi, Y.; Yadav, R.; Shankar, A. The interplay of emotional value, trend affinity and past practices in sustainable consumption: An application of theory of reciprocal determinism. *J. Strat. Mark.* **2025**, *33*, 337–355. [CrossRef]
26. Hilgard, E.R. The trilogy of mind: Cognition, affection, and conation. *J. Hist. Behav. Sci.* **1980**, *16*, 107–117. [CrossRef] [PubMed]
27. Quoquab, F.; Mohammad, J. Cognitive, affective and conative domains of sustainable consumption: Scale development and validation using confirmatory composite analysis. *Sustainability* **2020**, *12*, 7784. [CrossRef]
28. Oliver, R.L. Whence consumer loyalty? *J. Mark.* **1999**, *63*, 33–44. [CrossRef]
29. Ding, J.; Lee, E.S. Promoting consumers' sustainable consumption of online retail cold chain logistics services: Extended applications of SOR and cognitive-affective-conative theories. *Behav. Sci.* **2024**, *14*, 771. [CrossRef]
30. Lerner, J.S.; Li, Y.; Valdesolo, P.; Kassam, K.S. Emotion and decision making. *Annu. Rev. Psychol.* **2015**, *66*, 799–823. [CrossRef]
31. Mellers, B.A.; McGraw, A.P. Anticipated emotions as guides to choice. *Curr. Dir. Psychol. Sci.* **2001**, *10*, 210–214. [CrossRef]
32. Betzler, S.; Kempen, R.; Mueller, K. Predicting sustainable consumption behavior: Knowledge-based, value-based, emotional and rational influences on mobile phone, food and fashion consumption. *Int. J. Sustain. Dev. World Ecol.* **2022**, *29*, 125–138. [CrossRef]
33. Yao, L.; Guo, Y.; Zou, X.; Zhang, Y.; Zhang, Z.; Xing, S. Effect of sense of control on emotional experience and response in Chinese undergraduate students. *Front. Psychol.* **2025**, *16*, 1593500. [CrossRef]
34. Wang, K.S.; Yang, Y.-Y.; Delgado, M.R. How perception of control shapes decision making. *Curr. Opin. Behav. Sci.* **2021**, *41*, 162–168. [CrossRef]
35. Conte, B.; Hahnel, U.J.; Brosch, T. From values to emotions: Cognitive appraisal mediates the impact of core values on emotional experience. *Emotion* **2023**, *23*, 1115. [CrossRef]
36. Nimri, R.; Patiar, A.; Kensbock, S. A green step forward: Eliciting consumers' purchasing decisions regarding green hotel accommodation in Australia. *J. Hosp. Tour. Manag.* **2017**, *33*, 43–50. [CrossRef]
37. Patwary, A.K.; Aziz, R.C.; Hashim, N.A.A.N. Investigating tourists' intention toward green hotels in Malaysia: A direction on tourist sustainable consumption. *Environ. Sci. Pollut. Res.* **2023**, *30*, 38500–38511. [CrossRef] [PubMed]
38. Ipsos. Available online: http://www.ipsos.com/sites/default/files/ct/news/documents/2022-06/Ipsos%20for%20Europ%20Assistance%20-%20Holiday%20Barometer%202022_Short%20version.pdf (accessed on 10 January 2026).
39. Paulose, D.; Shakeel, A. Perceived experience, perceived value and customer satisfaction as antecedents to loyalty among hotel guests. *J. Qual. Assur. Hosp. Tour.* **2022**, *23*, 447–481. [CrossRef]
40. Lee, C.Y.; Fan, W.S.; Tsai, M.C. The Mediating Role of Employee Perceived Value in the ESG–Sustainability Link: Evidence from Taiwan's Green Hotel Industry. *Tour. Hosp.* **2025**, *6*, 153. [CrossRef]

41. KPMG. Available online: <https://kpmg.com/us/en/articles/2024/sustainability-organization-survey.html> (accessed on 10 January 2026).
42. Danish, M.; Ali, S.; Ahmad, M.A.; Zahid, H. Influencing factors on choice behavior regarding green electronic products: Based on green perceived value model. *Economies* **2019**, *7*, 99. [CrossRef]
43. Riva, F.; Magrizos, S.; Rubel, M.R.B.; Rizomyliotis, I. Green consumerism, green perceived value, and restaurant revisit intention: Millennials' sustainable consumption with moderating effect of green perceived quality. *Bus. Strat. Environ.* **2022**, *31*, 2807–2819. [CrossRef]
44. Biswas, A.; Roy, M. Leveraging factors for sustained green consumption behavior based on consumption value perceptions: Testing structural model. *J. Clean. Prod.* **2015**, *95*, 332–340. [CrossRef]
45. Damais, J.F.; Weaver, H. Embedding ESG in Experience: Strengthening Customer Relationships and Doing Right by the World. Available online: <https://www.ipsos.com/sites/default/files/ct/publication/documents/2023-03/EmbeddingESGinExperience.pdf> (accessed on 10 January 2026).
46. Kotler, P.; Keller, K.L. *Marketing Management*, 13th ed.; Prentice Hall: Upper Saddle River, NJ, USA, 2009.
47. Van Tonder, E.; Petzer, D.J.; van Vuuren, N.; De Beer, L.T. Perceived value, relationship quality and positive WOM intention in banking. *Int. J. Bank Mark.* **2018**, *36*, 1347–1366. [CrossRef]
48. Rasoolimanesh, S.M.; Iranmanesh, M.; Seyfi, S.; Ari Ragavan, N.; Jaafar, M. Effects of perceived value on satisfaction and revisit intention: Domestic vs. international tourists. *J. Vacat. Mark.* **2023**, *29*, 222–241. [CrossRef]
49. Saut, M.; Bie, S. Impact of service expectation, experiential quality, and perceived value on hotel customer satisfaction. *J. Qual. Assur. Hosp. Tour.* **2024**, *25*, 781–809. [CrossRef]
50. Kim, K.H.; Park, D.B. Relationships among perceived value, satisfaction, and loyalty: Communitybased ecotourism in Korea. *J. Travel Tour. Mark.* **2017**, *34*, 171–191. [CrossRef]
51. Oliver, R.L. Measurement and evaluation of satisfaction processes in retail settings. *J. Retail.* **1981**, *57*, 25–48.
52. Gao, Y.L.; Mattila, A.S. Improving consumer satisfaction in green hotels: The roles of perceived warmth, perceived competence, and CSR motive. *Int. J. Hosp. Manag.* **2014**, *42*, 20–31. [CrossRef]
53. Lin, C.C.; Nugraha, K.S.; Hsu, Y.J. Effect of Sustainable Development Goals on Customer Satisfaction, Customer Loyalty and Role of Brand Image in Green Hotels. *Adv. Manag. Appl. Econ.* **2025**, *15*, 1–7. [CrossRef]
54. Nguyen, N.; Leblanc, G. Contact personnel, physical environment and the perceived corporate image of intangible services by new clients. *Int. J. Serv. Ind. Manag.* **2002**, *13*, 242–262. [CrossRef]
55. Simoes, C.; Dibb, S.; Fisk, R.P. Managing corporate identity: An internal perspective. *J. Acad. Mark. Sci.* **2005**, *33*, 153–168. [CrossRef]
56. Dichter, E. What's in an image. *J. Consum. Mark.* **1985**, *2*, 75–81. [CrossRef]
57. Keaveney, S.M.; Hunt, K.A. Conceptualization and operationalization of retail store image: A case of rival middle-level theories. *J. Acad. Mark. Sci.* **1992**, *20*, 165–175. [CrossRef]
58. Liat, C.B.; Mansori, S.; Huei, C.T. The associations between service quality, corporate image, customer satisfaction, and loyalty: Evidence from the Malaysian hotel industry. *J. Hosp. Mark. Manag.* **2014**, *23*, 314–326. [CrossRef]
59. Nguyen, N.; LeBlanc, G. The mediating role of corporate image on customers' retention decisions: An investigation in financial services. *Int. J. Bank Mark.* **1998**, *16*, 52–65. [CrossRef]
60. Nguyen, N. The collective impact of service workers and servicescape on the corporate image formation. *Int. J. Hosp. Manag.* **2006**, *25*, 227–244. [CrossRef]
61. Ali, F. Hotel website quality, perceived flow, customer satisfaction and purchase intention. *J. Hosp. Tour. Technol.* **2016**, *7*, 213–228. [CrossRef]
62. Mirabi, V.; Akbariyeh, H.; Tahmasebifard, H. A Study of Factors Affecting on Customers Purchase Intention Case Study: The Agencies of Bono Brand Tile in Tehran. *J. Multidiscip. Eng. Sci. Technol.* **2015**, *2*, 267–273.
63. Yarmoglu, E.; Binboga, G. Understanding sustainable consumption in an emerging country: The antecedents and consequences of the ecologically conscious consumer behavior model. *Bus. Strat. Environ.* **2019**, *28*, 642–651. [CrossRef]
64. Langer, E.J. The illusion of control. *J. Pers. Soc. Psychol.* **1975**, *32*, 311–328. [CrossRef]
65. Anderson, E.C.; Carleton, R.N.; Diefenbach, M.; Han, P.K.J. The relationship between uncertainty and affect. *Front. Psychol.* **2019**, *10*, 2504. [CrossRef] [PubMed]
66. Beisswingert, B.M.; Zhang, K.; Goetz, T.; Fang, P.; Fischbacher, U. The effects of subjective loss of control on risk-taking behavior: The mediating role of anger. *Front. Psychol.* **2015**, *6*, 774. [CrossRef]
67. Carleton, R.N. The intolerance of uncertainty construct in the context of anxiety disorders: Theoretical and practical perspectives. *Expert Rev. Neurother.* **2012**, *12*, 937–947. [CrossRef] [PubMed]
68. Averill, J.R. Personal control over aversive stimuli and its relationship to stress. *Psychol. Bull.* **1973**, *80*, 286–303. [CrossRef]
69. Méndez, M.L.; Padrón, I.; Fumero, A.; Marrero, R.J. Effects of internet and smartphone addiction on cognitive control in adolescents and young adults: A systematic review of fMRI studies. *Neurosci. Biobehav. Rev.* **2024**, *159*, 105572. [CrossRef]

70. Joosten, H.; Bloemer, J.; Hillebrand, B. Consumer control in service recovery: Beyond decisional control. *J. Serv. Manag.* **2017**, *28*, 499–519. [CrossRef]
71. Ryan, R.M.; Deci, E.L. Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *Am. Psychol.* **2000**, *55*, 68–78. [CrossRef]
72. Gan, I.; Conroy, D. Control or Losing Control: Consumer Perceptions of Controlled Environment Agriculture (CEA) Based on Focus Group Findings. *Sustainability* **2024**, *16*, 4883. [CrossRef]
73. Lin, Y.; Liu, G.; Chang, C.; Lin, C.; Huang, C.; Chen, L.; Yeh, T. Perceived Behavioral Control as a Mediator between Attitudes and Intentions toward Marine Responsible Environmental Behavior. *Water* **2021**, *13*, 580. [CrossRef]
74. Salleh, M.; Misron, A.; Musa, N. Examining the Mediating Effects of Perceived Behavioral Control and Purchase Intention on Sustainable Consumer Behavior. *Int. J. Acad. Res. Bus. Soc. Sci.* **2024**, *14*, 3951–3972. [CrossRef] [PubMed]
75. Bendapudi, N.; Leone, R.P. Psychological implications of customer participation in co-production. *J. Mark.* **2003**, *67*, 14–28. [CrossRef]
76. Koc, E. Inversionary and liminoidal consumption: Gluttony on holidays and obesity. *J. Travel Tour. Mark.* **2013**, *30*, 825–838. [CrossRef]
77. Nelson, K.M.; Partelow, S.; Stäbler, M.; Graci, S.; Fujitani, M. Tourist willingness to pay for local green hotel certification. *PLoS ONE* **2021**, *16*, e0245953. [CrossRef] [PubMed]
78. Velaoras, K.; Menegaki, A.N.; Polyzos, S.; Gotzamani, K. The mediation effect of perceived behavioral control in ethical consumerism: A TPB approach to willingness to pay for eco-certified hotels. *Tour. Hosp. Res.* **2025**, *25*, 1–15. [CrossRef]
79. Assaker, G. Effects of hotel green business practices on consumers' loyalty intentions: Expanded multidimensional service model in upscale segment. *Int. J. Contemp. Hosp. Manag.* **2020**, *32*, 3787–3807. [CrossRef]
80. Kim, Y.J.; Kim, H.S. Impact of hotel customer experience on customer satisfaction through online reviews. *Sustainability* **2022**, *14*, 848. [CrossRef]
81. Yildiz, O.; Kelleci, A. Determinants of Sustainable Consumption Behavior: A Field Study on Turkish Gen Z. *Akad. Hassasiyetler* **2023**, *10*, 1–21. [CrossRef]
82. Falke, A.; Schröder, N.; Hofmann, C. The influence of values in sustainable consumption among millennials. *J. Bus. Econ.* **2022**, *92*, 899–928. [CrossRef]
83. Zhang, J.; Sheng, S.; Xu, X. How perceived life control shapes sustainable consumption: The role of outcome efficacy. *Psychol. Mark.* **2023**, *40*, 735–749. [CrossRef]
84. Hartmann, P.; Apaolaza-Ibañez, V. Consumer attitude and purchase intention toward green energy brands: Roles of psychological benefits and environmental concern. *J. Bus. Res.* **2012**, *65*, 1254–1263. [CrossRef]
85. Su, Q.; Li, F. Gain or loss? Congruence effect of message framing and mindset on consumers' willingness to pay premium for pro-environmental hotels. *J. Sustain. Tour.* **2024**, *32*, 713–736. [CrossRef]
86. Shao, C.; Lin, S. Do psychological costs matter? The mechanism of perceived value on green consumption behaviour. *Humanit. Soc. Sci. Commun.* **2024**, *11*, 1490. [CrossRef]
87. Kumar, S.; Vivekanand; Wadia, A.; Powar, A. Consumers Satisfaction Level Towards Sustainable Practices of 5-Star Category Hotels of Mumbai. *PUSA J. Hosp. Appl. Sci.* **2025**, *11*, 47–55. [CrossRef]
88. Saraç, Ö. Kültür turistlerinin sürdürülebilir tüketim davranışlarının cinsiyete göre farklılıkları: Safranbolu üzerinde bir araştırma. *J. Human. Tour. Res.* **2022**, *12*, 265–283. [CrossRef]
89. Ayar, I.; Gürbüz, A. Sustainable consumption intentions of consumers in Turkey: A research within the theory of planned behavior. *SAGE Open* **2021**, *11*, 21582440211047563. [CrossRef]
90. Hosta, M.; Žabkar, V. Antecedents of environmentally and socially responsible sustainable consumer behavior. *J. Bus. Ethics* **2021**, *171*, 273–293. [CrossRef]
91. Deng, W.; Yeh, M.L.; Sung, M.L. A customer satisfaction index model for international tourist hotels: Integrating consumption emotions into the American customer satisfaction index. *Int. J. Hosp. Manag.* **2013**, *35*, 133–140. [CrossRef]
92. Milfelner, B.; Snoj, B.; Korda, A.P. Measurement of perceived quality, perceived value, image, and satisfaction interrelations of hotel services: Comparison of tourists from Slovenia and Italy. *Drus. Istraz.* **2011**, *20*, 605–624. [CrossRef]
93. Blut, M.; Chaney, D.; Lunardo, R.; Mencarelli, R.; Grewal, D. Customer perceived value: A comprehensive meta-analysis. *J. Serv. Res.* **2023**, *27*, 501–524. [CrossRef]
94. Islam, Q.; Khan, S. Assessing consumer behavior in sustainable product markets: A structural equation modeling approach with partial least squares analysis. *Sustainability* **2024**, *16*, 3400. [CrossRef]
95. Kandampully, J.; Hu, H.-H. Do hoteliers need to manage image to retain loyal customers? *Int. J. Contemp. Hosp. Manag.* **2007**, *19*, 435–443. [CrossRef]
96. Kandampully, J.; Suhartanto, D. Customer loyalty in the hotel industry: The role of customer satisfaction and image. *Int. J. Contemp. Hosp. Manag.* **2000**, *12*, 346–351. [CrossRef]

97. Kandampully, J.; Suhartanto, D. The role of customer satisfaction and image in gaining customer loyalty in the hotel industry. *J. Hosp. Leis. Mark.* **2003**, *10*, 3–25. [CrossRef]
98. Nikou, S.; Selamat, H.B.; Yusoff, R.C.M.; Khiabani, M.M. Corporate/Hotel Image, Customer Satisfaction, and Customer Loyalty: A Literature Review (1983–2013). *Int. J. Res. Manag.* **2016**, *6*, 43–56.
99. Jani, D.; Han, H. Personality, satisfaction, image, ambience, and loyalty: Testing their relationships in the hotel industry. *Int. J. Hosp. Manag.* **2014**, *37*, 11–20. [CrossRef]
100. Aluri, A.; Slevitch, L.; Larzelere, R. The influence of embedded social media channels on travelers' gratifications, satisfaction, and purchase intentions. *Cornell Hosp. Q.* **2016**, *57*, 250–267. [CrossRef]
101. Berezan, O.; Raab, C.; Yoo, M.; Love, C. Sustainable hotel practices and nationality: The impact on guest satisfaction and guest intention to return. *Int. J. Hosp. Manag.* **2013**, *34*, 227–233. [CrossRef]
102. Gopalakishna, P.; Mummalaneni, V. Influencing satisfaction for dental services. *J. Health Care Mark.* **1993**, *13*, 16–22.
103. Kose, S.; Cizer, E. Deneyimsel pazarlamanın müşteri memnuniyeti ve müşteri sadakati ile ilişkisi: Akıllı telefon sektörüne yönelik bir araştırma. *Bus. Econ. Res. J.* **2021**, *12*, 219–232. [CrossRef]
104. Majeed, M.; Asare, C.; Fatawu, A.; Abubakari, A. Customer satisfaction and engagement on social media and repurchase intention in hospitality industry. *Cogent Bus. Manag.* **2022**, *9*, 2028331. [CrossRef]
105. Millar, M.; Baloglu, S. Hotel guests' preferences for green guest room attributes. *Cornell Hosp. Q.* **2011**, *52*, 302–311. [CrossRef]
106. Fauzi, M.A.; Hanafiah, M.H.; Kunjuraman, V. Tourists' intention to visit green hotels: Building on the theory of planned behaviour and the value-belief-norm theory. *J. Tour. Futures* **2024**, *10*, 255–276. [CrossRef]
107. Hair, J.; Alamer, A. Partial Least Squares Structural Equation Modeling (PLS-SEM) in second language and education research: Guidelines using an applied example. *Res. Methods Appl. Ling.* **2022**, *1*, 100027. [CrossRef]
108. Aguinis, H.; Bradley, K.J. Best practice recommendations for designing and implementing experimental vignette methodology studies. *Organ. Res. Methods* **2014**, *17*, 351–371. [CrossRef]
109. Altunisik, R.; Boz, H.; Gegez, E.; Koc, E.; Sigri, U.; Yildiz, E.; Yuksell, A. *Sosyal Bilimlerde Araştırma Yöntemleri: Yeni Perspektifler*; Seçkin Yayıncılık: Ankara, Türkiye, 2023.
110. Sekaran, U.; Bougie, R. *Research Methods for Business: A Skill Building Approach*; John Wiley & Sons: Hoboken, NJ, USA, 2016.
111. Gorsuch, R.L. *Factor Analysis: Classic Edition*; Routledge: London, UK, 2014. [CrossRef]
112. Nunnally, J.C. *Psychometric Theory*, 2nd ed.; McGraw-Hill: Columbus, OH, USA, 1978.
113. Akgün, A.A.; Kortunay, N. Sürdürülebilir tüketim ölçeğinin Türkçeye uyarlanması: Geçerlik ve güvenirlik çalışması. *Bus. Econ. Res. J.* **2024**, *15*, 419–433. [CrossRef]
114. Chitty, B.; Ward, S.; Chua, C. An application of the ECSI model as a predictor of satisfaction and loyalty for backpacker hostels. *Mark. Intell. Plan.* **2007**, *25*, 563–580. [CrossRef]
115. Han, H.; Ryu, K. The roles of the physical environment, price perception, and customer satisfaction in determining customer loyalty in the restaurant industry. *J. Hosp. Tour. Res.* **2009**, *33*, 490–491. [CrossRef]
116. Coyle, J.R.; Thorson, E. The effects of progressive levels of interactivity and vividness in web marketing sites. *J. Advert.* **2001**, *30*, 65–77. [CrossRef]
117. Moon, J.; Chadee, D.; Tikoo, S. Culture, product type, and price influences on consumer purchase intention to buy personalized products online. *J. Bus. Res.* **2008**, *61*, 31–39. [CrossRef]
118. Nguyen, N.; Leblanc, G. Corporate image and corporate reputation in customers' retention decisions in services. *J. Retail. Consum. Serv.* **2001**, *8*, 227–236. [CrossRef]
119. Harman, H.H. *Modern Factor Analysis*; University of Chicago Press: Chicago, IL, USA, 1976.
120. Kock, N. Common method bias in PLS-SEM: A full collinearity assessment approach. *Int. J. e-Collab.* **2015**, *11*, 1–10. [CrossRef]
121. Han, H.; Lee, J.S.; Trang, H.L.T.; Kim, W. Water conservation and waste reduction management for increasing guest loyalty and green hotel practices. *Int. J. Hosp. Manag.* **2018**, *75*, 58–66. [CrossRef]
122. Gössling, S.; Higham, J. The low-carbon imperative: Destination management under urgent climate change. *J. Travel Res.* **2021**, *60*, 1167–1179. [CrossRef]
123. Hair, J.F.; Black, W.C.; Babin, B.J.; Anderson, R.E. *Multivariate Data Analysis: A Global Perspective*, 7th ed.; Pearson: Upper Saddle River, NJ, USA, 2013.
124. Henseler, J.; Dijkstra, T.K.; Sarstedt, M.; Ringle, C.M.; Diamantopoulos, A.; Straub, D.W.; Ketchen, D.J.; Hair, J.F.; Hult, G.T.M.; Calantone, R.J. Common beliefs and reality about PLS: Comments on Rönkkö and Evermann (2013). *Organ. Res. Methods* **2014**, *17*, 182–209. [CrossRef]
125. Schermelleh-Engel, K.; Moosbrugger, H.; Müller, H. Evaluating the fit of structural equation models: Tests of significance and descriptive goodness-of-fit measures. *Methods Psychol. Res. Online* **2003**, *8*, 23–74.
126. Henseler, J.; Ringle, C.M.; Sarstedt, M. A new criterion for assessing discriminant validity in variance-based structural equation modeling. *J. Acad. Mark. Sci.* **2015**, *43*, 115–135. [CrossRef]

127. Henseler, J.; Ringle, C.M.; Sarstedt, M. Testing measurement invariance of composites using partial least squares. *Int. Mark. Rev.* **2016**, *33*, 405–431. [CrossRef]
128. Fuchs, C.; Prandelli, E.; Schreier, M. The psychological effects of empowerment strategies on consumers' product demand. *J. Mark.* **2010**, *74*, 65–79. [CrossRef]
129. Norton, M.I.; Mochon, D.; Ariely, D. The IKEA effect: When labor leads to love. *J. Consum. Psychol.* **2012**, *22*, 453–460. [CrossRef]
130. Dolnicar, S. Designing for more environmentally friendly tourism. *Ann. Tour. Res.* **2020**, *84*, 102933. [CrossRef]
131. Prahalad, C.K.; Ramaswamy, V. Co-creation experiences: The next practice in value creation. *J. Interact. Mark.* **2004**, *18*, 5–14. [CrossRef]
132. Vargo, S.L.; Lusch, R.F. Service-dominant logic: Continuing the evolution. *J. Acad. Mark. Sci.* **2008**, *36*, 1–10. [CrossRef]
133. Fast, N.J.; Gruenfeld, D.H.; Sivanathan, N.; Galinsky, A.D. Illusory control: A generative force behind power's far-reaching effects. *Psychol. Sci.* **2009**, *20*, 502–508. [CrossRef]
134. Grönroos, C. Value co-creation in service logic: A critical analysis. *Mark. Theory* **2011**, *11*, 279–301. [CrossRef]
135. Zeithaml, V.A. Consumer perceptions of price, quality, and value: A means-end model and synthesis of evidence. *J. Mark.* **1988**, *52*, 2–22. [CrossRef]
136. Koc, E. Service failures and recovery in hospitality and tourism: A review of literature and recommendations for future research. *J. Hosp. Mark. Manag.* **2019**, *28*, 513–537. [CrossRef]
137. Buhalis, D.; Leung, R. Smart hospitality—Interconnectivity and interoperability towards an ecosystem. *Int. J. Hosp. Manag.* **2018**, *71*, 41–50. [CrossRef]
138. Koc, E.; Hatipoglu, S.; Kivrak, O.; Celik, C.; Koc, K. Houston, we have a problem!: The use of ChatGPT in responding to customer complaints. *Technol. Soc.* **2023**, *74*, 102333. [CrossRef]
139. White, K.; Habib, R.; Hardisty, D.J. How to SHIFT consumer behaviors to be more sustainable: A literature review and guiding framework. *J. Mark.* **2019**, *83*, 22–49. [CrossRef]
140. Celik, F.; Koc, E.; Yildiz, S.Y.; Tarim, E.; Daryanto, A. Exploring the potential of the pratfall effect in travel influencer marketing. *J. Hosp. Tour. Manag.* **2026**, *66*, 101388. [CrossRef]

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Article

Does Sustainability Pay in Tourism? Market Segmentation and Green Premiums in the Restaurant Industry

Zhixue Liao, Zhibin Xing * and Xinyu Gou

School of Business Administration, Southwestern University of Finance and Economics, 555 Liutai Avenue, Chengdu 611130, China

* Correspondence: bingo@smail.swufe.edu.cn

Abstract

Within the hospitality sector, restaurants face growing pressure to integrate sustainable practices while maintaining economic viability. Two fundamental questions remain: do sustainability practices command price premiums, and does this relationship vary across market segments? This study employs dictionary-based text analysis to quantify sustainability practices from approximately 4.4 million consumer reviews spanning 38,930 U.S. restaurants (2018–2023). We make two methodological contributions: First, we identify a measurement artifact—sigmoid normalization applied to sparse keyword data can inflate regression coefficients by $25\text{--}44\times$ —and we propose a log-density transformation that preserves measurement validity. Second, using hedonic pricing models with city and cuisine fixed effects, ordered logit specifications, and interaction models, we document a monotonically decreasing relationship between restaurant quality and sustainability-associated price premiums. Lower-rated establishments (<3.0 stars) exhibit a positive premium of $+2.60\%$, mid-tier restaurants ($3.0\text{--}4.0$ stars) exhibit -0.61% , and higher-rated establishments (>4.0 stars) exhibit -2.06% . The interaction between sustainability and star rating is strongly negative ($\beta_{\text{int}} = -0.042$, $p < 0.001$), indicating that sustainability's marginal pricing association diminishes by approximately 4.2 percentage points per additional star. These results suggest that sustainability functions as a quality signal in lower-tier markets but transitions to a baseline expectation in higher-quality segments. The findings inform differentiated strategies for restaurant operators, certification bodies, and policymakers.

Keywords: restaurant sustainability; green premium; hedonic pricing; dictionary-based text analysis; market segmentation; hospitality; text mining; measurement artifacts

1. Introduction

The tourism and hospitality industries occupy a central position in global sustainability transformation. As the sector recovers from pandemic-era disruptions, stakeholders face growing pressure to reconcile business operations with environmental imperatives while preserving economic viability [1,2]. Digital technologies increasingly facilitate evidence-based sustainability assessment across hospitality ecosystems [3]. Within this context, food service establishments—integral to destination competitiveness and visitor experience—represent both significant environmental liabilities [4,5] and potential pathways for sustainable innovation [6].

Restaurants constitute a critical yet insufficiently examined dimension of hospitality sustainability. The food service sector accounts for approximately 8–10% of global greenhouse gas emissions through energy-intensive operations, supply chain logistics, and food

waste generation [7]. In the United States alone, restaurants generate over 11 million tons of annual food waste while consuming substantial water and energy resources [8]. These environmental externalities directly intersect with the United Nations Sustainable Development Goals, particularly SDG 12 (Responsible Consumption and Production) and SDG 13 (Climate Action).

Consumer environmental awareness has intensified in recent years [9], with diners showing growing interest in sustainable dining options beyond superficial “greenwashing” claims [10]. Restaurants respond through sustainability practices including local and organic sourcing, waste reduction protocols, energy-efficient equipment, and water conservation technologies [11,12]. The concept of “sustainable sushi,” for example, illustrates how leading sushi restaurants globally are implementing self-disclosed food sustainability measures [13]. The economic viability of these sustainability practices, specifically, whether they command sufficient price premiums to offset implementation costs, presents a complex challenge: do these practices command sufficient price premiums to offset implementation costs or do they necessitate ongoing subsidization?

Existing empirical evidence yields divergent conclusions regarding sustainability’s economic returns in hospitality. Some studies document positive “green premiums,” including eco-certification revenue effects in hotels [14], consumer willingness to pay for sustainable food products [15], brand-framing effects on green hotel premiums [16], and legacy-motivated packaging premiums [17]. Others report ambiguous or negative effects: Andreica Mihut et al. [18] explored the “green paradox” whereby perceived greenwashing erodes consumer trust, producing negative economic consequences; Haldorai et al. [19] found through longitudinal analysis that the relationship between environmental practices and financial performance remains inconclusive, as implementation costs may offset financial gains; and Elhoushy et al. [20] confirmed in a systematic review that sustainable tourism certifications yield mixed results, with many failing to deliver the expected economic returns. We contend that these contradictions reflect several interrelated methodological shortcomings: Standard text analysis normalization techniques can substantially distort coefficient estimates when applied to sparse keyword data—a computational artifact we identify and quantify below. Existing studies also share a sampling constraint: reliance on small samples (typically $N < 1000$) and self-reported metrics limits statistical power and external validity. Compounding both issues, the prevailing failure to accommodate market positioning heterogeneity obscures segment-specific dynamics that pooled estimates cannot capture.

The central research questions guiding this investigation are: how does the association between sustainability practices and restaurant pricing vary across market quality segments, and what measurement considerations affect the reliability of text-based sustainability quantification?

This study analyzes 38,930 U.S. restaurants and approximately 4.4 million consumer reviews (2018–2023) to examine how sustainability-associated price premiums vary across market segments. Using dictionary-based text analysis, hedonic pricing models with city and cuisine fixed effects, ordered logit specifications, and interaction models, we document a monotonically decreasing pattern: sustainability practices are associated with positive price premiums in lower-rated restaurants (+2.60%), declining to negative associations in mid-rated (−0.61%) and higher-rated (−2.06%) establishments. This pattern is confirmed by a strongly negative sustainability $\times$ stars interaction ($\beta = -0.042$, $p < 0.001$) and is robust to alternative specifications including ordered logit models and city-clustered standard errors.

These findings carry implications for operators, policymakers, and researchers alike. Restaurant operators can calibrate sustainability investment strategies to their market

positioning, while certification bodies and policymakers may benefit from designing differentiated support programs rather than uniform incentive structures. From a methodological standpoint, pooled estimates of sustainability premiums can obscure meaningful variation across quality segments—a risk that extends to the broader empirical literature.

The study makes three contributions: Methodologically, we identify and demonstrate a measurement artifact whereby sigmoid normalization applied to sparse keyword counts can inflate coefficient estimates by $25\text{--}44\times$ depending on normalization parameters, and we propose a log-density transformation that preserves measurement validity. Empirically, we provide large-scale evidence that the sign and magnitude of the sustainability–price association vary systematically with restaurant quality positioning. Theoretically, the results shed new light on how sustainability may transition from a competitive differentiator to a baseline expectation as market quality rises.

The remainder of this paper is organized as follows: Section 2 reviews the literature. Section 3 describes data and methods. Section 4 presents results. Section 5 discusses implications and limitations. Section 6 concludes.

2. Literature Review

2.1. Hospitality Sustainability and Restaurant Innovation

While the restaurant sector’s environmental liabilities are well documented (Section 1), the academic response has increasingly shifted from quantifying impacts to investigating mitigation pathways. Circular economy frameworks—encompassing food waste recovery, reusable packaging, and closed-loop supply chains—offer both environmental and economic benefits [21,22]. Emerging scholarship is investigating behavioral interventions, such as menu design nudges and default option manipulation, to promote sustainable dining choices [23,24], while industry-level transitions toward carbon-neutral operations align with broader climate mitigation targets [25,26].

Despite these advances, adoption barriers impede sustainability diffusion among small and medium-sized independent restaurants—the dominant ownership structure in the industry. Principal obstacles include substantial upfront capital costs, limited sustainable supplier availability, and knowledge deficits concerning best practices [11,27]. The pandemic-era disruption of established business models created windows for green innovation adoption yet also intensified financial constraints that limit investment capacity [1,8]. Critically, uncertainty regarding economic returns remains the most consequential barrier: insufficient evidence on whether sustainability generates price premiums or requires ongoing subsidization creates informational asymmetries that impede rational investment decisions.

The growing availability of large-scale consumer review platforms offers a promising avenue for addressing this evidence gap. Online reviews have demonstrated significant influence in purchasing decisions and business performance [28] and carry real economic consequences—including effects on small business lending [29]—establishing that review-derived measures have material economic validity. However, the integrity of online reviews faces systematic threats, including organized fraudulent review production [30] and reputation bias [31], requiring careful methodological design when leveraging such data for empirical analysis. We therefore turn to existing theory and empirical evidence to examine what determines whether sustainability investments command price premiums.

2.2. The Green Premium Debate: Theory and Evidence

Economic theory yields competing predictions regarding sustainability and pricing. The theoretical foundations for green premium formation draw on several complementary frameworks. Signaling theory [32] posits that costly sustainability investments serve as credible signals of otherwise unobservable quality attributes, a mechanism particularly

effective under information asymmetry. Value–Belief–Norm (VBN) theory extends this logic by modeling the psychological pathway from environmental values to behavioral intentions. Majeed et al. [33] applied this framework to green corporate social responsibility (CSR) in hospitality, demonstrating that consumers’ environmental worldview, awareness of consequences, and ascription of responsibility sequentially mediate willingness-to-pay premiums for green hotel attributes. Complementing VBN theory, Pan and Zhou [34] synthesized evidence on pro-environmental behavior in hospitality, identifying social norms, perceived behavioral control, and environmental attitude as key antecedents of sustainable consumption—mechanisms that collectively underpin the demand-side basis for green pricing power. Additionally, conspicuous conservation facilitates identity expression and social status signaling, particularly among environmentally conscious consumers [35].

Empirical evidence on green premiums in hospitality has grown substantially in recent years, though findings remain heterogeneous. In the hotel sector, willingness-to-pay (WTP) studies document positive premiums for eco-certified attributes [16,36], yet these effects vary by cultural context and consumer segment. In the restaurant and food service sector, Kesgin et al. [17] found significant WTP premiums for sustainable food packaging, moderated by environmental concern and dining context. Meta-analytic evidence reinforces these positive signals: Li and Kallas [37] synthesized 80 global studies and documented an average willingness-to-pay premium of 29.5% for sustainable food products, while Yu et al. [38] demonstrated that comparative advertising for organic ingredients significantly elevates WTP premiums in restaurant contexts. However, certification-based studies reveal important boundary conditions: Mao et al. [39] found that TripAdvisor’s GreenLeaders certification had mixed revenue effects—positive for luxury-tier properties but negligible or negative for economy-tier establishments—an early indication that sustainability’s economic returns may depend on market positioning. Similarly, Assaker and O’Connor [40] reported that certification influenced booking intentions primarily among environmentally committed consumer segments, suggesting limited pricing power beyond niche markets.

Conversely, the null-or-negative hypothesis identifies pathways whereby sustainability might fail to generate pricing power. If implementation costs substantially exceed consumer willingness to pay, restaurants may absorb costs through margin compression rather than price increases. Specific sustainable practices—waste reduction, energy efficiency, local sourcing—may reduce operating costs, facilitating price reductions while preserving profitability [8]. As sustainability practices proliferate, competitive dynamics may erode first-mover advantages. Longitudinal evidence confirms that environmental practices do not reliably translate to financial gains, as implementation costs may offset revenue benefits [19], and systematic reviews of sustainable tourism certifications have found mixed or negligible economic returns across certification programs [20]. Context-dependent associations between environmental practices and pricing outcomes further underscore the absence of a universal green premium [18].

Taken together, the empirical literature reveals a paradox: individual studies document either positive or null/negative premiums, yet no consensus emerges. We contend that this inconsistency reflects two interrelated limitations: First, a substantive gap: existing studies share common methodological constraints such as reliance on stated-preference surveys (typically $N < 1000$), single-certification designs, and failure to account for market segment heterogeneity. Second, a measurement gap: text-based approaches to sustainability measurement involve normalization, weighting, and aggregation choices that can substantially affect results [41–43], yet these choices are rarely subjected to systematic scrutiny in hospitality applications. Dictionary-based text analysis of consumer reviews—combining transparency and reproducibility [44,45] with scalability across large corpora [46]—offers a pathway to address both gaps simultaneously, yet, in applying this approach, we identify a

previously undocumented measurement artifact whereby sigmoid normalization of sparse keyword counts can inflate coefficient estimates by 25–44×, underscoring that the measurement gap remains an active methodological challenge. Closing the substantive gap in turn requires explicit attention to whether premiums vary across market segments—the theoretical question we develop next.

2.3. Market Segmentation and Quality-Dependent Premiums

Restaurant markets exhibit pronounced stratification. Quality tiers—from fast food to casual dining to fine dining—serve distinct clientele segments with divergent price sensitivities, value perceptions, and sustainability expectations. The hedonic pricing framework [47] provides the conceptual foundation for decomposing product prices into implicit valuations of constituent attributes. Recent applications of hedonic methods to hospitality have exploited large-scale online data: Sanchez-Lozano et al. [48] applied big data hedonic pricing models to hospitality establishments, demonstrating that location, amenities, online reputation, and service attributes jointly explain substantial pricing variation, with online reputation measures (star ratings, review sentiment) emerging as particularly influential determinants. Signaling theory [49] predicts that sustainability’s utility as a quality signal should diminish as baseline quality increases: in low-quality segments where information asymmetry is high, sustainability provides a valuable credible signal; in high-quality segments where quality is already well established, sustainability adds less informational value.

Identity-based consumption frameworks predict that sustainability facilitates self-expression most effectively for middle-status consumers pursuing differentiation [35]. High-status consumers may perceive sustainability as a baseline requirement rather than a differentiator, while price-sensitive consumers may prioritize affordability over environmental attributes [50,51]. The empirical evidence reviewed above provides indirect support for this quality-contingent hypothesis: Mao et al.’s (2023) [39] finding that Green-Leaders certification benefits luxury but not economy hotels and Assaker and O’Connor’s (2023) [40] finding that certification effects concentrate among committed segments both suggest that sustainability’s pricing power varies systematically across market positions.

These theoretical perspectives lead us to hypothesize that sustainability premiums decrease monotonically with restaurant quality, being positive in lower-tier segments (quality signaling mechanism), diminishing through mid-tier segments, and approaching zero or becoming negative in upper-tier segments (baseline expectation). The empirical framework and measurement approach employed to test this hypothesis are described in the following section.

3. Data and Methods

3.1. Data Sources

We employ the Yelp Academic Dataset (2023 release), which provides business and review data for commercial establishments across the United States. From the full dataset, we extract all establishments classified as “Restaurants” or “Food,” yielding 52,268 establishments. We apply two filters: price tier information availability (retaining 44,484 establishments) and minimum review volume (at least 10 reviews, yielding 38,930 establishments). Table 1 documents this sample construction process.

Table 1. Sample construction.

Step	N
All restaurant/food businesses	52,268
With price tier information	44,484
With ≥ 10 reviews (final sample)	38,930

For each establishment, we compile the (1) aggregate star rating (1–5 scale), (2) price tier (\$, \$\$, \$\$\$, \$\$\$\$), (3) review count, (4) location (city, state), (5) business categories, (6) business name (for chain identification), and (7) the full text of all user reviews. The sample encompasses approximately 4.4 million reviews spanning 2018–2023.

This dataset offers several advantages for studying sustainability pricing: the large sample size enables detection of heterogeneous effects across segments; consumer-generated reviews represent authentic dining experiences rather than hypothetical survey responses susceptible to social desirability bias, with documented associations between online reviews and business outcomes [29]; and comprehensive sustainability capture encompasses both formal certification and informal practices as perceived by actual patrons.

However, consumer-generated reviews have well-documented limitations: First, representativeness: online reviewers constitute a self-selected sample that may skew toward younger, more digitally engaged demographics [28,31]. Second, manipulation: while Yelp employs proprietary algorithms to filter fraudulent content [30], some inauthentic reviews may persist. Third, extremity bias: voluntary reviewers tend to over-represent extreme experiences. We note that sustainability-related keyword mentions are unlikely targets for strategic manipulation (unlike star ratings or general praise), partially mitigating these concerns for our specific measurement approach.

3.2. Variable Construction

3.2.1. Dependent Variable: Price

Yelp categorizes restaurants into four price tiers based on approximate per-person meal cost: \$ (<\$10), \$\$ (\$10–25), \$\$\$ (\$25–60), and \$\$\$\$ (>\$60). Following standard hedonic pricing methodology [47], as applied to restaurant contexts by Sanchez-Lozano et al. [48], we convert these ordinal tiers to approximate dollar midpoints for regression analysis: \$8.00, \$17.50, \$42.50, and \$80.00, respectively. The first three values represent the approximate midpoints of their respective ranges; the fourth (\$80) represents a conservative estimate for the open-ended upper tier. We log-transform these values for OLS estimation.

Because this conversion introduces the measurement imprecision inherent to ordinal-to-continuous mapping, we implement three validation strategies: First, we conduct sensitivity analyses, varying the Tier 4 assignment across a wide range (\$65–\$120), demonstrating that substantive conclusions are invariant to this choice. Second, we estimate ordered logit models treating price tier as an ordinal outcome, avoiding any cardinal assumption. Third, we verify that the monotonically decreasing subgroup pattern holds across all specifications.

3.2.2. Independent Variable: Sustainability Score

We construct a sustainability measure using dictionary-based keyword analysis of consumer review text, an approach grounded in the “text as data” paradigm, which treats unstructured text as quantifiable empirical evidence [41,42]. Dictionary-based methods—which count occurrences of pre-specified keyword lists—represent one of the most established and transparent approaches in computational text analysis [44–46], with documented applications across social science disciplines [43]. Rather than relying on self-reported practices or third-party certifications—which capture only the subset of restaurants pursuing formal recognition—we extract sustainability signals from unstructured review text. This approach captures the full spectrum of sustainability practices as perceived by consumers.

Three keyword categories are defined: The environmental dimension comprises nine terms: organic, local, sustainable, farm-to-table, seasonal, eco-friendly, zero-waste, compost, and renewable. Social sustainability is captured through six terms: fair-trade, ethical,

community, family-owned, local business, and minority-owned. A third certification category incorporates five terms: USDA organic, certified organic, LEED certified, B-corp, and green certified.

Keyword matching employs a case-insensitive search with phrase-level matching for multi-word terms (e.g., “farm-to-table” and “farm to table” are both matched; see Appendix A for the complete pre-processing pipeline). We acknowledge that some terms (particularly “local” and “community”) can appear in non-sustainability contexts, introducing measurement noise. We address this limitation through robustness checks using subsets of less ambiguous keywords (environmental-only and social-only scores) and by noting that any resulting attenuation bias would work against finding significant effects.

A consequential issue with sigmoid normalization, commonly employed in text analysis applications, warrants attention before proceeding: the sigmoid function $S(x) = 1/(1 + e^{-ax})$ maps inputs to $(0, 1)$. For sparse keyword data where most establishments have zero or few mentions, this creates a floor effect, $S(0) = 0.5$, assigning non-trivial scores to establishments with no sustainability keywords. The resulting variance compression can inflate regression coefficients substantially. Across scaling parameters ($a = 0.1$ to 2.0), sigmoid normalization inflates the sustainability coefficient by 25–44× relative to our proposed alternative; under the standard sigmoid ($a = 1.0$), the inflation factor is approximately 31× (see Appendix B for detailed quantification).

To avoid this artifact, we employ a log-density transformation:

$$Score = \log\left(1 + \frac{KeywordCount}{ReviewCount} \times 1000\right) \quad (1)$$

This assigns score = 0 to establishments with no keywords (preserving the zero baseline), scales by review volume (controlling for exposure), and log-transforms to handle skewness. The resulting scores range from 0 to 7.98 with standard deviation 1.70 (see Appendix C for qualitative face validation).

We construct three component scores—environmental, social, and overall (weighted composite: $0.4 \times \text{environmental} + 0.3 \times \text{social} + 0.3 \times \text{certification}$)—where the weights reflect the relative frequency distribution of keyword categories in the corpus (environmental terms are most prevalent; see Table 2). Primary analyses use the overall score; robustness checks examine components separately.

Table 2. Descriptive statistics ($N = 38,930$).

Variable	Mean	SD	Min.	Max.
Price (\$, corrected)	14.74	8.24	8.00	80.00
Star Rating	3.50	0.79	1.0	5.0
Review Count	111.8	213.0	10	7568
Sustainability Score	2.80	1.70	0.00	7.98
Environmental Score	3.99	2.39	—	—
Social Score	1.33	1.93	—	—
Score = 0 (%)	20.5%	—	—	—
Score > 6.0 (%)	1.1%	—	—	—

3.2.3. Control Variables

We control for (1) star rating (1–5 scale), capturing establishment quality; (2) log of review count, capturing visibility and popularity; (3) chain indicator (=1 if the business name appears ≥ 5 times in dataset), controlling for chain vs. independent effects; (4) cuisine type (27 categories extracted from the Yelp business categories), absorbing cuisine-specific pricing norms; and (5) city fixed effects (131 cities with ≥ 50 establishments; remaining cities grouped as “Other”), controlling for local cost-of-living and market conditions.

3.3. Analytical Strategy

We begin with global OLS baseline hedonic pricing models:

$$\ln(\text{Price}_i) = \beta_0 + \beta_1 \text{Sustainability}_i + \beta_2 \text{Stars}_i + \beta_3 \ln(\text{Reviews}_i) + \gamma' \text{Controls}_i + \varepsilon_i \quad (2)$$

Four specifications are estimated sequentially: (M1) bivariate, (M2) with quality controls, (M3) with full city/cuisine fixed effects, chain indicator, and quality controls, and (M4) omitting star rating to examine potential mediation.

To test whether premiums vary by market segment, we then stratify the sample by star rating into three tiers—Low (<3.0 stars), Mid (3.0–4.0 stars), High (>4.0 stars)—and re-estimate the model separately for each, both with basic controls and with full fixed effects. Ordered logit models are estimated in parallel, treating price tier as an ordinal outcome and thereby avoiding the cardinal assumptions of OLS.

A continuous interaction specification then tests whether quality moderates the sustainability effect across the full rating range:

$$\ln(\text{Price}_i) = \beta_0 + \beta_1 \text{Sustainability}_i + \beta_2 \text{Stars}_i + \beta_3 (\text{Sustainability}_i \times \text{Stars}_i) + \text{Controls} + \varepsilon_i \quad (3)$$

A negative β_3 would indicate diminishing premiums as quality increases. Marginal effects are computed at key star values to characterize the economic profile. Finally, robustness analyses examine sensitivity to alternative Tier 4 price codings (\$65–\$120), alternative sustainability measures (environmental-only, social-only, binary), alternative minimum review thresholds (20, 50 reviews), and city-clustered standard errors. All OLS specifications employ heteroskedasticity-robust (HC1) standard errors.

4. Results

4.1. Descriptive Statistics

Table 2 summarizes the sample's characteristics. The average restaurant has a star rating of 3.50, charges approximately \$14.74 per meal, and has 112 reviews. Sustainability scores exhibit substantial variation (SD = 1.70), with 20.5% of restaurants scoring zero (no sustainability keyword mentions) and 1.1% scoring above 6.0 (high sustainability emphasis). Environmental keywords are more prevalent (mean = 3.99) than social keywords (mean = 1.33).

4.2. Global Results: The Misleading Average

Table 3 presents pooled OLS results. Model 1 (bivariate) yields a sustainability coefficient of +0.0455 ($p < 0.001$), which is substantially attenuated to +0.0040 ($p = 0.012$) upon adding quality controls in Model 2. A one-unit increase in the sustainability score (SD = 1.70) is associated with a +0.40% change in price (Model 2 with basic controls). For a one-standard-deviation increase (1.70 units), the implied association is +0.68%.

Model 3 adds city fixed effects (131 cities), cuisine fixed effects (27 categories), and a chain indicator. Notably, the sustainability coefficient reverses sign to −0.0049 ($p < 0.001$), suggesting that the positive global association in Model 2 partly reflects omitted variable bias: sustainable restaurants tend to cluster in more expensive cities and cuisine categories. The R-squared increases substantially (from 0.115 to 0.291), confirming the importance of these controls.

Model 4 omits star rating to examine whether stars mediate the sustainability–price relationship. The sustainability coefficient increases to +0.0110 ($p < 0.001$), consistent with partial mediation: sustainability practices may influence star ratings, which, in turn, affect pricing. However, this interpretation requires caution given the cross-sectional design.

The sign instability across specifications underscores that the global average effect is fragile and should not be the focus of interpretation. As the subgroup analysis reveals, this instability masks systematic heterogeneity across market segments.

Table 3. Global hedonic pricing models.

	Model 1 (Bivariate)	Model 2 (Controls)	Model 3 (Full FE)	Model 4 (No Stars)
Sustainability Score	+0.0455 *** (0.0013)	+0.0040 * (0.0016)	−0.0049 *** (0.0015)	+0.0110 *** (0.0015)
Star Rating	—	+0.0410 ***	−0.0237 ***	—
ln (Review Count)	—	+0.1266 ***	—	—
Chain Indicator	—	—	−0.1876 ***	—
City Fixed Effects	No	No	Yes (131)	No
Cuisine Fixed Effects	No	No	Yes (27)	No
R-Squared	0.028	0.115	0.291	0.111
N	38,930	38,930	38,930	38,930

Heteroskedasticity-robust standard errors in parentheses. *** $p < 0.001$, * $p < 0.05$. Model 4 omits star rating to examine potential mediation.

Figure 1 presents the methodological comparison illustrating the sigmoid normalization artifact. Panel A shows the bivariate estimate without controls (+4.66%). Panel B shows the corrected estimates with controls (+0.40% OLS, −0.49% with fixed effects). Panel C displays the variance compression under sigmoid normalization, demonstrating a 31× coefficient inflation under the standard sigmoid function.

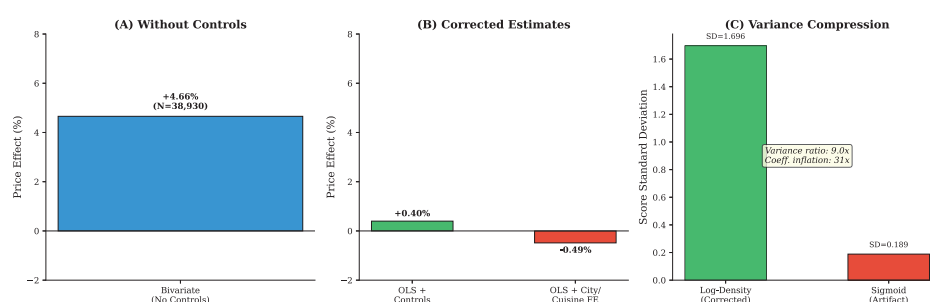


Figure 1. Methodological comparison. (A) Bivariate OLS without controls yields a +4.66% sustainability effect driven by confounding. (B) Corrected estimates with controls (+0.40%) and with city/cuisine fixed effects (−0.49%). (C) Sigmoid normalization compresses variance (SD: 1.70 vs. 0.19), inflating coefficients by approximately 31× under the standard sigmoid.

4.3. Subgroup Analysis: Quality-Dependent Premiums

Table 4 presents our central finding: sustainability price associations vary monotonically across market segments.

Among lower-rated establishments (<3.0 stars, $N = 12,574$), the sustainability coefficient of +0.0257 ($p < 0.001$) documents a +2.60% price premium. The association persists with full city/cuisine fixed effects (coefficient = +0.0068, $p = 0.004$, +0.68%), and the ordered logit confirms a positive and significant result ($\beta = +0.135$, $p < 0.001$). This pattern is consistent with sustainability functioning as a quality signal in a segment where information asymmetry is high.

The mid-quality segment (3.0–4.0 stars, $N = 20,111$) tells a markedly different story. The coefficient reverses sign to −0.0062 ($p = 0.006$), indicating a small negative association of −0.61%. Under full fixed effects, this strengthens to −0.0101 ($p < 0.001$, −1.01%). The ordered logit corroborates the reversal ($\beta = -0.027$, $p = 0.008$). Sustainability no longer confers a pricing advantage in this competitive segment.

The pattern continues in the same direction among higher-rated establishments (>4.0 stars, $N = 6245$). The coefficient of −0.0208 ($p < 0.001$) represents a −2.06% price

discount. With fixed effects, the estimate is -0.0145 ($p < 0.001$, -1.44%), confirmed by the ordered logit ($\beta = -0.078$, $p < 0.001$). In upscale dining, sustainability appears to function as a baseline expectation rather than a differentiating attribute.

The monotonically decreasing pattern ($+2.60\% \rightarrow -0.61\% \rightarrow -2.06\%$) is robust to the inclusion of city and cuisine fixed effects ($+0.68\% \rightarrow -1.01\% \rightarrow -1.44\%$), confirmed by ordered logit models, robust to city-clustered standard errors (all subgroup effects remain significant), and stable when restricting to restaurants with ≥ 20 reviews ($+2.17\% \rightarrow -1.04\% \rightarrow -3.01\%$, all $p < 0.001$).

Table 4. Sustainability premium by market segment.

	Low Stars (<3.0)	Mid Stars ($3.0-4.0$)	High Stars (>4.0)
Panel A: OLS with Basic Controls			
Sustainability Score	$+0.0257^{***}$ (0.0026)	-0.0062^{**} (0.0023)	-0.0208^{***} (0.0040)
Price Effect	$+2.60\%$	-0.61%	-2.06%
R-Squared	0.166	0.094	0.086
Panel B: OLS with City/Cuisine Fixed Effects			
Sustainability Score	$+0.0068^{**}$ (0.0024)	-0.0101^{***} (0.0021)	-0.0145^{***} (0.0039)
Price Effect	$+0.68\%$	-1.01%	-1.44%
R-Squared	0.366	0.260	0.249
Panel C: Ordered Logit			
Sustainability Score	$+0.1348^{***}$ (0.0128)	-0.0271^{**} (0.0102)	-0.0784^{***} (0.0174)
N	12,574	20,111	6245
Avg Price	\$13.17	\$15.68	\$14.92

Robust standard errors in parentheses. $*** p < 0.001$, $** p < 0.01$.

Figure 2 visualizes the monotonically decreasing sustainability premium across market segments, showing consistency between basic controls (Figure 2A) and full fixed effects (Figure 2B).

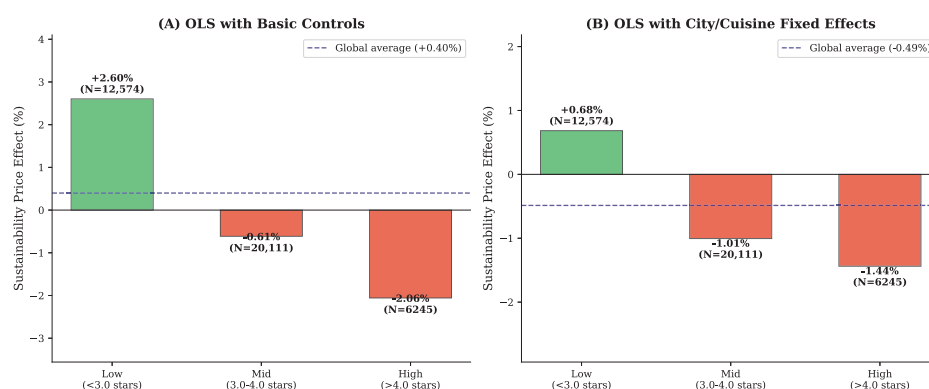


Figure 2. Quality-dependent sustainability premium. Sustainability price associations across three market segments showing a monotonically decreasing pattern. (A) OLS with basic controls (Low: $+2.60\%$, Mid: -0.61% , High: -2.06%). (B) OLS with city/cuisine fixed effects (Low: $+0.68\%$, Mid: -1.01% , High: -1.44%). The dashed line indicates the global average, which masks segment-specific heterogeneity.

4.4. Interaction Effects

Table 5 examines the sustainability–quality interaction using a continuous specification. The interaction term ($\beta = -0.0418$, $p < 0.001$) confirms that sustainability’s pricing association diminishes monotonically with restaurant quality. The main effect of sustain-

ability is positive and large (+0.1489, $p < 0.001$) at the intercept (i.e., at zero stars), but this is offset by the strongly negative interaction as star rating increases.

Table 5. Interaction model: sustainability $\times$ star rating.

	OLS (Sust $\times$ Stars)
Sustainability Score	+0.1489 *** (0.0054)
Star Rating	+0.1343 ***
Sust $\times$ Stars	−0.0418 *** (0.0015)
ln (Review Count)	included
R-Squared	0.130
N	38,930
Marginal effect of sustainability at	
2.5 stars	+4.54%
3.0 stars	+2.38%
3.5 stars	+0.26%
4.0 stars	−1.81%
4.5 stars	−3.84%

HCl robust standard errors in parentheses. *** $p < 0.001$. Marginal effect = $(\exp(\beta_{\text{sust}} + \beta_{\text{int}} \times \text{stars}) - 1) \times 100$.

Computing marginal effects at specific star values reveals the economic pattern: at 2.5 stars, a one-unit increase in sustainability is associated with a +4.54% price premium; at 3.0 stars, the association is +2.38%; at 3.5 stars, the association is essentially zero (+0.26%); at 4.0 stars, it becomes negative (−1.81%); and at 4.5 stars, it is −3.84%. The cross-over from positive to negative occurs at approximately 3.6 stars, which falls within the mid-tier segment.

Figure 3 displays the marginal effect of sustainability across the continuous quality spectrum, derived from the interaction model. The positive-to-negative cross-over occurs at approximately 3.6 stars.

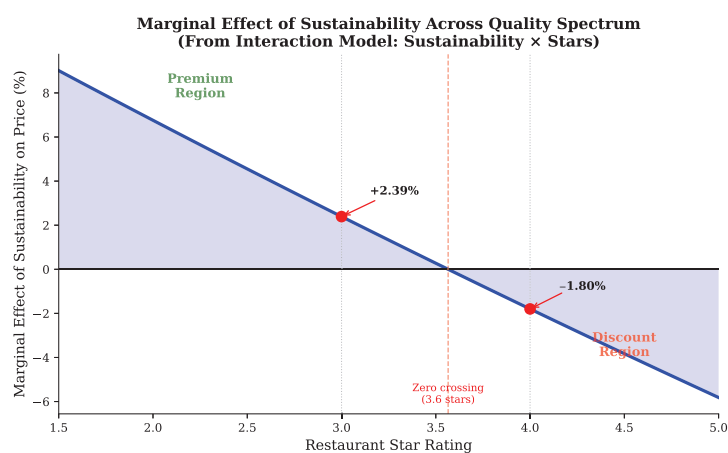


Figure 3. Marginal effect of sustainability across the quality spectrum, derived from the interaction model (sustainability $\times$ stars) and showing the estimated price effect of a one-unit increase in sustainability score at each star rating level. The cross-over from positive to negative occurs at approximately 3.6 stars. Red markers indicate effects at tier boundaries (3.0 and 4.0 stars).

4.5. Robustness and Sensitivity

Table 6 summarizes several robustness analyses. Regarding price coding, the Tier 4 (\$\$\$\$) midpoint assignment is inherently uncertain given the open-ended upper range: varying this value from \$65 to \$120 yields global sustainability coefficients ranging from +0.0042

to +0.0036 (all $p < 0.05$), demonstrating that substantive conclusions are invariant to this choice. Turning to alternative sustainability measures, environmental keywords alone yield a positive and significant association (+1.18%, $p < 0.001$), while social keywords alone show a negative association (−2.24%, $p < 0.001$). The binary (above-median) indicator is not significant ($p = 0.55$), consistent with continuous variation being more informative than a dichotomous threshold.

With respect to sample composition, restricting to restaurants with ≥ 20 reviews yields a non-significant global effect, yet the subgroup pattern is fully preserved (Low, +2.17%; Mid, −1.04%; High, −3.01%; all, $p < 0.001$): with ≥ 50 reviews, the global coefficient becomes significantly negative (−2.35%, $p < 0.001$). City-clustered standard errors approximately double relative to HC1 robust standard errors (0.0031 vs. 0.0016), rendering the global effect non-significant ($p = 0.20$) and further pointing to the importance of segment-level analysis. All subgroup effects, however, remain significant under clustering (Low: $p < 0.001$; Mid: $p = 0.009$; High: $p < 0.001$).

To directly address the relevance of our findings to tourism contexts, we classify cities by tourism intensity based on established visitor volume statistics. Cities in states with major tourism sectors (Florida, Louisiana, Tennessee, Nevada, and Arizona)—encompassing prominent destinations including New Orleans, Nashville, Tampa, Tucson, and Reno—are classified as high-tourism, yielding 21,567 restaurants (55.4%) in high-tourism cities and 17,363 (44.6%) in non-tourism baseline cities. The monotonically decreasing sustainability–price pattern is fully reproduced within tourism-intensive cities: Low-star +1.95% ($p < 0.001$), Mid-star −0.71% ($p = 0.020$), High-star −2.41% ($p < 0.001$). A Chow test confirms statistically significant structural differences between tourism and non-tourism restaurant markets ($F = 56.11$, $p < 0.001$), and a triple interaction model (sustainability $\times$ stars $\times$ tourism) yields a significant three-way interaction ($\beta = 0.009$, $p = 0.003$), indicating that tourism context meaningfully moderates the quality-dependent premium pattern.

Table 6. Robustness and sensitivity analyses.

Specification	β_{sust}	Effect (%)	N
Panel A: Tier 4 Price Sensitivity			
Tier 4 = \$65	+0.0042	+0.42%	38,930
Tier 4 = \$80 (baseline)	+0.0040	+0.40%	38,930
Tier 4 = \$100	+0.0038	+0.38%	38,930
Tier 4 = \$120	+0.0036	+0.36%	38,930
Panel B: Alternative Sustainability Measures			
Environmental keywords only	+0.0117	+1.18% ***	38,930
Social keywords only	−0.0226	−2.24% ***	38,930
Binary (above median)	−0.0029	−0.29%	38,930
Panel C: Alternative Minimum Reviews			
Min. 20 reviews	−0.0006	−0.06%	31,257
Min. 50 reviews	−0.0235	−2.35% ***	19,830
Panel D: Standard Error Comparison (Global Model)			
HC1 robust SE		SE = 0.0016, $p = 0.012$	
City-clustered SE		SE = 0.0031, $p = 0.201$	

Table 6. *Cont.*

Specification	β_{sust}	Effect (%)	N
Panel E: Tourism Intensity Stratification			
Tourism cities (global)	−0.0003	−0.03%	21,567
Low stars	+0.0193	+1.95% ***	6620
Mid stars	−0.0071	−0.71% *	11,212
High stars	−0.0244	−2.41% ***	3735
Non-tourism cities (global)	+0.0063	+0.64% **	17,363
Chow test (F-stat)		$F = 56.11, p < 0.001$	

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$. All models include stars and $\ln(\text{reviews})$ as controls.

5. Discussion

The following practical and policy implications are informed by the associational patterns documented in our corrected empirical analyses. Given the cross-sectional, observational nature of our research design, these recommendations should be interpreted as evidence-informed hypotheses warranting validation through experimental or quasi-experimental investigation rather than as established causal prescriptions.

5.1. Practical Implications for Restaurant Operators

Our findings provide a framework for sustainability investment decisions that varies by market positioning (Table 7).

Table 7. Decision framework for restaurant operators.

Market Position	Association	Mechanism	Suggested Strategy
Budget (<\$15/meal, <3 stars)	+2.60% (positive)	Quality signal	Selective adoption of visible practices: organic options, local sourcing. Communicate as quality improvement.
Mid-Market (\$15–25/meal, 3–4 stars)	−0.61% (small negative)	Neutral/ consumer expectation	Adopt for operational cost savings and brand alignment rather than pricing power. Benefits may be non-price.
High-End (>\$25/meal, >4 stars)	−2.06% (negative)	Baseline expectation	Implement as baseline practice without prominent marketing. Emphasize chef artistry, service, ambiance.

For budget restaurants, sustainability offers modest positive pricing associations (+2.60%). To illustrate the potential economic magnitude, consider a hypothetical low-star restaurant serving 200 customers daily at a \$13.17 average check (the mean for our low-star segment). Under the estimated association of +2.60% for this segment, this would correspond to approximately \$25,000 in annual incremental revenue—an illustrative scenario conditional on the assumptions of constant customer volume, full pass-through of sustainability associations to pricing, and applicability of average effects to individual establishments. We note that this association is substantially smaller in the pooled sample (+0.40%) and reverses in higher-star segments. Selective, visible adoption—such as organic options, local sourcing, and compostable packaging—may function as quality signals in a segment where information asymmetry is high. Cost-effective practices that simultaneously reduce operating expenses (e.g., waste reduction, energy efficiency) may offer the best return.

For mid-market establishments, our results suggest sustainability does not command positive price premiums in this segment. However, sustainability adoption may yield non-price benefits including operational cost savings, brand differentiation, customer loyalty, and alignment with consumer values. Restaurants in this segment should evaluate sustainability investments based on total business value rather than pricing power alone.

For high-end restaurants, sustainability appears to function as a baseline expectation rather than a differentiating attribute. Prominent marketing of environmental credentials may detract from other value dimensions central to luxury positioning. Sustainability should be integrated as standard practice rather than highlighted as a competitive advantage.

We note that the following strategic implications derive from observed associations in cross-sectional data rather than experimentally validated causal effects. While the patterns are robust across multiple specifications and consistent with theoretical predictions, practitioners should interpret these recommendations as evidence-informed guidance warranting validation through pilot implementation and longitudinal monitoring rather than as deterministic causal prescriptions.

5.2. Implications for Hospitality Policy

Our findings suggest that uniform “one-size-fits-all” sustainability incentive programs may not optimally serve all market segments. Lower-tier restaurants, where sustainability generates positive pricing associations, may benefit most from technical assistance connecting them to local suppliers and low-cost operational improvements. Certification bodies might differentiate outreach strategies by market segment, recognizing that the economic case for certification varies across quality tiers.

However, we note important caveats. First, our analysis examines Yelp-listed U.S. restaurants, which may not represent the full restaurant population. Second, while Yelp reviews are generated by the general dining public (including both tourists and residents), our tourism intensity stratification (Table 6, Panel E) confirms that the quality-dependent pattern is fully reproduced in tourism-intensive cities, supporting the direct applicability of these implications to tourism destination management. Third, policy recommendations based on cross-sectional associations should be treated as preliminary until validated by causal research designs.

5.3. Theoretical Contributions

Our results contribute to the sustainability economics and consumer behavior literature in three ways:

First, we demonstrate that green premiums are not a universal phenomenon but rather a market segment-contingent outcome. The monotonically decreasing pattern we document—positive premiums in lower-quality segments transitioning to negative associations in higher-quality segments—may help reconcile apparently contradictory findings in the prior literature. Studies reporting positive premiums [14,16,36] and those finding mixed or negative effects [18,19] may both be accurate within their respective market segments.

Second, we provide quantitative evidence consistent with multiple theoretical mechanisms operating simultaneously. In low-quality segments, positive premiums align with signaling theory [32]: sustainability may serve as a costly signal of otherwise unobservable quality. In higher-quality segments, the null or negative association is consistent with sustainability transitioning to a baseline expectation—a hygiene factor rather than a differentiator.

Third, the variance compression mechanism we identify constitutes a cautionary case for computational social science applications employing sigmoid or hyperbolic tangent normalization on sparse count data, contributing to the broader methodological discourse on rigor in text-as-data applications [41,45]. While we cannot estimate the precise prevalence of this specific pipeline configuration across the broader literature without systematic review, the underlying mathematical mechanism—mapping zeros to 0.5 rather

than 0.0—affects any application where normalization functions with non-zero intercepts are applied to count variables exhibiting substantial zero inflation, a common data structure in keyword-based text analysis. Our log-density transformation provides one alternative, though we note that other approaches (e.g., TF-IDF weighting, Bayesian shrinkage) may also be appropriate depending on the research context.

5.4. Limitations and Future Research

Several limitations warrant acknowledgment: Our cross-sectional design establishes associations between sustainability practices and pricing outcomes but cannot definitively establish causal directionality. Several plausible confounding pathways warrant explicit acknowledgment: First, reverse causality: higher-priced restaurants may possess greater resources and marketing sophistication to communicate environmental practices in ways that generate sustainability-related review content, without those practices necessarily driving pricing power. Second, neighborhood-level confounding: restaurants situated in wealthier, more educated neighborhoods may simultaneously command higher prices and attract environmentally conscious patrons who generate more sustainability-related review language, producing a spurious association driven by geographic sorting rather than sustainability's direct pricing effects. Third, construct conflation: our text-based sustainability score may partially capture broader quality dimensions—operational care, ingredient freshness, management professionalism—that correlate with both sustainability communication and pricing rather than isolating the independent contribution of environmental practices per se. The sign reversal between Model 2 and Model 3 (Table 3) illustrates the sensitivity of estimates to control variable specification. Future research using natural experiments—certification program rollouts or sustainability mandate implementations—could provide causal identification.

A second set of concerns relates to measurement. The dictionary-based keyword approach captures consumer perceptions of sustainability rather than verified practices—a common limitation of text-as-data methods in social science [43,44]. Terms such as “local” and “community” can appear in non-sustainability contexts (keyword ambiguity), restaurants with genuine sustainability commitments may receive no keyword mentions (false negatives), and the composite weighting scheme (0.4/0.3/0.3) is asserted rather than empirically validated. Validating scores against external certification data or manual coding would strengthen future applications. The dependent variable warrants a similar caution: despite our sensitivity analyses, converting four ordinal price tiers to continuous values introduces measurement imprecision. Ordered logit results confirm the directional patterns, but continuous dollar magnitudes should be interpreted accordingly.

Third, generalizability is constrained by the U.S. sample, which may not transfer to contexts with different regulatory environments, cultural norms, or consumer expectations. Evidence from diverse markets [33,36] documents varying sustainability premium patterns, suggesting meaningful cultural and institutional moderation. International comparative analysis would help clarify these boundary conditions.

Tourism-specific interpretation merits separate consideration. The tourism intensity stratification in Table 6 (Panel E) demonstrates that the quality-dependent pattern is fully reproduced in tourism-intensive cities, with effect magnitudes comparable to or larger than the full-sample estimates (Low: +1.95%, Mid: −0.71%, High: −2.41%). The significant Chow test ($F = 56.11$, $p < 0.001$) and triple interaction ($p = 0.003$) confirm that tourism context meaningfully moderates these relationships. However, we cannot distinguish individual tourist reviews from resident reviews within our data. Future work employing tourism-specific platforms (e.g., TripAdvisor) or reviewer origin data could further refine tourism-specific implications.

Finally, the cross-section spans 2018–2023, and, as sustainability transitions from niche to mainstream, the quality-dependent pattern documented here may itself evolve. Longitudinal analysis would illuminate whether these segment-specific dynamics persist, intensify, or collapse over time. Together, these limitations point toward a research agenda encompassing causal identification through quasi-experiments, measurement validation against external sustainability indicators, international replication, and tourism-specific analyses incorporating destination intensity data.

6. Conclusions

This study examines the relationship between sustainability practices and restaurant pricing across market segments, analyzing 38,930 U.S. restaurants and approximately 4.4 million consumer reviews. Two principal contributions emerge. Methodologically, we identify a measurement artifact in text-mining applications: sigmoid normalization applied to sparse keyword counts creates variance compression that can inflate regression coefficients by 25–44× depending on scaling parameters. A log-density transformation is proposed as an alternative that preserves measurement validity, and its properties are demonstrated quantitatively.

Empirically, the association between sustainability and pricing varies monotonically with restaurant quality: lower-rated restaurants (<3.0 stars) exhibit positive price premiums (+2.60%), while mid-rated (3.0–4.0 stars, −0.61%) and higher-rated (>4.0 stars, −2.06%) establishments show negative associations. A strongly negative sustainability × stars interaction ($\beta = -0.042$, $p < 0.001$) confirms this gradient, which is robust to ordered logit specifications, city/cuisine fixed effects, and clustered standard errors; the cross-over from a positive to a negative premium occurs at approximately 3.6 stars. Taken together, these results suggest that sustainability transitions from a competitive differentiator in lower-quality segments—where it may function as a quality signal—to a baseline expectation in higher-quality establishments, a pattern that may help reconcile apparently contradictory prior findings in the green premium literature.

We acknowledge important limitations: the cross-sectional design precludes causal inference, the dictionary-based sustainability measure captures consumer perceptions rather than verified practices, and the ordinal price variable introduces measurement imprecision. The practical implications discussed—differentiated sustainability strategies by market segment—should be treated as hypotheses for further investigation rather than established prescriptions.

As sustainability practices continue their transition from niche to mainstream across the hospitality industry, understanding the market segment-specific dynamics documented here may help inform both business strategy and policy design. However, causal validation through experimental or quasi-experimental research remains essential before these associations can confidently guide resource allocation decisions.

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Appendix A. Text Analysis Pre-Processing Documentation

This appendix documents the text pre-processing pipeline for the dictionary-based sustainability measure described in Section 3.2.2. All review text undergoes the following pre-processing pipeline prior to keyword matching:

1. Case folding: All text is lowercased before matching.
2. Phrase matching: Hyphenated variants are handled via pattern matching (e.g., “farm-to-table” also matches “farm to table”); multi-word terms are matched as n-grams (up to trigrams).
3. Disambiguation protocol: To reduce false positives from ambiguous terms, “local” is matched only when appearing within a three-word window of food-related terms (e.g., “local produce,” “local farm,” “locally sourced”), excluding geographic references (e.g., “local bar,” “local hangout”). Similarly, “community” is matched only near terms such as “supported,” “owned,” or “engagement.”
4. Tokenization: Whitespace- and punctuation-based segmentation, with n-gram matching for multi-word terms.

Appendix B. Sigmoid Normalization Artifact Demonstration

This appendix provides quantitative evidence for the sigmoid normalization artifact discussed in Section 3.2.2.

Distribution comparison. In our sample, 20.5% of restaurants have zero sustainability keyword mentions, and the distribution of raw keyword counts is strongly right-skewed. Under sigmoid normalization ($S(x) = 1/(1 + e^{-ax})$), zeros are mapped to 0.5 rather than 0.0, compressing the effective score range to [0.50, 1.00]. Under our log-density transformation, zeros map to 0.0, preserving the full [0.00, 7.98] range.

Variance quantification. The standard deviation under log-density transformation is 1.70, compared to 0.19 under the standard sigmoid ($a = 1.0$)—a variance ratio of approximately 9:1.

Multi-scale coefficient comparison. We apply sigmoid normalization with five scaling parameters ($a = 0.1, 0.3, 0.5, 1.0, 2.0$) to the sustainability keyword counts and re-estimate the baseline hedonic pricing model. The sustainability coefficient under sigmoid normalization ranges from $25\times$ to $44\times$ the log-density coefficient across all parameterizations ($31\times$ under the standard sigmoid, $a = 1.0$). This inflation is structurally inherent to sigmoid normalization of sparse count data, not an artifact of a specific parameter choice.

Appendix C. Qualitative Face Validation

This appendix provides qualitative face validation for the dictionary-based sustainability measure constructed in Section 3.2.2, presenting representative examples from the extremes of the score distribution.

High-scoring restaurants (sustainability score $\geq$ 90th percentile):

- Community Cafe (St. Petersburg, FL; 4.5★, \$, score = 7.41): “Sustainable food and business practices, supporting local businesses, and supporting the LGBTQ+ community.”

- Joe Coffee Bar (Philadelphia, PA; 4.0★, \$, score = 7.33): “Joe Coffee Bar was one of the first, about ten years ago, to feature fair-trade coffee.”
- Food For Ascension Cafe (Tucson, AZ; 4.5★, \$\$, score = 7.26): “The restaurant claims that their food is locally grown and it sure tastes like it.”

Zero-scoring restaurants (sustainability score = 0):

- iSushi (Carmel, IN; 3.5★, \$\$): Typical reviews discuss sushi quality and atmosphere; zero sustainability keyword matches.
- Blackjack Pizza & Salads (Tucson, AZ; 2.0★, \$\$): Reviews discuss pizza quality and delivery speed; zero sustainability keyword matches.
- McDonald’s (Eagle, ID; 2.0★, \$): Reviews discuss convenience and service speed; zero sustainability keyword matches.

High scores correspond to restaurants whose reviewers explicitly discuss sustainability practices (organic sourcing, fair trade, local ingredients), while zero scores correspond to establishments with no sustainability-relevant content, confirming the measure’s face validity.

References

1. Mahendru, M.; Arora, V.; Chatterjee, R.; Sharma, G.D.; Shahzadi, I. From over-tourism to under-tourism via COVID-19: Lessons for sustainable tourism management. *Eval. Rev.* **2024**, *48*, 177–210. [CrossRef]
2. Long, Y.; Liu, Q.; Cheng, M.; Wang, Y. Tourism recovery and sustainable development: The case of revenge tourism in China. *Curr. Issues Tour.* **2025**, 1–18. [CrossRef]
3. Alves, J.; Arantes, L.; Moreira, A.C. AI-powered sustainable tourism: Aligning innovations with the sustainable development goals. *Tour. Hosp. Res.* **2025**, 14673584251409416. [CrossRef]
4. Ashton, M.; Sezerel, H.; Filimonau, V.; Gunay, S. Gender dynamics and sustainable practices: Exploring food waste management among female chefs in the hospitality industry. *J. Sustain. Tour.* **2025**, *33*, 1658–1683. [CrossRef]
5. Guimarães, N.S.; Reis, M.G.; Costa, B.V.d.L.; Zandonadi, R.P.; Carrascosa, C.; Teixeira-Lemos, E.; Costa, C.A.; Alturki, H.A.; Raposo, A. Environmental footprints in food services: A scoping review. *Nutrients* **2024**, *16*, 2106. [CrossRef]
6. Principato, L.; Comis, C.; Yu, M.; Secondi, L. Food sharing platforms as a technology to reduce food waste at food service level: Recommendations for businesses and society. *Bus. Ethics Environ. Responsib.* **2025**. [CrossRef]
7. Iqbal, B.; Alabbosh, K.F.; Jalal, A.; Suboktagin, S.; Elboughdiri, N. Sustainable food systems transformation in the face of climate change: Strategies, challenges, and policy implications: B. Iqbal et al. *Food Sci. Biotechnol.* **2025**, *34*, 871–883. [CrossRef]
8. Cardenas, M.; Schivinski, B.; Brennan, L. Circular practices in the hospitality sector regarding food waste. *J. Clean. Prod.* **2024**, *472*, 143452. [CrossRef]
9. Nichifor, B.; Zait, L.; Timiras, L. Drivers, barriers, and innovations in sustainable food consumption: A systematic literature review. *Sustainability* **2025**, *17*, 2233. [CrossRef]
10. Hossan, F.; Hasan, M.; Islam, T. Green Practices to the Owners and Management of Restaurant Business: an Empirical Study. *Manag. Sustain. Dev.* **2024**, *16*, 58–74. [CrossRef]
11. Baloglu, S.; Raab, C.; Malek, K. Organizational motivations for green practices in casual restaurants. *Int. J. Hosp. Tour. Adm.* **2022**, *23*, 269–288. [CrossRef]
12. Madanaguli, A.; Dhir, A.; Kaur, P.; Srivastava, S.; Singh, G. Environmental sustainability in restaurants. A systematic review and future research agenda on restaurant adoption of green practices. *Scand. J. Hosp. Tour.* **2022**, *22*, 303–330. [CrossRef]
13. Hamada, I. The global rise of “sustainable sushi” practices: Restaurant responses and challenges. *Food Foodways* **2024**, *32*, 56–78. [CrossRef]
14. Arbelo, A.; Arbelo-Pérez, M.; De Vera, V.; Bilgihan, A. Green premiums: Assessing the revenue impact of eco-certification in the hospitality sector. *Int. J. Contemp. Hosp. Manag.* **2025**, *37*, 64–83. [CrossRef]
15. Mouchtaropoulou, E.; Mallidis, I.; Giannaki, M.; Koukaras, K.; Früh, S.; Ettinger, T.; Benmehaia, A.M.; Kacem, A.; Achour, L.; Detzel, A.; et al. Consumer willingness to pay for fair and sustainable foods: Who profits in the agri-food chain? *Front. Sustain. Food Syst.* **2024**, *8*, 1504985. [CrossRef]
16. Xue, J.; Han, W.; Zhang, S. Dual reference-point synergy model: Brand biography and message framing effect on willingness to pay a premium for green hotels. *Int. J. Hosp. Manag.* **2026**, *134*, 104552. [CrossRef]
17. Kesgin, M.; Can, A.S.; Ding, L.; Legg, M.; Schuler, D. Legacy matters: Encouraging willingness to pay a premium for environmentally friendly off-premises food packaging. *Int. J. Hosp. Manag.* **2025**, *126*, 104037. [CrossRef]

18. Andreica Mihut, I.S.; Sterie, L.G.; Mican, D. The green dilemma: What drives consumers to green purchase intention in an emerging EU economy? *J. Appl. Econ.* **2025**, *28*, 2536323. [CrossRef]
19. Haldorai, K.; Kim, W.G.; Phetvaroon, K. Environmental and financial performance in Thailand's hospitality industry: A longitudinal analysis. *J. Hosp. Tour. Insights* **2025**, 1–16. [CrossRef]
20. Elhoushy, S.; Elzek, Y.; Font, X. Sustainable tourism certification: A systematic literature review and suggested ways forward. *J. Sustain. Tour.* **2025**, 355–381. [CrossRef]
21. Mehta, R.; Oh, C. Institutional food waste and the circular economy: Is it time to revisit produce waste in global food supply chains? *Glob. Food Secur.* **2024**, *43*, 100819. [CrossRef]
22. Gál, T.; Kovács, S.; Bugyó-Nyakas, E. A comprehensive analysis of food waste through historical context: A bibliometric study from 2019 to 2024. *Clean. Waste Syst.* **2025**, *11*, 100318. [CrossRef]
23. Fechner, D.; Karl, M.; Grün, B.; Dolnicar, S. How can restaurants entice patrons to order environmentally sustainable dishes? Testing new approaches based on hedonic psychology and affective forecasting theory. *J. Sustain. Tour.* **2024**, *32*, 2225–2244.
24. Voss, S.; Andre, H.; Kock, F.; Karl, M.; Josiassen, A. Guiding pro-environmental behaviour: Examining the impact of cognitive and behavioural interventions on sustainable food choices in hospitality. *J. Sustain. Tour.* **2026**, *34*, 21–41. [CrossRef]
25. Mutale, B.; Dai, S.; Chen, Z.; Maulu, S. Enhancing food security amid climate change: Assessing impacts and developing adaptive strategies. *Cogent Food Agric.* **2025**, *11*, 2519800. [CrossRef]
26. Lavaredas, A.; Campos, F.; Almeida, G.G.F.; Dias, F.; Almeida, P. Sustainable development goals in tourism research. *Discov. Sustain.* **2025**, *6*, 759. [CrossRef]
27. Li, Y.; He, P.; Shan, Y.; Li, Y.; Hang, Y.; Shao, S.; Ruzzenenti, F.; Hubacek, K. Reducing climate change impacts from the global food system through diet shifts. *Nat. Clim. Change* **2024**, *14*, 943–953. [CrossRef]
28. Chen, N.; Li, A.; Talluri, K. Reviews and self-selection bias with operational implications. *Manag. Sci.* **2021**, *67*, 7472–7492. [CrossRef]
29. Huang, R. The financial consequences of online review aggregators: Evidence from Yelp ratings and SBA loans. *Manag. Sci.* **2025**, *71*, 59–82. [CrossRef]
30. He, S.; Hollenbeck, B.; Proserpio, D. The market for fake reviews. *Mark. Sci.* **2022**, *41*, 896–921. [CrossRef]
31. Zervas, G.; Proserpio, D.; Byers, J.W. A first look at online reputation on Airbnb, where every stay is above average. *Mark. Lett.* **2021**, *32*, 1–16. [CrossRef]
32. Spence, M. Job market signaling. In *Uncertainty in Economics*; Elsevier: Amsterdam, The Netherlands, 1978; pp. 281–306.
33. Majeed, S.; Kim, W.G.; Kim, T. Perceived green psychological benefits and customer pro-environment behavior in the value-belief-norm theory: The moderating role of perceived green CSR. *Int. J. Hosp. Manag.* **2023**, *113*, 103502. [CrossRef]
34. Pan, T.; Zhou, W. Navigating pro-environmental behavior among tourists: The role of value-belief-norm theory, personality traits, and commitment. *J. Hosp. Tour. Manag.* **2024**, *61*, 226–239. [CrossRef]
35. Griskevicius, V.; Tybur, J.M.; Van den Bergh, B. Going green to be seen: Status, reputation, and conspicuous conservation. *J. Personal. Soc. Psychol.* **2010**, *98*, 392. [CrossRef] [PubMed]
36. Nelson, K.M.; Partelow, S.; Stäbler, M.; Graci, S.; Fujitani, M. Tourist willingness to pay for local green hotel certification. *PLoS ONE* **2021**, *16*, e0245953. [CrossRef]
37. Li, S.; Kallas, Z. Meta-analysis of consumers' willingness to pay for sustainable food products. *Appetite* **2021**, *163*, 105239. [CrossRef]
38. Yu, W.; Han, X.; Cui, F. Increase consumers' willingness to pay a premium for organic food in restaurants: Explore the role of comparative advertising. *Front. Psychol.* **2022**, *13*, 982311. [CrossRef]
39. Mao, Z.; Yang, Y.; Zhou, J. Are GreenLeaders also performance leaders? An econometric analysis of TripAdvisor hotel certification of GreenLeaders. *J. Sustain. Tour.* **2023**, *31*, 2150–2172. [CrossRef]
40. Assaker, G.; O'Connor, P. The importance of green certification labels/badges in online hotel booking choice: A conjoint investigation of consumers' preferences pre-and post-COVID-19. *Cornell Hosp. Q.* **2023**, *64*, 401–414. [CrossRef]
41. Grimmer, J.; Roberts, M.E.; Stewart, B.M. *Text as Data: A New Framework for Machine Learning and the Social Sciences*; Princeton University Press: Princeton, NJ, USA, 2022.
42. Ash, E.; Hansen, S. Text algorithms in economics. *Annu. Rev. Econ.* **2023**, *15*, 659–688. [CrossRef]
43. Macanovic, A. Text mining for social science—The state and the future of computational text analysis in sociology. *Soc. Sci. Res.* **2022**, *108*, 102784.
44. Mehraliyev, F.; Chan, I.C.C.; Kirilenko, A.P. Sentiment analysis in hospitality and tourism: A thematic and methodological review. *Int. J. Contemp. Hosp. Manag.* **2022**, *34*, 46–77. [CrossRef]
45. Alantari, H.J.; Currim, I.S.; Deng, Y.; Singh, S. An empirical comparison of machine learning methods for text-based sentiment analysis of online consumer reviews. *Int. J. Res. Mark.* **2022**, *39*, 1–19. [CrossRef]
46. Lekmiti, A.; Stolk, P.J.; Taylor, A.; Ramachandran, S.; Yap, N.K. Text mining in tourism and hospitality research: A bibliometric perspective. *J. Hosp. Tour. Technol.* **2025**, *16*, 588–610.

47. Rosen, S. Hedonic prices and implicit markets: Product differentiation in pure competition. *J. Political Econ.* **1974**, *82*, 34–55. [CrossRef]
48. Sanchez-Lozano, G.; Pereira, L.N.; Chavez-Miranda, E. Big data hedonic pricing: Econometric insights into room rates' determinants by hotel category. *Tour. Manag.* **2021**, *85*, 104308. [CrossRef]
49. Connelly, B.L.; Certo, S.T.; Ireland, R.D.; Reutzel, C.R. Signaling theory: A review and assessment. *J. Manag.* **2011**, *37*, 39–67.
50. Van Phuong, N.; Mergenthaler, M.; Quynh, P.N.H. Consumer transition: Analyzing the impact of environmental and health consciousness on green food choices in Vietnam. *Discov. Sustain.* **2025**, *6*, 415. [CrossRef]
51. Mat'ová, H.; Triznová, M.O.; Kaputa, V.; Loučanová, E.; Vlosky, R.P. Strategic Environmental Consumer Segmentation: An Exploratory Case Study in Slovakia. *SAGE Open* **2024**, *14*, 21582440241240638. [CrossRef]

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Article

E-Servicescape and Online Travel Platform Outcomes: The Moderating Role of E-Familiarity

Abdullah Uslu ¹, Abdullah Tarinc ^{2,*}, Emrullah Erul ³, Ramazan Eren ¹, Gricela Andrade-Ruiz ⁴, Mehmet Arif Tuncer ⁵ and Gürkan Alagöz ⁶

¹ Department of Tourism Management, Manavgat Tourism Faculty, Akdeniz University, Antalya 07600, Türkiye; auslu@akdeniz.edu.tr (A.U.); ramazaneren@akdeniz.edu.tr (R.E.)

² Department of Gastronomy and Culinary Arts, Manavgat Tourism Faculty, Akdeniz University, Antalya 07600, Türkiye

³ Department of Tourism Management, Tourism Faculty, Izmir Katip Celebi University, Izmir 35620, Türkiye; emrullah.erul@ikcu.edu.tr

⁴ Faculty of Social and Legal Sciences, Valencian International University, 46002 Valencia, Spain; gricelaelizabeth.andrade@professor.universidadviu.com

⁵ Department of Business Management, Institute of Postgraduate Education, İstanbul Gedik University, İstanbul 34876, Türkiye; arif.tuncer@gedik.edu.tr

⁶ Department of Hotel, Restaurant and Catering, Vocational School of Tourism and Hotel Management, Erzincan Binali Yıldırım University, Erzincan 24050, Türkiye; galagoz@erzincan.edu.tr

* Correspondence: atarinc@akdeniz.edu.tr; Tel.: +90-530-170-5202

Abstract

This study examines the effects of the e-servicescape on flow experience, positive affect, trust, website loyalty, and e-WOM in the context of online travel platforms, while investigating the moderating role of e-familiarity. Drawing on servicescape theory, the S-O-R framework, and the Technology Acceptance Model (TAM), a comprehensive research model is proposed. Data were collected from 256 consumers residing in Türkiye who had previously used online travel agencies, and the hypotheses were tested using partial least squares structural equation modeling (PLS-SEM). The findings reveal that the e-servicescape has significant positive effects on flow experience, positive affect, and trust. While flow experience was a significant predictor of positive affect, it did not have a significant direct effect on e-WOM. Furthermore, positive affect and trust, in turn, significantly predicted both website loyalty and e-WOM. Moreover, e-familiarity negatively moderated the relationship between e-servicescape and flow experience, suggesting that highly familiar users derive less immersive benefit from enhanced online environments. The study contributes to the digital tourism and consumer behavior literature by highlighting the role of user familiarity in shaping experiential outcomes.

Keywords: e-servicescape; flow experience; e-familiarity; e-WOM; website loyalty

1. Introduction

Despite the growing prevalence of mobile applications in tourism, websites remain a central digital touchpoint for travelers, particularly during information search and evaluation stages. Compared to mobile applications, websites offer broader content visibility, fewer technical constraints, and higher accessibility across devices, making them critical platforms for shaping tourists' perceptions, trust, and booking-related decisions. Online platforms now function as the primary channels through which businesses interact with consumers, particularly in service industries where digital interfaces shape the overall

experience. In these environments, features such as interface structure, navigational coherence, and functional reliability influence how users perceive and evaluate online services. This concept, often referred to as the e-servicescape (ES), encompasses the virtual settings where services are delivered and experienced. Originating from traditional servicescape theory [1], the ES extends these principles to the digital realm, incorporating factors such as aesthetic appeal, online layout, functionality, and financial security [2,3].

The ES serves as a critical interface between businesses and consumers, shaping user experiences and influencing emotions, trust, and behavioral outcomes. A high-quality ES has been linked to enhanced customer satisfaction, trust, and loyalty, as well as increased positive e-WOM [4,5]. However, the nuanced mechanisms through which ES impacts consumer behavior, especially in the context of flow experience (FE), positive affect (PA), and trust, remain underexplored. Additionally, the role of e-familiarity (EF), or the extent to which users are accustomed to navigating digital environments, adds another layer of complexity, potentially moderating these relationships [6,7].

Research conducted to date suggests that the ES is significantly associated with several key consumer-related outcomes, including FE [8–10], trust [2,11,12], and e-WOM communication [11,13]. Moreover, the impact of the ES on affective responses, especially PA, has been investigated in recent empirical research [14]. While earlier research has provided valuable insights into various outcomes associated with ES, the literature remains fragmented with respect to several critical relationships. Specifically, empirical studies directly examining the effect of the ES on PA remain limited, indicating a need for further investigation in this area. Moreover, although Website Loyalty (WL) constitutes a critical outcome in online service contexts, research explicitly addressing the relationship between the ES and WL is scarce. In particular, existing research has yet to offer a comprehensive examination that integrates emerging constructs within a unified framework.

Furthermore, while the concept of EF has only recently emerged in the literature, there is insufficient empirical research examining its impact both directly and indirectly in online service contexts. By including EF in the proposed research model, this study aims to extend the literature and offer a novel theoretical perspective. Data were collected from consumers residing in Türkiye, who had previously used online travel agencies at least once, thereby ensuring the relevance and contextual validity of the findings within the online travel domain.

This study aims to examine the effects of the ES on FE, PA, trust, WL, and e-WOM, as well as to examine the moderating role of EF in these relationships. By integrating insights from the literature on consumer behavior, marketing, and digital interface design, this research offers a holistic framework for understanding the influence of the ES on online consumer behavior and its implications for digital marketing strategies.

The current study addresses the following research questions:

1. How does ES influence FE, PA, and trust?
2. What are the downstream effects of these factors on WL and e-WOM?
3. How does EF moderate the relationships between ES and these outcomes?

The findings of this study are expected to inform both academic inquiry and managerial practice by clarifying how online service environments can be designed to foster stronger consumer engagement and support organizational outcomes.

2. Theoretical Background

In hospitality and tourism research, service experiences have long been understood as outcomes shaped not only by service performance but also by the environments in which consumption-related interactions occur. The concept of ES can be exemplified through various platforms in the tourism industry. Websites like Trivago, TripAdvisor, and Book-

ing.com not only offer visually appealing images but also stand out as user-friendly and financially secure platforms. A study conducted by Amer (2021) [15] revealed that participants were also familiar with various third-party sites such as Agoda, AlMosafer, Wego, and Expedia. Expedia and Booking.com are companies with significant positions in the tourism industry [16]. As tourism services increasingly shift to digital platforms, online environments have become central spaces where tourists form evaluations, experience emotions, and develop behavioral intentions prior to actual consumption. In such contexts, the absence of physical interaction heightens the importance of environmental cues embedded in digital interfaces, making theoretical examination of online service environments particularly relevant.

Servicescape theory provides a useful point of departure for understanding how environmental characteristics influence consumer responses. Originally developed to explain the effects of physical surroundings in service settings, the theory emphasizes that environmental cues shape individuals' interpretations, emotional reactions, and subsequent behaviors [1]. Within hospitality and tourism research, this perspective has been widely applied to explain how atmospherics contribute to experiential evaluations in hotels, restaurants, and destinations. As service encounters increasingly occur online, these ideas have been extended to digital contexts through the notion of ES. In online tourism settings, design coherence, functional clarity, and perceived security collectively form the environment in which tourists engage with service providers [2]. These elements serve as substitutes for tangibility and interpersonal contact, thereby influencing perceived reliability and experiential quality.

While servicescape theory defines the service environment, the Stimulus-Organism-Response (S-O-R) paradigm sheds light on how such environments influence consumer behavior. The S-O-R framework, derived from environmental psychology, views environments as stimuli that activate internal psychological processes, which then influence behavioral responses. [17,18]. In tourism research (including sustainability-oriented studies), this framework has been particularly valuable for examining experiential mechanisms through which environmental cues affect emotions, trust, and loyalty-related outcomes.

Although the Stimulus-Organism-Response framework serves as the primary theoretical foundation of this study, the Technology Acceptance Model (TAM) is explicitly incorporated within the organism component. Users' evaluations of system efficiency and ease of interaction are conceptualized as TAM-based cognitive appraisals that mediate the relationship between environmental stimuli and behavioral responses in the online tourism context.

In the present context, ES operates as the stimulus that initiates tourists' internal evaluations. These internal responses include experiential immersion, affective reactions, and relational judgments. FE reflects a state of concentrated engagement that enhances the perceived meaningfulness of digital interactions. PA captures emotional responses such as enjoyment and interest that emerge during interaction with online platforms. Trust represents a critical relational assessment in tourism contexts characterized by information asymmetry and pre-consumption risk [6]. Together, these internal states shape behavioral outcomes such as WL and e-WOM. From a sustainability perspective, such outcomes contribute to stable platform usage, reduce dependence on short-term promotional tactics, and support long-term consumer-platform relationships. By combining servicescape theory, the S-O-R framework, and the Technology Acceptance Model (TAM), this study conceptualizes online travel platforms as experiential environments that shape tourists' cognitive evaluations, affective responses, and long-term behavioral intentions, thereby providing a coherent and integrative theoretical foundation for examining sustainable behavioral outcomes in hospitality and tourism.

3. Conceptual Model

3.1. E-Servicescape

ES as a construct originates from earlier discussions of digitally mediated service environments. It builds upon Venkatesh's (1998) notion of cyber market scapes [19] and Koernig's (2003) conceptualization of e-scapes [20]. In subsequent studies, the same phenomenon has been examined under different terminologies, including virtual servicescape [21], online servicescape [2,22,23], digital servicescape [24], and electronic servicescape [3]. Although these labels vary, they collectively refer to the characteristics of online environments in which service encounters take place.

Harris and Goode (2010) [2] define ES as a set of environmental cues present during online service delivery that shape consumer perceptions and evaluations. Similarly, Wu et al. (2017) [4] emphasize the role of online "physical" elements that exist at the moment of service interaction and influence customer satisfaction. In this respect, the ES functions as a digital counterpart to the traditional servicescape, adapting Bitner's (1992) framework to virtual contexts [1].

Within online settings, ES plays a critical role in shaping consumers' behavioral intentions and emotional responses. By guiding users toward particular actions, it contributes to both affective and cognitive evaluations of the service experience [25]. According to Harris and Goode (2010) [2], the ES consists of three core dimensions: aesthetic appeal, online layout and functionality, and financial security. While the first two dimensions are conceptually aligned with those proposed in physical service environments, financial security reflects the unique demands and risks associated with online transactions.

Aesthetic appeal refers to the overall visual attractiveness and sensory impression of a website. It encompasses design elements that stimulate users' interest and enhance their engagement with online content [5]. Effective visual design not only captures attention but also mitigates information overload by facilitating clarity and coherence [3]. In this context, consistency in visual elements such as colour schemes, typography, and layout structure is essential for creating a positive user experience.

Online layout and functionality represent the structural and operational aspects of a website that enable smooth interaction. Layout relates to the organization, adaptability, and navigational structure of web pages, whereas functionality concerns the usefulness, relevance, and accessibility of website content [23]. Together, these elements determine how efficiently users can accomplish their goals and how enjoyable they perceive the interaction [5]. Financial security is another fundamental dimension of the ES. Beyond safeguarding personal and payment information, it also involves minimizing perceived risk and simplifying the online purchasing process. Perceptions of smooth and secure transaction processes contribute to higher levels of user trust in the platform [22].

In virtual service environments, the ES serves as the primary interface through which communication between firms and consumers occurs. Although a substantial body of research has examined the relationship between ES attributes and behavioral outcomes, relatively limited attention has been given to consumers' experiential evaluations of online hotel booking platforms. Prior empirical studies indicate that well-designed service environments significantly enhance user experience across different settings. For instance, websites that effectively balance hedonic and utilitarian design features are positively associated with FE [26].

Within tourism and hospitality contexts, website quality has been identified as a key determinant of flow in both virtual travel communities and hotel booking platforms [27,28]. Furthermore, Eroglu et al. (2003) [29] argue that online service environments are closely linked to users' emotional states. Supporting this view, Huang et al. (2017) [9] highlight the online environment as a crucial antecedent of PA. The influence of environmental cues on

emotional responses has also been widely discussed in tourism research across both offline and online domains [30].

Finally, the performance of ES dimensions has been shown to exert a significant impact on consumer trust. A well-designed and reliable online environment enhances users' confidence in a website, thereby fostering trust [5]. Trust, in turn, plays a mediating role in the relationship between website quality, design features, and the broader ES, shaping long-term consumer–brand relationships [31].

In light of this information, we propose the following hypotheses:

H1: *ES is positively related to FE on the website.*

H2: *ES is positively related to PA on the website.*

H3: *ES is positively related to Trust on the website.*

3.2. Flow Experience

The relationship between ES and FE is well-documented in the context of online platforms. FE, characterized by an immersive state of deep involvement and enjoyment, is closely tied to the design and functionality of online environments [27]. A well-designed ES, with its appealing aesthetics, seamless layout, and robust functionality, facilitates user engagement by minimizing distractions and enhancing usability [32]. For instance, studies have shown that ES with hedonic and utilitarian features positively influences consumers' likelihood of experiencing flow states while browsing or shopping online [26]. These immersive experiences, in turn, foster greater customer satisfaction and loyalty, making the optimization of ES a strategic priority for businesses.

FE, often described as a condition of deep immersion and engagement in an activity, significantly impacts customers' emotions and satisfaction, particularly in the tourism industry. It is characterized by a sense of enjoyment, focus, and a loss of self-consciousness. Rather than representing a static psychological state, flow emerges through interaction with environments that balance usability, challenge, and engagement. It involves elements such as focused attention, time distortion, and a sense of control over the activity [33,34].

FE in tourism, such as during ecotourism or virtual reality tours, is positively related to customer satisfaction. This is because flow enhances the enjoyment and memorability of the experience, leading to higher satisfaction levels [35–37]. Flow contributes to the “fun” emotion, which is crucial for memorable tourism experiences. This emotional engagement can increase tourists' intentions to recommend and revisit destinations [33,38].

Within the tourism domain, FE not only boosts satisfaction but also encourages environmentally responsible behaviors and destination loyalty. This is particularly evident in eco-tourism settings where FEs are linked to tourists' value perceptions [35]. Novelty and interpersonal interactions are important in creating FE, which in turn enhances satisfaction and positive memories of the tourism experience [33].

Flow influences consumer behavior by fostering positive emotions and satisfaction, which in turn encourages e-WOM. FEs in seamless omnichannel environments lead to increased positive e-WOM. Consumers in a flow state tend to engage in positive experience-sharing behaviors, as the seamless environment enhances their overall satisfaction and engagement [39]. FEs within online brand communities enhance customer engagement, which subsequently increases e-WOM intention. The immersive experience encourages community members to share their positive experiences with others [40]. By fostering a state of deep involvement and enjoyment, flow can lead to increased customer loyalty and positive behavioral intentions, such as recommendations and revisits. In the tourism industry, creating opportunities for FE can significantly improve customer satisfaction

and emotional connections with destinations. Additionally, Website loyalty (e-loyalty) refers to users' intentions to revisit a website or to engage in future transactions on the site. Although online loyalty is often measured through behavioral indicators such as the time a visitor spends on a site or the frequency of return visits, determining whether users are genuinely committed to a website is not always straightforward [41]. Without customer loyalty, even the most well-designed e-commerce platforms may fail to sustain long-term viability. Firms aiming to cultivate a loyal customer base must consistently satisfy their users and focus on developing enduring relationships with them [42].

Accordingly, the following hypotheses are proposed:

H4: *FE is positively related to WL.*

H5: *FE is positively related to e-WOM.*

In the purchase decision-making process, both FE and PA are valuable experiences [9]. This relationship merits closer empirical examination. In several studies, PA is suggested to be a consequence of FE. Greater FE is associated with greater PA [43]. Guo et al. (2016) [44] further noted that the FE has a direct impact on consumers' emotions when they search and trade online. On this basis, the following hypothesis is proposed:

H6: *FE is positively related to PA.*

3.3. Positive Affect

Affect is a psychological construct that represents mental states of evaluative feelings about a situation [45]. In accordance with Watson et al. (1988) [46] creators of the extensively used PANAS scale, PA captures the extent to which individuals feel energetic, attentive, and emotionally engaged during an experience. It represents a state in which one is highly aroused, fully focused and pleasantly engaged. PA is the feeling of being interested, enthusiastic, alert and inspired while performing an activity [47].

When individuals experience positive emotions, their attentional focus, cognitive processes, and range of behaviors tend to broaden [48]. If consumers feel more pleasure and joy while shopping, this PA will in turn increase their positive behavior, such as buying and revisiting [9]. In addition, their findings indicate that positive emotions partially mediate the relationship with behavioral loyalty, whereas negative emotions partially mediate the relationship with attitudinal loyalty.

PA, which encompasses feelings of pleasure, joy, and enthusiasm, is another critical outcome of a well-constructed ES. The emotional appeal of an online environment, including its visual and functional attributes, plays a key role in shaping consumers' emotional responses [45]. When customers perceive an ES as aesthetically pleasing and user-friendly, they are more likely to associate their online interactions with positive emotions [9]. These emotions contribute to a more favourable overall customer experience and, in turn, encourage repeat visits as well as positive e-WOM. Furthermore, studies in tourism and hospitality sectors have revealed that PA mediated by high-quality ESs significantly increases customer trust and loyalty [7,49]. Hereby, the following hypothesis are proposed:

H7: *PA is positively related to WL.*

H8: *PA is positively related to e-WOM.*

3.4. Trust

In e-commerce settings, trust reflects the level of confidence consumers place in online vendors, which can fluctuate based on various factors such as perceived privacy, service quality, and security. Trust is a multidimensional concept that includes elements like integrity, benevolence, and ability, and is crucial for overcoming consumer hesitancy in online transactions [50–52].

Trust is a cornerstone of successful online interactions, particularly in e-commerce, where customers rely heavily on the perceived credibility of a website [53]. The ES contributes to trust by providing a secure, visually appealing, and functional digital environment [2]. Elements such as financial security, user-friendly layouts, and consistent branding reinforce customers' confidence in the platform [5]. High levels of trust in the ES not only encourage immediate purchase decisions but also promote long-term loyalty and advocacy behaviors, such as positive e-WOM. The relationship between trust and ES highlights the critical role of digital interface design in building sustainable customer relationships in the online marketplace.

Trust influences consumers' commitment to a brand or website, especially in high-involvement situations where trust can have a stronger impact than overall satisfaction [54,55]. Trust affects not only the intention to purchase but also actual purchasing behavior, including preference, cost, and frequency of visits, thereby enhancing consumer loyalty and profitability for the website [56].

Trust significantly impacts e-WOM, as it determines how likely customers are to share their experiences and recommendations online. A positive ES, which includes customer reviews and other online environmental factors, enhances trust, which in turn positively influences e-WOM and customer loyalty [31]. Trust in a brand or website encourages consumers to engage in e-WOM, sharing their experiences and recommendations, which can either benefit or harm the brand depending on the nature of the feedback [31,57].

Trust is a critical component in e-commerce, influencing both WL and e-WOM. It acts as a foundation for consumer confidence, affecting their purchasing decisions and their propensity to engage in brand recommendations. Trust enhances loyalty by fostering a reliable and secure online environment, and it drives e-WOM by encouraging consumers to share their positive experiences. In light of the theoretical arguments outlined above, the following hypotheses are advanced:

H9: *Trust is positively related to WL.*

H10: *Trust is positively related to e-WOM.*

3.5. E-Familiarity

EF literature frequently conceptualizes familiarity as a form of situational normality, referring to an individual's perception that a given environment operates in an expected and understandable manner based on prior experience [6]. Familiarity contributes to the reduction in social uncertainty by enabling individuals to interpret and evaluate situations more effectively through accumulated experience [58]. As individuals become familiar with an environment, they are better able to anticipate the behavior of other parties, which enhances their perceived level of control and, in turn, fosters the development of trust [59].

In online contexts, users who possess extensive experience with internet technologies, websites, and especially e-commerce platforms tend to exhibit lower levels of hesitation and anxiety when engaging in online transactions [58]. Beyond technical competence, familiarity also encompasses an understanding of institutional safeguards designed to protect

consumers. In this regard, perceptions of financial security represent an essential element within the online environment and play a central role in the formation of online trust.

Existing empirical studies have examined the moderating role of e-trust in relation to constructs such as e-satisfaction, e-loyalty, and e-service quality [60]. Similarly, studies in adjacent domains have highlighted the importance of familiarity as a contextual moderator. For instance, Catalán et al. (2019) [61] demonstrated that brand familiarity strengthens the relationship between advergames experiences and flow. Likewise, Park et al. (2019) [7] found that brand familiarity significantly moderates the effect of substantive ES elements on PA. The relationship between familiarity and trust has also been empirically supported by Gefen (2000) [59], who showed that even non-personal and routine interactions mediated through standardized technological interfaces can contribute to trust formation when familiarity is present.

Building on this body of literature, EF is expected to shape how users interpret and respond to experiential and affective cues within the ES. On this basis, the following hypotheses are advanced:

H11: EF has a significantly moderating role in the relationship between FE and ES.

H12: EF has a significantly moderating role in the relationship between PA and ES.

H13: EF has a significantly moderating role in the relationship between trust and ES.

4. Methods

4.1. Research Model

As seen in Figure 1, this study aims to investigate the influence of ES on consumer experiences, specifically focusing on FE, trust, WL, and electronic word-of-mouth (e-WOM). ES has three components and these components aesthetically appealing, layout and functionality and financial security. This study focuses on consumers who purchase services via online websites. Within this context, a comprehensive model has been developed incorporating variables such as ES, FE, PA, trust, WL, and e-WOM. Firstly, the study examines the existence of positive relationships between ES and FE, PA, and trust. Subsequently, it investigates whether EF moderates these relationships. The proposed research model represents a detailed extended model, which, to the best of our knowledge, constitutes the first study to present such a framework in the literature (Figure 1).

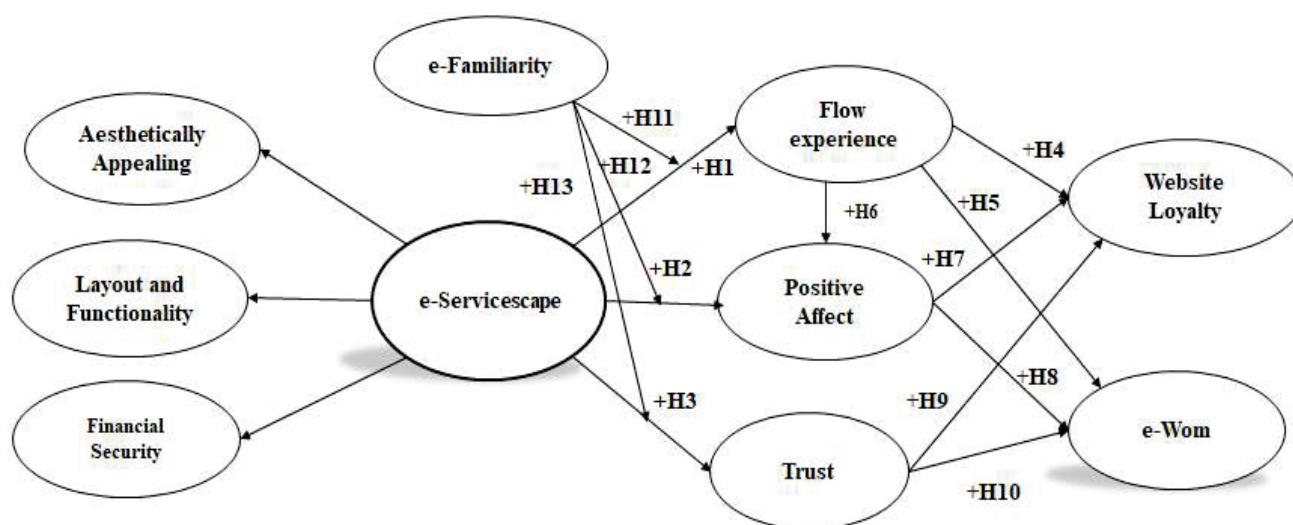


Figure 1. Proposed Research Model.

4.2. Sample and Data Collection

The population of this study consisted of voluntary consumers aged 18 and above residing in Türkiye. Participants were required to have purchased travel services at least once, specifically within the last 12 months, using an online travel agency. This specific timeline was enforced to ensure the contemporary relevance of the data and to mitigate potential recall bias or the ‘halo effect’, ensuring that respondents’ evaluations were based on recent and clear interactions with digital interfaces. The data were collected using a survey method. The survey, developed for the purposes of this research, was administered online to the study population via Google Forms. Between February 1 and March 1, 2024, the researchers collected 270 online surveys from consumers using the convenience sampling method. This method, in which only easily accessible individuals are included in the sample, provides researchers with advantages in terms of time and cost. However, the main limitation of convenience sampling is that it is uncertain whether the obtained sample accurately represents the population. Consequently, the generalizability of the findings is limited [62]. Thus, 14 questionnaires excluded from the research due to incomplete questionnaires. The study was conducted using the remaining 256 questionnaires.

The adequacy of the obtained sample size in representing the population was assessed with reference to Bryman and Cramer (2001) [63]. The authors suggest that multiplying the total number of items in a scale by five or ten is sufficient to represent the population. In this study, the questionnaire used comprised 38 items, indicating that a minimum sample size of 190 can be considered acceptable. Additionally, Tabachnick and Fidell (2007) [64] state that studies involving multivariate analyses require at least 210 participants. Accordingly, a total of 256 participants were reached in this study, suggesting that the sample size is sufficient to represent the population.

Because the questionnaire was administered online, the sample is more reflective of digitally active adult consumers. We therefore interpret the findings within this context and acknowledge that differences in participants’ educational background and other unobserved characteristics may influence comprehension and response patterns. Future studies should employ stratified sampling and measurement-invariance testing across demographic groups to further enhance robustness. Moreover, while age may shape individuals’ familiarity with technology, age-related differences were not explicitly examined as a moderating variable in the current research model.

4.3. Measures

The measurement scales employed in this study are summarized as follows. The ES scale, adopted from Tanković and Benazić (2018) [65], consists of 17 items and reflects a three-sub-factor constructs. Specifically, the first factor, aesthetic appeal, comprises five items; the second factor, layout and functionality, includes seven items; and the third factor, financial security, consists of five items. The online FE construct was measured using a five-item scale developed by Huang et al. (2017) [9]. In addition, the PA construct was assessed using a four-item scale also developed by Huang et al. (2017) [9]. WL was measured using a three-item scale proposed by Casaló et al. (2008) [66]. Furthermore, the electronic word-of-mouth (e-WOM) construct was measured using a three-item scale developed by Line and Hanks (2019) [67]. Finally, EF was measured using a five-item scale developed by Gefen (2000) [59], while trust was assessed using a three-item scale, also adapted from Gefen (2000) [59]. Thus, the items on the scales were presented using a 5-point Likert-type scale (1 = Strongly disagree... 5 = Strongly agree).

4.4. Data Analysis

Smart PLS 3.0.9 and SPSS v.27 were used to analyze the data. The study's prediction-oriented focus on explaining variance in important endogenous constructs (flow experience, positive affect, trust, website loyalty, and e-WOM) within a complex model incorporating a hierarchical second-order construct (e-servicescape) and moderation effects led to the use of PLS-SEM. PLS-SEM was considered the most suitable analytical method due to its suitability for higher-order and interaction models, strong performance with moderate sample sizes, and broad support in tourism and hospitality research for maximizing explained variance (R^2) and predictive relevance (Q^2).

In accordance with Podsakoff et al. (2003) [68] recommendations, potential common method bias (CMB) was evaluated. To lessen evaluation anxiety and social desirability bias, procedural remedies were put in place, such as guaranteeing respondent anonymity and highlighting the lack of right or wrong answers. Furthermore, Harman's single-factor test revealed that the first factor explained 36.82% of the overall variation, which is less than the 50% cutoff, indicating that CMB is not likely to seriously jeopardize the validity of the study.

5. Findings

5.1. Demographic Features of Participants

As shown in Table 1, the participants had an equal gender distribution (50% female, 50% male). Regarding age distribution, 41.4% are between 25 and 34 years old. The majority of participants were unmarried (55.1%) and had a university degree (64.5%). Trivago was the most popular online reservation platform (39.9%), followed by ETS Tour (30.3%), Tatilsepeti (9.6%), and Booking (9.2%). Other platforms (Tatilbudur: 2.8%; hotel websites: 1.8%; Otelz: 3.2%; Jolly Tour: 3.2%) were used less frequently. 218 of the 256 participants answered the question on platform usage. A significant fraction of the sample had significant experience with online reservation systems, as seen by the fact that 47.7% reported making one online reservation, 12.1% reported making two, and 40.2% reported making three or more.

Table 1. Demographic profile of participants.

Variable	Category	n	%
Gender	Male	128	50.0
	Female	128	50.0
Education level	University degree	165	64.5
	Other	91	35.5
Marital status	Single	141	55.1
	Married/Other	115	44.9
Age	18–24	72	28.1
	25–34	106	41.4
	35–44	63	24.6
	45–58	15	5.9

Table 1. Cont.

Variable	Category	n	%
Most frequently used online reservation platform (n = 218)	Trivago	87	39.9
	ETS Tour	66	30.3
	Tatilsepeti	21	9.6
	Booking	20	9.2
	Otelz	7	3.2
	Jolly Tour	7	3.2
	Tatilbudur	6	2.8
	Hotel websites	4	1.8
Frequency of online reservations	Once	122	47.7
	Twice	31	12.1
	Three or more times	103	40.2

As shown in Table 1, the sample has a balanced gender distribution, and the participants are quite young. Many participants reported being single and having a university degree. Trivago and ETS Tour were found to be the most popular platforms for online reservation behavior, and a sizable percentage of participants reported making reservations online three or more times, suggesting a generally high degree of familiarity with digital booking systems.

5.2. Measurement Model

The validity of the measurement model was evaluated in terms of convergent and discriminant validity [69]. Convergent validity was assessed using factor loadings, average variance extracted (AVE), rho A values, and composite reliability (CR). Convergent validity was confirmed by examining the factor loadings and AVE values of the constructs (Table 2). The factor loadings for Flowexperience3, Layandfunc1, and Layandfunc3 were below 0.40 and therefore excluded from the analysis. Ref. [69] emphasized the importance of assessing internal consistency reliability when an item's factor loading falls between 0.40 and 0.70. In this context, the factor loadings of Aesthetic3, Layandfunc2, Seconline4, and Flowexp4 were found to be outside the ideal range of 0.70 to 0.90 [70]. Since the removal of these items did not produce a positive change in the AVE values of the constructs, they were retained to preserve construct integrity. Finally, the results indicated satisfactory convergent validity, as the CR values ranged from 0.882 to 0.969 and the AVE values from 0.612 to 0.874.

Table 2. Measurement results.

Latent Variables	Indicators	Loading	CR	AVE
<i>ES (Second-order)</i>			0.923	0.801
Aesthetically Appealing	Aesthetic1	0.903	0.919	0.698
	Aesthetic2	0.912		
	Aesthetic3	0.643		
	Aesthetic4	0.873		
	Aesthetic5	0.819		

Table 2. Cont.

Latent Variables	Indicators	Loading	CR	AVE
Layout and Functionality	Layandfunc2	0.592	0.904	0.658
	Layandfunc4	0.860		
	Layandfunc5	0.929		
	Layandfunc6	0.929		
	Layandfunc7	0.716		
Financial Security	FinSec1	0.725	0.883	0.612
	FinSec2	0.910		
	FinSec3	0.842		
	FinSec4	0.484		
	FinSec5	0.872		
FE	Flowexp1	0.885	0.882	0.664
	Flowexp2	0.921		
	Flowexp4	0.468		
	Flowexp5	0.898		
PA	Posaffect1	0.866	0.949	0.824
	Posaffect2	0.935		
	Posaffect3	0.905		
	Posaffect4	0.923		
Trust	Trust1	0.904	0.948	0.786
	Trust2	0.935		
	Trust3	0.924		
	Trust4	0.943		
	Trust5	0.705		
WL	Loy1	0.932	0.954	0.874
	Loy2	0.933		
	Loy3	0.938		
EF	Efamailiar1	0.940	0.969	0.885
	Efamailiar2	0.939		
	Efamailiar3	0.938		
	Efamailiar4	0.946		
e-WOM	Ewom1	0.936	0.952	0.868
	Ewom2	0.943		
	Ewom3	0.916		

Discriminant validity was evaluated using the Fornell–Larcker criterion and the Heterotrait–Monotrait ratio (HTMT). Discriminant validity ensures that each construct is empirically distinct from the others, which is verified when the square root of the AVE for each construct exceeds its inter-construct correlations [71]. As shown in Table 3, this criterion was met for all constructs, confirming discriminant validity.

Table 3. Discriminant validity (Fornell-Larcker).

	1	2	3	4	5	6	7	8	9	10
1	0.836									
2	0.718	0.811								
3	0.671	0.714	0.782							
4	---*	---*	---*	0.793						
5	0.729	0.697	0.700	0.723	0.815					
6	0.678	0.640	0.647	0.732	0.754	0.908				
7	0.684	0.680	0.724	0.777	0.742	0.697	0.887			
8	0.647	0.624	0.637	0.711	0.679	0.675	0.720	0.935		
9	0.635	0.631	0.678	0.723	0.684	0.621	0.738	0.700	0.941	
10	0.660	0.575	0.620	0.692	0.625	0.629	0.720	0.706	0.625	0.932

Explanation: 1: Aesthetically Appealing; 2: Layout and Functionality; 3: Financial Security; 4: ES; 5: FE; 6: PA; 7: Trust; 8: WL; 9: EF; 10: E-Wom. Values in bold are the square root of AVE values. * e-Servicescape (In the secondary reflector-reflector measurement, a check of discriminant validity among sub-dimensions was not performed by Hair et al. (2019) [69]. Discriminant validity between secondary dimensions and its sub-dimensions is also not examined).

In addition, the HTMT criterion was used to further assess discriminant validity [69,72]. As presented in Table 4, all HTMT values were below the threshold of 0.90, confirming that discriminant validity was achieved. Overall, these results validate the measurement model and allow for subsequent testing of the structural model.

Table 4. Discriminant validity (HTMT).

	1	2	3	4	5	6	7	8	9	10	11
1											
2	0.810										
3	0.722	0.799									
4	---*	---*	---*								
5	0.830	0.806	0.781	0.880							
6	0.743	0.708	0.703	0.784	0.839						
7	0.743	0.736	0.778	0.820	0.823	0.748					
8	0.704	0.687	0.669	0.749	0.758	0.727	0.771				
9	0.682	0.688	0.714	0.757	0.749	0.658	0.777	0.741			
10	0.720	0.627	0.661	0.731	0.693	0.678	0.772	0.760	0.662		
11	0.488	0.448	0.509	0.525	0.512	0.426	0.427	0.385	0.309	0.376	

Explanation: 2: Aesthetically Appealing; 3: Layout and Functionality; 4: Financial Security; 5: ES; 6: FE; 7: PA; 8: Trust; 9: WL; 10: EF; 11: E-Wom.* e-Servicescape = It is important to note that HTMT values between the second-order construct (ES) and its first-order dimensions are omitted, in accordance with the recommendations of Hair et al. (2019) [69] for reflective-reflective hierarchical component models.

5.3. Structural Model

After establishing the validity of the measurement model, the structural model was analyzed (Table 5). First, the variance inflation factor (VIF) values were examined. All VIF values ranged from 1.327 to 2.956, indicating no multicollinearity concerns. Second, to assess the model's predictive power, the coefficient of determination (R^2) (Fornell & Larcker, 1981) [71] and cross-validated redundancy (Q^2) values were analyzed (Hair et al., 2019) [69]. As shown in Table 4, the model explains 66.2% of FE, 62.1% of PA, 67.1% of Trust, 59% of WL, and 55.3% of e-WOM. All Stone–Geisser Q^2 values were positive, indicating sufficient predictive relevance ([64,65]).

To examine the significance and strength of the path coefficients, bootstrapping (5000 resamples) was performed.

The findings indicate that ES exerted a strong positive effect on FE ($\beta = 0.563$, $p < 0.05$, $f^2 = 0.370$), a small but significant effect on PA ($\beta = 0.304$, $p < 0.05$, $f^2 = 0.010$), and a moderate positive effect on trust ($\beta = 0.480$, $p < 0.05$, $f^2 = 0.276$). Accordingly, Hypotheses H1, H2, and H3 were supported.

Table 5. Inner model results.

Hypothesis	Manner	β	t	p	Outcome	VIF	f^2
H_1	e-Serv $\rightarrow$ Flowexp	0.563	7.003	0.000	Supported	2.199	0.370
H_2	e-Serv $\rightarrow$ Posaff	0.304	3.121	0.002	Supported	2.294	0.010
H_3	e-Serv $\rightarrow$ Trust	0.480	5.748	0.000	Supported	2.119	0.276
H_4	Flowexp $\rightarrow$ WebLoy	0.191	2.422	0.015	Supported	2.932	0.030
H_5	Flowexp $\rightarrow$ e-Wom	0.095	1.153	0.249	Not Supported	2.932	0.007
H_6	Flowexp $\rightarrow$ Posaff	0.432	4.696	0.000	Supported	2.956	0.166
H_7	Posaff $\rightarrow$ WebLoy	0.249	3.562	0.000	Supported	2.567	0.059
H_8	Posaff $\rightarrow$ e-Wom	0.205	2.743	0.006	Supported	2.567	0.037
H_9	Trust $\rightarrow$ WebLoy	0.406	5.280	0.000	Supported	2.467	0.233
H_{10}	Trust $\rightarrow$ e-Wom	0.507	6.574	0.000	Supported	2.467	0.163
H_{11}	e-Fam $\times$ e-Serv $\rightarrow$ Flowexp	−0.091	2.448	0.014	Supported	1.327	0.026
H_{12}	e-Fam $\times$ e-Serv $\rightarrow$ Posaff	−0.029	0.718	0.473	Not Supported	1.362	0.002
H_{13}	e-Fam $\times$ e-Serv $\rightarrow$ Trust	−0.049	1.325	0.185	Not Supported	1.327	0.006
Flowexp $R^2 = 0.662$ $Q^2 = 0.643$; Posaff $R^2 = 0.621$ $Q^2 = 0.541$; Trust $R^2 = 0.671$ $Q^2 = 0.654$; WebLoy $R^2 = 0.590$ $Q^2 = 0.556$; e-Wom $R^2 = 0.553$ $Q^2 = 0.496$							

Explanation: e-Fam: EF, e-Serv: ES, Flowexp: FE; Posaff: PA, WebLoy: WL.

FE demonstrated a small yet significant influence on WL ($\beta = 0.191$, $p < 0.05$, $f^2 = 0.030$) and a moderate, statistically significant effect on PA ($\beta = 0.432$, $p < 0.05$, $f^2 = 0.166$), leading to the acceptance of H_4 and H_6 . In contrast, the effect of FE on e-WOM was not statistically significant ($\beta = 0.095$, $p > 0.05$, $f^2 = 0.007$), resulting in the rejection of H_5 .

PA exhibited small but significant effects on both WL ($\beta = 0.249$, $p < 0.05$, $f^2 = 0.059$) and e-WOM ($\beta = 0.205$, $p < 0.05$, $f^2 = 0.037$), thereby supporting H_7 and H_8 . Finally, trust showed moderate and significant effects on WL ($\beta = 0.406$, $p < 0.05$, $f^2 = 0.233$) and e-WOM ($\beta = 0.507$, $p < 0.05$, $f^2 = 0.163$), providing support for H_9 and H_{10} .

5.4. Results of Moderating Effect

The interaction between ES and FE was negatively and significantly influenced by EF ($\beta = -0.091$, $t = 2.448$, $p < 0.05$, $f^2 = 0.026$). However, the interactions between ES and PA, and between ES and Trust, were not significantly influenced by EF. These findings indicate that EF negatively moderates the relationship between ES and FE. Thus, H_{11} was supported, whereas H_{12} and H_{13} were rejected. To further interpret the moderating effect of EF, a simple slope analysis was conducted (Figure 2).

In this analysis, slope lines were plotted based on the mean of EF and its ± 1 standard deviation values. The non-parallel nature of these lines confirms the presence of a moderation effect. The slope test results indicate that the relationship between EF and ES is significant and negative at both high and low levels of FE.

In summary, customers with higher EF experience lower levels of Flow when ES is high compared to those with lower EF. Therefore, when accounting for EF, participants' perception of FE may decrease as ES intensifies.

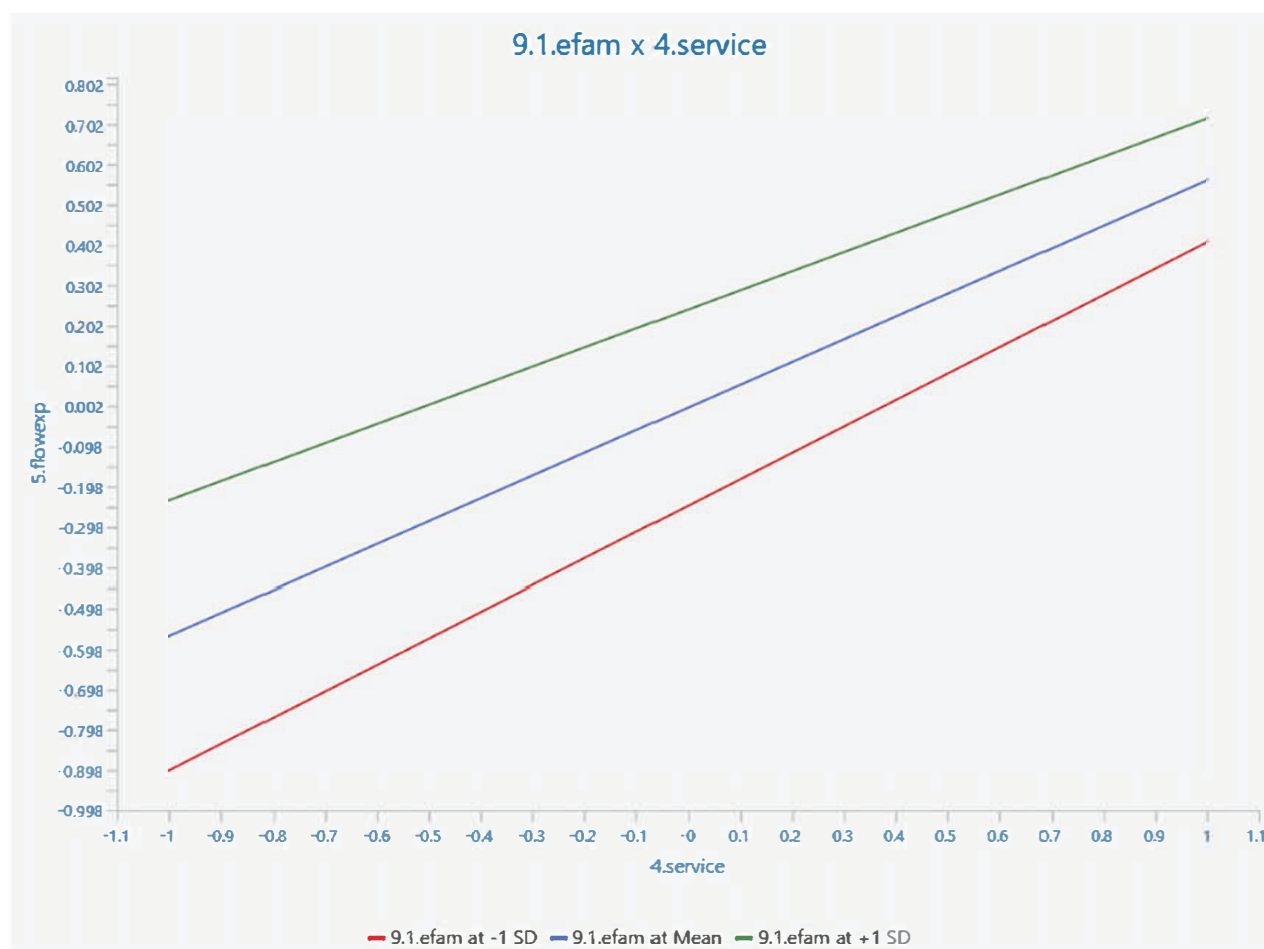


Figure 2. Simple Slope test.

6. Discussion, Conclusion and Implications

6.1. The Effect of ES on FE

The findings of this study indicate that ES has a positive and statistically significant effect on FE. This result suggests that the aesthetic appeal, functional design, and perceived financial security of online environments play a critical role in facilitating users' immersive experiences during digital interactions. FE, characterized by deep concentration, enjoyment, and a diminished sense of time, emerges more readily when users interact with well-structured and visually appealing online platforms. In this respect, ES functions as a key environmental stimulus that reduces cognitive effort and enables seamless user–platform interaction.

This finding is consistent with prior research emphasizing that well-designed online environments enhance users' engagement by minimizing distractions and improving navigational efficiency [26,27,32]. When users perceive an online platform as intuitive and aesthetically coherent, they are more likely to become fully absorbed in the activity, thereby experiencing higher levels of flow. Accordingly, the present study reinforces the notion that ES is not merely a functional interface but also an experiential mechanism that shapes consumers' psychological states. However, while the positive influence of ES on FE is well established, the strength of this relationship may vary depending on individual user characteristics. In particular, users' prior experience and familiarity with digital platforms warrant closer examination, highlighting the relevance of EF as a potential boundary condition in this relationship.

6.2. The Effect of ES on Trust

Beyond experiential outcomes, the results further demonstrate that ES exerts a significant positive effect on trust. This finding underscores the importance of online environmental cues in reducing perceived risk and fostering confidence in digital platforms. Elements such as financial security, consistent visual design, and functional reliability signal credibility and professionalism, thereby enhancing users' trust perceptions. In online contexts where face-to-face interaction is absent, such cues become especially salient in shaping users' evaluations of platform integrity and reliability.

This result aligns with previous studies suggesting that ES serves as a foundational determinant of trust in e-commerce and digital service environments [2,5,53]. A secure and well-organized online interface reassures users that their personal and financial information is protected, which in turn strengthens their willingness to engage with the platform. Moreover, trust plays a pivotal role in driving downstream behavioral outcomes, such as loyalty and positive electronic word-of-mouth. Therefore, the positive relationship identified in this study confirms the strategic importance of ES in establishing sustainable consumer–platform relationships. Nevertheless, similar to experiential responses, trust formation may also be contingent upon users' prior exposure to and familiarity with online environments, suggesting that the role of EF deserves further attention.

6.3. The Moderating Role of EF in the ES–FE Relationship

One of the most notable and theoretically meaningful findings of this study is the negative moderating effect of EF on the relationship between ES and FE. Contrary to the dominant assumption in the literature that familiarity consistently strengthens positive experiential outcomes, the results reveal that as users' EF increases, the positive impact of ES on FE weakens.

Existing research generally posits that higher levels of familiarity reduce uncertainty and cognitive effort, thereby facilitating more positive user experiences [6,7]. While this assumption holds for the direct effects of EF, the present findings suggest a more nuanced mechanism when familiarity interacts with environmental stimuli. Specifically, highly familiar users may become habituated to standard design features and interface structures, which diminish the novelty and stimulation necessary for experiencing flow. From this perspective, the marginal experiential value of an optimized ES decreases as users' familiarity with digital platforms increases.

This negative moderating effect can also be explained through the lens of behavioral automatization. Users with high EF tend to adopt goal-oriented and efficiency-driven interaction patterns, focusing primarily on task completion rather than experiential enjoyment. As a result, their interactions become more automatic and less immersive, limiting the emergence of flow states that rely on deep cognitive and emotional engagement. Additionally, familiar users often develop higher expectations regarding platform performance and design quality. When these expectations are met but not exceeded, the ES may no longer function as a sufficiently stimulating trigger for FE.

6.4. Theoretical Contributions

This study provides several significant theoretical contributions by expanding the application of servicescape theory and the Stimulus–Organism–Response (S–O–R) framework within the digital tourism domain. However, its primary value lies in identifying critical boundary conditions and theoretical inconsistencies that challenge prevailing assumptions in digital consumer behavior literature.

First, this research offers a critical examination of the “unproven” relationship between flow experience (FE) and electronic word-of-mouth (e-WOM). While established literature in omnichannel marketing [39] and online brand communities [40] posits that immersive flow states are primary drivers of social advocacy, our findings (H5 rejected; $\beta = 0.095$, $p > 0.05$) demonstrate a significant theoretical divergence. This inconsistency suggests an Internal–External Orientation Gap within utilitarian service environments. Flow is fundamentally a private, self-referential state characterized by “deep concentration” and a “loss of self-consciousness” [26]. In the goal-oriented context of an online travel agency (OTA), this internal immersion is task-driven and does not automatically translate into the external, social behavior of e-WOM. This suggests that the S-O-R framework’s “Response” phase is more complex than previously assumed; social responses like e-WOM may require external “bridge” mechanisms—such as social presence or community identification—that are distinct from the internal cognitive state of flow [40].

Second, the study enhances theoretical criticality by explicitly contrasting competing perspectives on e-familiarity (EF). A dominant theme in digital marketing research suggests that familiarity acts as a facilitator, reducing cognitive friction and amplifying positive experiential outcomes [7,61]. However, our results (H11: $\beta = -0.091$, $p < 0.05$) support the competing theory of behavioral automatization [59]. By demonstrating that the impact of the e-servicescape on flow weakens as familiarity increases, this study identifies EF as a potential constraint rather than a universal enabler. For highly familiar users, an optimized digital environment is perceived as a standard functional requirement rather than a novel stimulus, leading to routine-driven interactions that lack the emotional intensity required for a flow state [33].

Third, the research clarifies the hierarchy of drivers for digital advocacy in the tourism sector. The findings reveal that Trust (H10: $\beta = 0.507$) and Positive Affect (H8: $\beta = 0.205$) are much stronger predictors of e-WOM than the intensity of the digital interaction (FE) itself. This provides a more nuanced understanding of the S-O-R paradigm, suggesting that in service contexts characterized by financial risk and information asymmetry, relational and emotional “Organism” states take precedence over cognitive immersion when driving social responses [2].

In summary, by highlighting these theoretical inconsistencies and boundary conditions, this study advances the understanding of the e-servicescape not merely as a structural interface, but as a complex experiential stimulus whose effectiveness is contingent upon user characteristics and the specific nature of the digital service environment.

6.5. Managerial Implications

This study yields managerial implications for online travel agencies (OTAs) and hotel booking platforms, demonstrating that the effectiveness of e-servicescapes depends on users’ e-familiarity. The significant negative moderating role of e-familiarity suggests that standardized interface designs alone are insufficient for achieving long-term experiential outcomes, as repeated interactions lead to behavioral automatization. Managers are therefore advised to adopt adaptive e-servicescape strategies that differentiate between novice and experienced users. While visually coherent and functionally intuitive interfaces remain critical for reducing cognitive load and facilitating initial engagement with novice users, experienced users require dynamically updated and personalized design elements to mitigate habituation effects and maintain experiential value.

The findings challenge the assumption that immersive flow experiences directly stimulate electronic word-of-mouth (e-WOM) in utilitarian digital service contexts. Instead, trust and positive affect are found to be the dominant antecedents of advocacy behavior, emphasizing the importance of relational and affective mechanisms over experiential

immersion alone. From a managerial standpoint, this suggests that investments aimed at enhancing perceived financial security and transactional transparency are likely to be more effective in fostering e-WOM than focusing exclusively on gamified or hedonic design features.

Furthermore, the observed discontinuity between internal experiential states and outward social behaviors implies that positive user experiences do not automatically result in voluntary recommendations. To address this, practitioners should design structural mechanisms that explicitly facilitate the conversion of private booking experiences into public social signals, such as incentive-based sharing features or embedded social presence cues.

Significantly, previous usage frequency, platform exposure, and accumulated transactional experience all affect e-familiarity; hence, it should not be regarded solely as an age-related characteristic. Therefore, familiarity-based user categorization should take precedence over demographic presumptions in managerial tactics. Personalized, efficiency-focused features for highly familiar users and easier navigation for less familiar users are just two examples of how adaptable interface designs can improve sustained engagement on online travel platforms. Moreover, onboarding manuals, recommendation systems, and trust-building indicators (such as transparent payment procedures and security assurances) can improve sustained engagement beyond digital natives by reducing perceived complexity and fostering loyalty among older or less technologically adept users.

6.6. Limitations

The present work contains numerous methodological deficiencies that warrant consideration notwithstanding its contributions. The ability to draw causal inferences regarding the development of flow experience and website loyalty is restricted by the cross-sectional design and reliance on self-reported survey data, which hinder the ability to capture temporal dynamics in user experiences. Furthermore, in technology-mediated service environments where unconscious or habitual acts are prevalent, self-reported metrics might not accurately reflect actual online behaviors. These limitations may restrict the generalizability of the findings across cultures and industries. Consequently, while the sample size is statistically sufficient for the model, the results should be interpreted with caution when applied to different cultural or industrial settings. Additionally, while the age categories show a broad range of respondents, the higher frequency of participants in the 26–35 age group indicates a concentration of ‘digital natives.’ This concentration may limit the generalizability of the results to older cohorts, whose motivations and cognitive responses to e-servicescape cues may differ from those of the more tech-savvy younger segments. Second, the cross-sectional and self-reported nature of the data constrains causal inference and may be subject to common method bias, despite satisfactory measurement properties. Third, the results reflect the online reservation context; behavioral patterns and path strengths may differ in other digital service settings. Although user motivation can influence how online information is interpreted, motivation was not measured explicitly in this study. We partially account for user heterogeneity by modeling e-familiarity as a boundary condition; however, future research should incorporate motivational constructs directly and test whether the proposed relationships differ across motivational segments and platform contexts. Although the model explains substantial variance, it does not incorporate additional antecedents such as perceived value, social influence, or broader service quality signals beyond interface cues.

Furthermore, while PLS-SEM is a suitable statistical approach for validating the complex structural relationships within our proposed model, its reliance on retrospective, self-reported data represents a limitation compared to more objective methodologies such as laboratory experiments, A/B testing, or neuro marketing tools. Unlike the current survey-based design,

these alternative methods—such as eye-tracking or the measurement of cognitive load—capture real-time behavioral and physiological responses, providing higher ecological validity for analyzing the immediate impact of interface micro-interventions. Explicitly acknowledging these methodological trade-offs highlights the potential for future research to bridge the gap between perceived and observed user behavior in digital environments.

Finally, another limitation is that the research was conducted within the scope of online travel platforms' websites serving the tourism sector. Although mobile tourism applications have gained popularity in recent years, websites continue to play a crucial role in the tourism industry. Mobile applications face several technical and operational constraints, including limited hardware capacity, small screen sizes, battery restrictions, high development costs, and compatibility issues across devices, as well as concerns related to network performance and data security, which may hinder user adoption [73]. In contrast, online travel websites remain influential in shaping consumers' booking decisions by offering comprehensive accommodation information, user-generated reviews, visual content, and appealing service packages. These platforms deliver not only utilitarian value but also informative and epistemic value, thereby strengthening user trust and enhancing the overall service experience [74]. By increasing perceived benefits and reducing perceived risks, websites positively influence users' intention to use online travel agency services through accessibility, ease of use, and adaptability to diverse consumer needs [75]. Furthermore, integrating advanced, user-friendly, and reliable features inspired by mobile application functionalities can stimulate consumer curiosity and positively affect booking intentions [76].

6.7. Directions for Future Research

Future studies could build on these findings in several ways. First, longitudinal and experimental designs may provide stronger causal inference and provide insight into how changes in e-servicescape components affect advocacy, affect, trust, and loyalty over time. Second, to better capture actual user engagement and uncover the mechanisms behind flow experience and loyalty development, future studies may incorporate objective behavioral indicators (such as click-stream data, dwell duration, travel patterns, and interaction logs). Third, cross-industry and cross-cultural comparisons could determine context-specific boundary constraints and assess the generalizability of the suggested model. Fourth, future research should investigate how varying motivations for internet usage—such as purely utilitarian task-completion versus hedonic or social-driven goals—influence the formation of flow experience and trust, providing a more granular view of user behavior in digital tourism. Fifth, to further understand the observed non-significant direct effect, future research should investigate other psychological mechanisms (such as social presence, community identification, or gamified sharing incentives) that might transform flow experience into e-WOM activity. Finally, the application of behavioral or physiological measurements and A/B testing could improve ecological validity and provide more detailed data on the efficacy of face design techniques at various e-familiarity levels.

To advance methodological rigor beyond retrospective self-reported data, which may be subject to recall bias, researchers should integrate neuromarketing tools—such as eye-tracking, heart rate monitoring, and cognitive load indicators—alongside A/B testing to capture real-time, objective physiological responses to digital interface micro-interventions.

Furthermore, investigating the “Internal–External Orientation Gap” remains a critical theoretical priority. Specifically, future research should explore social “bridge” mechanisms, such as social presence, community identification, or gamified sharing incentives, that may effectively convert the private, goal-oriented state of flow into externalized e-WOM advocacy. Finally, to address the generalizability constraints inherent in convenience sampling,

subsequent inquiries should utilize stratified sampling and measurement-invariance testing across diverse demographic groups, cultures, and industries to validate the robustness of the identified familiarity-based boundary conditions and behavioral automatization effects.

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References

1. Bitner, M.J. Servicescapes: The Impact of Physical Surroundings on Customers and Employees. *J. Mark.* **1992**, *56*, 57–71. [CrossRef]
2. Harris, L.C.; Goode, M.M.H. Online Servicescapes, Trust, and Purchase Intentions. *J. Serv. Mark.* **2010**, *24*, 230–243. [CrossRef]
3. Dutta, A. Impact of Electronic Servicescape of Online Gaming on Customer Engagement. *J. Electron. Commer. Organ.* **2020**, *18*, 49–63. [CrossRef]
4. Wu, L.; Shen, H.; Fan, A.; Mattila, A.S. The Impact of Language Style on Consumers' Reactions to Online Reviews. *Tour. Manag.* **2017**, *59*, 590–596. [CrossRef]
5. Yadav, R.; Mahara, T. Exploring the Role of E-Servicescape Dimensions on Customer Online Shopping. *J. Electron. Commer. Organ.* **2020**, *18*, 53–73. [CrossRef]
6. Gefen, D.; Karahanna, E.; Straub, D.W. Trust and TAM in Online Shopping: An Integrated Model. *MIS Q.* **2003**, *27*, 51–90. [CrossRef]
7. Park, J.-Y.; Back, R.M.; Bufoquin, D.; Shapoval, V. Servicescape, Positive Affect, Satisfaction and Behavioral Intentions: The Moderating Role of Familiarity. *Int. J. Hosp. Manag.* **2019**, *78*, 102–111. [CrossRef]
8. Lee, S.; Jeong, M. Effects of E-Servicescape on Consumers' Flow Experiences. *J. Hosp. Tour. Technol.* **2012**, *3*, 47–59. [CrossRef]
9. Huang, D.; Li, Z.; Mou, J.; Liu, X. Effects of Flow on Young Chinese Consumers' Purchase Intention: A Study of e-Servicescape in Hotel Booking Context. *Inf. Technol. Tour.* **2017**, *17*, 203–228. [CrossRef]
10. Boukabiya, A.; Outtaj, B. The Impact of E-Servicescape on the Flow and Purchase Intention of Online Consumers: Quantitative Analysis of B to C e-Commerce Stores in Morocco. *Int. J. Account. Financ. Audit. Manag. Econ.* **2021**, *2*, 200–219.
11. Alipoor, V.; Professor, A.; Reza Sa, M.; Golshan, G. Investigating the Impact of E-Servicescape Dimensions and Experience & Risk Factors on E-WOM: Mediating Role of Trust. *J. Bus. Intell. Manag. Stud.* **2022**, *11*, 87–114.
12. Safira, S.N.; Nirawati, L. The Influence of E-Servicescape, E-Trust, and E-Service Quality on Customer Satisfaction on the E-Commerce. *J. Manaj. Bisnis* **2024**, *11*, 1530–1543. [CrossRef]
13. Wichitsathian, S.; Suvittawat, A. The Mediating Roles of Service Experience and Satisfaction: How Servicescape Influences Loyalty and Electronic Word-of-Mouth. *Adm. Sci.* **2025**, *15*, 485. [CrossRef]
14. Li, Z.; Tulcanaza-Prieto, A.B.; Lee, C.W. Effect of E-Servicescape on Emotional Response and Revisit Intention in an Internet Shopping Mall. *J. Theor. Appl. Electron. Commer. Res.* **2024**, *19*, 2030–2050. [CrossRef]
15. Amer, S.M. The Effect of E-Servicescape, Website Trust and Perceived Value on Consumer Online Booking Intentions: The Moderating Role of Online Booking Experience. *Int. Bus. Res.* **2021**, *14*, 133. [CrossRef]
16. Zentner, H.; Gračan, D.; Barkičija Sotošek, M. Digital Business Models in the Hospitality Sector: Comparing Hotel Bookings with Yacht Charter Bookings. *Sustainability* **2022**, *14*, 12755. [CrossRef]

17. Mehrabian, A.; Russell, J.A. *An Approach to Environmental Psychology*; MIT Press: Cambridge, MA, USA, 1974.
18. Erul, E.; Karacabey, F.A.; Woosnam, K.M.; Koc, E. Rethinking Stimulus-Organism-Response Theory for Residents' Behaviour in Tourism. *Curr. Issues Tour.* **2024**, *2024*, 1–17. [CrossRef]
19. Venkatesh, A. Cybermarketscapes and Consumer Freedoms and Identities. *Eur. J. Mark.* **1998**, *32*, 664–676. [CrossRef]
20. Koernig, S.K. E-scapes: The Electronic Physical Environment and Service Tangibility. *Psychol. Mark.* **2003**, *20*, 151–167. [CrossRef]
21. Vilnai-Yavetz, I.; Rafaeli, A. Aesthetics and Professionalism of Virtual Servicescapes. *J. Serv. Res.* **2006**, *8*, 245–259. [CrossRef]
22. Alcántara-Pilar, J.M.; Del Barrio-García, S.; Porcu, L.; Crespo-Almendros, E. Language as a Cultural Vessel in Online Servicescapes: Its Impact on Consumers' Perceived Risk, Attitudes, and Behavioural Intentions. *J. Consum. Behav.* **2017**, *16*, E61–E75. [CrossRef]
23. Kuhn, S.W.; Spies, H.; Petzer, D.J. Online Servicescape Dimensions as Predictors of Website Trust in the South African Domestic Airline Industry. *South. Afr. Bus. Rev.* **2019**, *19*, 44–71. [CrossRef]
24. Ballantyne, D.; Nilsson, E. All That Is Solid Melts into Air: The Servicescape in Digital Service Space. *J. Serv. Mark.* **2017**, *31*, 226–235. [CrossRef]
25. Teng, H.-J.; Ni, J.-J.; Chen, H.-H. Relationship between E-Servicescape and Purchase Intention among Heavy and Light Internet Users. *Internet Res.* **2018**, *28*, 333–350. [CrossRef]
26. Bilgihan, A.; Nusair, K.; Okumus, F.; Cobanoglu, C. Applying Flow Theory to Booking Experiences: An Integrated Model in an Online Service Context. *Inf. Manag.* **2015**, *52*, 668–678. [CrossRef]
27. Gao, L.; Bai, X. Online Consumer Behaviour and Its Relationship to Website Atmospheric Induced Flow: Insights into Online Travel Agencies in China. *J. Retail. Consum. Serv.* **2014**, *21*, 653–665. [CrossRef]
28. Ali, F. Hotel Website Quality, Perceived Flow, Customer Satisfaction and Purchase Intention. *J. Hosp. Tour. Technol.* **2016**, *7*, 213–228. [CrossRef]
29. Eroglu, S.A.; Machleit, K.A.; Davis, L.M. Empirical Testing of a Model of Online Store Atmospherics and Shopper Responses. *Psychol. Mark.* **2003**, *20*, 139–150. [CrossRef]
30. Ali, F.; Amin, M.; Ryu, K. The Role of Physical Environment, Price Perceptions, and Consumption Emotions in Developing Customer Satisfaction in Chinese Resort Hotels. *J. Qual. Assur. Hosp. Tour.* **2016**, *17*, 45–70. [CrossRef]
31. Tran, G.A.; Strutton, D. Comparing Email and SNS Users: Investigating e-Servicescape, Customer Reviews, Trust, Loyalty and E-WOM. *J. Retail. Consum. Serv.* **2020**, *53*, 101782. [CrossRef]
32. Lee, S.A.; Jeong, M.; Jeon, M.M. Effects of Experiential Stimuli on Customers' Responses: An Example of Bed and Breakfast Websites. *J. Hosp. Tour. Technol.* **2016**, *7*, 390–404. [CrossRef]
33. da Silva de Matos, N.M.; de Oliveira Duarte, P.A.; de Sá, E.S. Once-in-a-Lifetime Leisure Experiences (OLLE): The Role of Flow, Novelty, and Interpersonal Interaction on Tourists' Satisfaction and Memories. *J. Vacat. Mark.* **2024**, *30*, 615–632. [CrossRef]
34. Karasakal, S. Effects of Flow Experience on Satisfaction: An Examination on Vacation Experience. *Anatolia Tur. Araştırmaları Derg.* **2020**, *31*, 63–73. [CrossRef]
35. Kim, M.; Thapa, B. Perceived Value and Flow Experience: Application in a Nature-Based Tourism Context. *J. Destin. Mark. Manag.* **2018**, *8*, 373–384. [CrossRef]
36. Sann, R.; Luecha, P.; Rueangchaithanakun, R. The Effects of Virtual Reality Travel on Satisfaction and Visiting Intention Utilizing an Extended Stimulus-Organism-Response Theory: Perspectives from Thai Tourists. *J. Hosp. Tour. Insights* **2024**, *7*, 2684–2703. [CrossRef]
37. An, S.; Choi, Y.; Lee, C.-K. Virtual Travel Experience and Destination Marketing: Effects of Sense and Information Quality on Flow and Visit Intention. *J. Destin. Mark. Manag.* **2021**, *19*, 100492. [CrossRef]
38. Chen, X.; Cheng, Z.; Kim, G.-B. Make It Memorable: Tourism Experience, Fun, Recommendation and Revisit Intentions of Chinese Outbound Tourists. *Sustainability* **2020**, *12*, 1904. [CrossRef]
39. Rodríguez-Torrico, P.; San José Cabezudo, R.; San-Martín, S.; Trabold Apadula, L. Let It Flow: The Role of Seamlessness and the Optimal Experience on Consumer Word of Mouth in Omnichannel Marketing. *J. Res. Interact. Mark.* **2023**, *17*, 1–18. [CrossRef]
40. Zhang, M.; Hu, M.; Guo, L.; Liu, W. Understanding Relationships among Customer Experience, Engagement, and Word-of-Mouth Intention on Online Brand Communities. *Internet Res.* **2017**, *27*, 839–857. [CrossRef]
41. Cyr, D.; Hassanein, K.; Head, M.; Ivanov, A. The Role of Social Presence in Establishing Loyalty in E-Service Environments. *Interact. Comput.* **2007**, *19*, 43–56. [CrossRef]
42. Anderson, R.E.; Srinivasan, S.S. E-satisfaction and E-loyalty: A Contingency Framework. *Psychol. Mark.* **2003**, *20*, 123–138. [CrossRef]
43. van Noort, G.; Voorveld, H.A.M.; van Reijmersdal, E.A. Interactivity in Brand Web Sites: Cognitive, Affective, and Behavioral Responses Explained by Consumers' Online Flow Experience. *J. Interact. Mark.* **2012**, *26*, 223–234. [CrossRef]
44. Guo, Z.; Xiao, L.; Van Toorn, C.; Lai, Y.; Seo, C. Promoting Online Learners' Continuance Intention: An Integrated Flow Framework. *Inf. Manag.* **2016**, *53*, 279–295. [CrossRef]

45. Díaz-García, A.; González-Robles, A.; Mor, S.; Mira, A.; Quero, S.; García-Palacios, A.; Baños, R.M.; Botella, C. Positive and Negative Affect Schedule (PANAS): Psychometric Properties of the Online Spanish Version in a Clinical Sample with Emotional Disorders. *BMC Psychiatry* **2020**, *20*, 56. [CrossRef]
46. Watson, D.; Clark, L.A.; Tellegen, A. Development and Validation of Brief Measures of Positive and Negative Affect: The PANAS Scales. *J. Pers. Soc. Psychol.* **1988**, *54*, 1063–1070. [CrossRef] [PubMed]
47. Ehlers, L.; van Schalkwyk, S. Product Videos “Gone Viral”: Exploring the Role of Content, Positive Affect and Social Motivations. *J. Commun. Sci. South. Afr.* **2021**, *40*, 43–62. [CrossRef]
48. Bilgihan, A.; Okumus, F.; Nusair, K.; Bujisic, M. Online Experiences: Flow Theory, Measuring Online Customer Experience in e-Commerce and Managerial Implications for the Lodging Industry. *Inf. Technol. Tour.* **2014**, *14*, 49–71. [CrossRef]
49. Su, L.; Hsu, M.K.; Marshall, K.P. Understanding the Relationship of Service Fairness, Emotions, Trust, and Tourist Behavioral Intentions at a City Destination in China. *J. Travel Tour. Mark.* **2014**, *31*, 1018–1038. [CrossRef]
50. Beatty, P.; Reay, I.; Dick, S.; Miller, J. Consumer Trust in E-Commerce Web Sites. *ACM Comput. Surv.* **2011**, *43*, 1–46. [CrossRef]
51. McKnight, D.H.; Choudhury, V.; Kacmar, C. Developing and Validating Trust Measures for E-Commerce: An Integrative Typology. *Inf. Syst. Res.* **2002**, *13*, 334–359. [CrossRef]
52. Hwang, Y.; Kim, D.J. Customer Self-Service Systems: The Effects of Perceived Web Quality with Service Contents on Enjoyment, Anxiety, and e-Trust. *Decis. Support Syst.* **2007**, *43*, 746–760. [CrossRef]
53. Gefen, D.; Straub, D.W. Consumer Trust in B2C E-Commerce and the Importance of Social Presence: Experiments in e-Products and e-Services. *Omega* **2004**, *32*, 407–424. [CrossRef]
54. Delgado-Ballester, E.; Luis Munuera-Alemán, J. Brand Trust in the Context of Consumer Loyalty. *Eur. J. Mark.* **2001**, *35*, 1238–1258. [CrossRef]
55. Harris, L.C.; Goode, M.M.H. The Four Levels of Loyalty and the Pivotal Role of Trust: A Study of Online Service Dynamics. *J. Retail.* **2004**, *80*, 139–158. [CrossRef]
56. Flavián, C.; Guinalíu, M. Consumer Trust, Perceived Security and Privacy Policy. *Ind. Manag. Data Syst.* **2006**, *106*, 601–620. [CrossRef]
57. Velicia-Martin, F.; Folgado-Fernández, J.A.; Palos-Sánchez, P.R.; López-Catalán, B. MWOM Business Strategies: Factors Affecting Recommendations. *J. Comput. Inf. Syst.* **2023**, *63*, 176–189. [CrossRef]
58. Aeron, P.; Jain, S.; Kumar, A. Revisiting Trust toward E-Retailers among Indian Online Consumers. *J. Internet Commer.* **2019**, *18*, 45–72. [CrossRef]
59. Gefen, D. E-Commerce: The Role of Familiarity and Trust. *Omega* **2000**, *28*, 725–737. [CrossRef]
60. Kaya, B.; Behraves, E.; Abubakar, A.M.; Kaya, O.S.; Orús, C. The Moderating Role of Website Familiarity in the Relationships Between E-Service Quality, e-Satisfaction and e-Loyalty. *J. Internet Commer.* **2019**, *18*, 369–394. [CrossRef]
61. Catalán, S.; Martínez, E.; Wallace, E. Analysing Mobile Advergaming Effectiveness: The Role of Flow, Game Repetition and Brand Familiarity. *J. Prod. Brand Manag.* **2019**, *28*, 502–514. [CrossRef]
62. Gagez, A.E. *Pazarlama Araştırmaları (Marketing Researches)*, 3rd ed.; Beta Basım Yayım Dağıtım: Istanbul, Turkey, 2010.
63. Bryman, A.; Cramer, D. *Quantitative Data Analysis with SPSS Release 10 for Windows*; Routledge: Milton Park, UK, 2002.
64. Tabachnick, B.G.; Fidell, L.S. *Using Multivariate Statistics*, 5th ed; Pearson: New York, NY, USA, 2007.
65. Tankovic, A.C.; Benazic, D. The Perception of E-Servicescape and Its Influence on Perceived e-Shopping Value and Customer Loyalty. *Online Inf. Rev.* **2018**, *42*, 1124–1145. [CrossRef]
66. Casaló, L.V.; Flavián, C.; Guinalíu, M. The Role of Satisfaction and Website Usability in Developing Customer Loyalty and Positive Word-of-mouth in the E-banking Services. *Int. J. Bank Mark.* **2008**, *26*, 399–417. [CrossRef]
67. Line, N.D.; Hanks, L. The Social Servicescape: Understanding the Effects in the Full-Service Hotel Industry. *Int. J. Contemp. Hosp. Manag.* **2019**, *31*, 753–770. [CrossRef]
68. Podsakoff, P.M.; MacKenzie, S.B.; Lee, J.-Y.; Podsakoff, N.P. Common Method Biases in Behavioral Research: A Critical Review of the Literature and Recommended Remedies. *J. Appl. Psychol.* **2003**, *88*, 879–903. [CrossRef] [PubMed]
69. Hair, J.F.; Anderson, R.E.; Tatham, R.L.; Black, W.C. *Multivariate Data Analysis, Multivariate Data Analysis*; Annabel Ainscow: Southampton, UK, 2019; Volume 87.
70. Chin, W.W. How to Write up and Report PLS Analyses. In *Handbook of Partial Least Squares: Concepts, Methods and Applications*; Springer Handbooks of Computational Statistics; Springer: Berlin/Heidelberg, Germany, 2010; pp. 655–690.
71. Fornell, C.; Larcker, D.F. Evaluating Structural Equation Models with Unobservable Variables and Measurement Error. *J. Mark. Res.* **1981**, *18*, 39–50. [CrossRef]
72. Henseler, J.; Ringle, C.M.; Sarstedt, M. A New Criterion for Assessing Discriminant Validity in Variance-Based Structural Equation Modeling. *J. Acad. Mark. Sci.* **2015**, *43*, 115–135. [CrossRef]
73. Sia, P.Y.-H.; Saidin, S.S.; Iskandar, Y.H.P. Systematic Review of Mobile Travel Apps and Their Smart Features and Challenges. *J. Hosp. Tour. Insights* **2023**, *6*, 2115–2138. [CrossRef]
74. Chen, J.-S.; Kamalanon, P.; Janupiboon, T.P. Company Websites and Mobile Apps versus Social Media: Which Service Experience Creates More Customer Value for Online Travel Agencies? *Serv. Bus.* **2022**, *16*, 1081–1110. [CrossRef]

75. Hien, N.N.; Vo, L.T.; Ngan, N.T.T.; Ghi, T.N. The Tendency of Consumers to Use Online Travel Agencies from the Perspective of the Valence Framework: The Role of Openness to Change and Compatibility. *J. Open Innov. Technol. Mark. Complex.* **2024**, *10*, 100181. [CrossRef]
76. Ali, F.; Ali, L.; Gao, Z.; Terrah, A.; Turktarhan, G. Determinants of User's Intentions to Book Hotels: A Comparison of Websites and Mobile Apps. *Aslib J. Inf. Manag.* **2024**, *76*, 16–41. [CrossRef]

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Article

Hotel Guests' Perceptions of Sustainable Tourism Practices Within the Framework of Cue Utilization Theory: An Analysis of a Worldwide Online Travel Platform's Sustainability-Certified Hotels

Aysel Çetinkaya ¹, Zeynep Benan Dondurucu ², Sema Çağlayan ^{3,*}, Gamze Yetkin Cılızoğlu ⁴ and Yeliz Kuşay ⁵

¹ Department of Journalism, Faculty of Communication, Kocaeli University, Kocaeli 41001, Türkiye; aysel.cetinkaya@kocaeli.edu.tr

² Department of Public Relations and Publicity, Faculty of Communication, Kocaeli University, Kocaeli 41001, Türkiye; benan.dondurucu@kocaeli.edu.tr

³ Independent Researcher, Kocaeli 41310, Türkiye

⁴ Department of Advertising, Faculty of Communication, Kocaeli University, Kocaeli 41001, Türkiye; gamze.cilizoglu@kocaeli.edu.tr

⁵ Department of Public Relations and Publicity, Faculty of Communication, Marmara University, İstanbul 34722, Türkiye; ykusay@marmara.edu.tr

* Correspondence: semacaglyan@gmail.com

Abstract

In the digital tourism marketplace, online reviews have become a decisive source of information for travelers who cannot directly assess the quality of hospitality services before purchase. However, it remains unclear how service-related and sustainability-related cues interact to shape guest perceptions in sustainable hotel contexts. This study investigates how intrinsic and extrinsic cues are reflected in online user reviews of sustainable hotels. Drawing on Cue Utilization Theory, a longitudinal content analysis was conducted on a worldwide online travel platform's (OTP) reviews of hotels certified for their sustainability practices (2004–2024) by user selection. A coding framework was developed deductively based on prior studies on hotel service quality and sustainability practices, and data were analyzed using MAXQDA, Leximancer, and VADER sentiment analysis. Findings indicated that reviews primarily emphasize service quality attributes—particularly staff efficiency, food quality, and accommodation facilities—while sustainability themes appear less frequently, often in nature-related contexts. Sentiment analysis revealed a predominantly positive emotional tone shaped by service quality experiences. Overall, intrinsic cues play a central role in forming guest perceptions, highlighting the need for emotionally engaging sustainability communication strategies.

Keywords: sustainable tourism; sustainability communication; guest satisfaction; cue utilization theory

1. Introduction

Online trip-booking platforms have emerged as significant tourism marketing channels due to advances in information technologies [1]. Product/service ratings and reviews featured on these platforms are integral components of online shopping experiences and serve as vital sources of specific information about products and services [2].

Guests often experience uncertainty about a hotel's quality when making online reservations [3]. To reduce this uncertainty, they look at product cues such as brand name, cost of the

product/service, and user reviews, before making a decision [1,4]. These cues can be either intrinsic or extrinsic. While intrinsic cues refer to features inherent to the good itself—such as size, form, texture—extrinsic cues have flexible characteristics such as price, trademark, and country of origin [5]. The interaction between intrinsic and extrinsic cues found in online reviews serves as a crucial factor shaping consumer decision-making patterns.

Because hospitality services are intangible, guests typically rely on intrinsic and as extrinsic cues to reduce uncertainty and risk when making reservation decisions [3]. For experience-based goods, such as hotel and tourism offerings, intrinsic cues are often unavailable at the moment of purchase. Therefore, consumers tend to rely on extrinsic cues [6] or derive intrinsic cues indirectly through other reviews of consumers.

In the literature, studies examining online consumer reviews in the hospitality sector have addressed various dimensions such as hotel service quality [7–10], customer behavior/experience [11–14], customer satisfaction/dissatisfaction [15–20], review reliability [21–23], and sentiment analysis [24–26]. Studies focusing on online reviews of sustainable accommodation have primarily concentrated on guest perception/evaluation [27–30] and customer satisfaction/dissatisfaction [31–33]. However, the examination of intrinsic and extrinsic cues in relation to tourism destinations remains limited, and consumers tend to consider both categories when selecting potential destinations [34,35]. Considering that travelers also tend to check online reviews of alternative hotels before making a reservation [36], hotel reviews represent a fundamental source for evaluating intrinsic and extrinsic cues.

In this context, the primary aim of this study is to reveal how frequently these cue types appear in online reviews of sustainable hotels, with which themes they are associated, and in what message tone they are presented. Accordingly, the study analyzes general service-quality- and sustainability-related themes identified in 20,820 online reviews from OTP-listed hotels with sustainability certifications ranked by user choice, examining them in relation to cue type and message tone. Drawing on Cue Utilization Theory, this analysis provides valuable contributions to both the literature and practice by offering a comparative examination of hotel service quality and sustainability practices within the guest evaluation process. This study differs from prior research by conducting a comprehensive assessment of intrinsic and extrinsic cues within sustainable hotels through a large dataset, examining their thematic and message tone dimensions under the framework of Cue Utilization Theory.

2. Cue Utilization Theory

Cue Utilization Theory explains how consumers and decision-makers use various informational cues to make judgments about products or situations [37]. One of the foremost scholars to formulate a theoretical model of the consumer product evaluation process, Cox [38], conceptualized a product as “a set of cues.” Based on his sorting rule model of the consumer product evaluation process, consumers rely on a sequence of cues to form evaluative judgments about a product [38,39]. Building on Cox’s model, Olson [39] developed a more comprehensive framework for the process of product quality evaluation. In the first stage of this model, consumers perceive and distinguish product cues, then select those they believe to be related to quality. In the second stage, they combine their judgments about these cues to form an overall quality perception [5]. According to this theory, consumers draw on both intrinsic and extrinsic cues when considering goods.

Intrinsic cues refer to properties that are inherent to the physical structure of a product or inseparable aspects of a service that cannot be adjusted without modifying the product itself [37]. These include attributes such as taste, design, performance, product features, the logo’s visual design, general appearance, packaging quality, and instruction manual quality [37,40]. For example, in the hotel context, attributes such as location, service quality,

atmosphere, room quality, price–performance ratio, and hotel amenities can be considered intrinsic cues [35]. In the context of tourism, core attraction elements are considered intrinsic cues and include factors such as special events, physical geography, climate, culture, history, diversity of activities, entertainment, and infrastructure [34]. Intrinsic cues are generally assumed to exert a stronger influence in the consumer evaluation process [5,6].

Extrinsic cues, on the other hand, are attributes external to the product but associated with it. These attributes include price, brand name, warranty, manufacturer or brand reputation, retailer, point of sale, and country of origin [37,40]. Moreover, extrinsic cues also encompass elements such as online consumer reviews—covering aspects like average rating, variance, volume, content style, source credibility, and purchase verification—along with brand and price [41]. The number of online reviews is known to influence consumers' behavioral intentions, such as purchase likelihood and recommendation intentions. Label, cost, and digital customer feedback are among the key external indicators that buyers depend on when judging experiential products. These reviews provide indirect experiences that help consumers minimize ambiguity and prevent purchase-related risks. In the tourism sector, consumers also tend to check online reviews of alternative hotels before making a purchase decision [36]. Extrinsic cues become particularly important when information is ambiguous, when they serve as the only available information source, or when consumers lack expertise or time [39,42].

3. The Role of Online Reviews in Shaping Guest Perception in the Tourism Sector

Globalization and technological progress have accelerated the spread of e-commerce, leading to the widespread use of online reviews (ORs) to evaluate hotels, destinations, restaurants, and other tourism products. ORs, as a new form of online word-of-mouth communication, influence consumers' purchase decisions. Online consumer reviews (OCRs) are digital platforms where users share their evaluations of products and where other consumers can access these evaluations. OCRs serve as a crucial source of information that directly or indirectly affects potential consumer behavior and provides insight into how well consumer expectations are met regarding product quality, ease of use, and customer service [43,44]. Zhang et al. [45] emphasize that consumers seeking to purchase an item or offering engage in digital information seeking before finalizing their choices. Liu et al. [46] highlight that online reviews influence potential consumers' purchase decisions.

OCRs function as platforms that allow customers and potential consumers to access information while evaluating a product [47]. Reviews reflect the positive, negative, or neutral opinions of users who have purchased a product or used a service in an online environment [45]. This is because individuals who check consumer review websites may take into account variables such as the brand under review, total number of reviews (volume), provenance of the review (e.g., verified user or expert), average rating (valence), variance among reviews, and the degree of consensus across opinions before making a purchase decision. These variables influence consumers' evaluations and purchase behavior [41].

A growing body of research highlights the importance of online reviews in guiding customer decision [43]. Ananda et al. [47], in their study of in Denpasar, determined that online customer reviews exert a positive and substantial influence on buying intention. Hasrul et al. [48] similarly observed that online customer reviews influence purchase intentions for electronic products on Tokopedia.

Consumers intending to purchase tourism products/services often consult the reviews of other consumers to reduce perceived risks before making a decision [4,49]. During the COVID-19 pandemic, this tendency became even stronger, as consumers increasingly sought unbiased and reliable information to minimize uncertainty regarding tourism

products and services [43,44,49,50]. Potential travelers frequently use online platforms before making purchase decisions. The main reason for this tendency is that potential consumers perceive online reviews as less biased and more trustworthy [51].

According to data from BrightLocal [52], 91% of consumers regularly read online reviews for tourism-related products, and 84% trust these reviews as much as personal recommendations. 68% of guests are inclined to spend more on touristic attractions with positive reviews and higher ratings. Faridah et al. [53] found that 70% of participants trust online reviews when making accommodation reservations, and 60% perceive reviews as more reliable than traditional marketing or advertising. As a result of this trend, the tourism and hospitality industry has increasingly focused on strengthening its online image to encourage positive reviews [54].

4. The Concept of Sustainable Tourism and the Impact of Hotel Service Quality and Sustainable Initiatives on Guest Satisfaction

The tourism industry, due to its multi-sectoral nature and its strong dependence on the environment and local communities, must adopt a sustainable approach [55]. Sustainable tourism (ST) represents a positive approach that seeks to minimize environmental and cultural impacts, reduce tensions arising from the interactions among industry, visitors, environment, and communities, enhance guest satisfaction and promote sustained economic development [56].

When considered as a tool, ST refers to various levels of sustainability-oriented practices. On the demand side, such practices include responsible behaviors of tourists who voluntarily support environmental, social, and economic sustainability (the triple bottom line—TBL), represented by concepts such as responsible tourism, green tourism, and volunteer tourism [57]. On the supply side, ST practices encompass the responsible actions of companies that adopt corporate social responsibility (CSR) or environmental, social, and governance (ESG) approaches [58].

Four main approaches have emerged in defining sustainable tourism—duality, continuity, goal, and convergence—and these approaches have evolved over time [59]. According to the duality approach, ST is positioned as a small-scale type of tourism that stands in opposition to mass tourism, which is perceived as large-scale and unsustainable [56]. The continuum perspective emerged in the 1990s, proposing that there is a continuum between sustainable tourism and mass tourism, and suggesting that sustainability should be regarded as a value to be achieved [59]. The goal-oriented approach argues that mass tourism can be made more sustainable and that sustainability should be treated as a target to be achieved. In line with this understanding, implementation rules and guidelines were developed, and stakeholders were encouraged to adopt more sustainable practices. The convergence approach represents the most recent interpretation of sustainable tourism. It considers ST as a universal goal pertinent to all tourism formats, regardless of scale, emphasizing that progress toward this goal is what truly matters [56,59].

ST encompasses four dimensions: economic, environmental, socio-cultural, and governance. The aim across these dimensions is to establish a sustainable alignment of environmental protection, cultural coherence, social equality, and the pursuit of economic values. The economic dimension of ST includes maximizing benefits to local economies (creating employment, strengthening local supply chains), reducing income leakage, and alleviating poverty. The environmental dimension involves protecting the natural and built environment, saving energy and water, managing waste, and preserving biodiversity, including practices such as environmental/ecological footprint reduction. The socio-cultural dimension focuses on boosting the everyday welfare of local communities, maintaining cultural integrity, ensuring community participation, and aligning tourism activities with principles

of social equity [56,60–62]. Current academic discourse has primarily emphasized environmental sustainability, paying limited attention to social and cultural aspects; however, the significance of local communities has recently gained greater recognition [63,64]. The governance dimension of ST focuses on the importance of institutional capacity and multi-stakeholder participation for sustainable tourism planning and management. Therefore, several scholars have recognized governance as the fourth pillar of sustainability [65,66].

In the hospitality industry, guest satisfaction is directly linked to hotel service quality. Given the intense competition in tourism markets, hotel service quality attributes stand out as key differentiators for achieving competitive advantage and improving consumer satisfaction. Service quality in tourism refers to a hotel's ability to meet guest expectations, or the degree to which the offered service corresponds to those expectations. Identifying the factors influencing service quality in accommodation businesses is crucial for ensuring guest satisfaction/loyalty, as well as for enhancing the overall service experience [8,67,68]. Markovic and Jankovic [69] identified accessibility, tangibility, and staff empathy as essential elements of hotel service quality. Similarly, Ali et al. [67] found that empathy, responsiveness, assurance, and tangibility are positively associated with customer satisfaction, while Rao and Sahu [70] highlighted that tangible aspects such as staff performance and cleanliness are among the most decisive factors influencing guest satisfaction. Considering the significant correlation between guest satisfaction and service quality in hospitality, it becomes crucial to define the dimensions that determine hotel service quality and to identify the factors through which customer satisfaction is formed.

In the literature, hotel service quality dimensions have been examined in various aspects such as room amenities, hotel amenities, hotel style, bed comfort, cleanliness, physical atmosphere, food and beverage, breakfast, meals, staff, service personalization, location, parking, view, travel experience, cost–benefit ratio, value, budget, security and safety, and general satisfaction [7,10,12–14,16–20,71,72]. As emphasized by Kalnaovakul & Promsivapallop [8], these service quality dimensions can also be analyzed through guest feedbacks and online reviews to assess customer satisfaction.

In service-oriented industries such as tourism, sustainability initiatives can further enhance customer satisfaction. This is because communication strategies based on social and environmental sustainability principles have the potential to strengthen corporate image and reputation, improve customer relationship management, and increase trust, satisfaction, and loyalty [73]. Moise et al. [74] found that green hotel practices have a positive impact on guest satisfaction and loyalty, while Chang et al. [75] reported that eco-friendly hotels achieve higher guest satisfaction. In the context of online reviews, Gerdt et al. [76] highlighted a positive relationship between sustainability themes and guest satisfaction, Galati et al. [77] showed that such reviews affect tourists' green hotel purchase decisions, while Pacheco et al. [28] found that tourists often mention sustainability-related aspects in their hotel evaluations. In the literature, hotels' sustainability practices have been analyzed in relation to guest evaluation and customer satisfaction, focusing on environmental and social dimensions such as reuse, waste management, recycling, water and energy efficiency, eco-sustainability certification, sustainable food and infrastructure, local product use, cultural heritage, community support, and guest education [28–30]. Additionally, several studies have explored satisfaction/dissatisfaction in sustainable hotels through eco-luxury experiences, ecological accommodation, and factors such as greenwashing and green marketing [31–33,78–80]. However, as highlighted by Aliyah et al. [81], both sustainable practices and general service quality attributes play decisive roles in shaping customer satisfaction in sustainable hotels. Therefore, this study integrates both service quality and sustainability practices to generate a holistic comprehension of the factors shaping guest evaluation in sustainable hotels.

5. Methodology

5.1. Research Design

This study aims to examine online user reviews of sustainable hotels to identify the frequency, thematic distribution, and emotional tone of intrinsic and extrinsic cues, thereby interpreting these reviews within the context of guest perception and sustainability communication. Accordingly, the research seeks to address the following questions, which aim to explore the multidimensional dynamics of user reviews in the context of sustainable hotels:

RQ1: What is the frequency of service quality and sustainability themes in user reviews?

RQ2: How have service quality and sustainability themes evolved over time in user reviews?

RQ3: How frequently, and within which themes, do intrinsic and extrinsic cues appear in user reviews?

RQ4: What is the emotional distribution (positive, neutral, negative) of user reviews across different themes?

In this study, the content analysis method was adopted due to its ability to systematically analyze large datasets of hotel reviews, its frequent use in similar studies in the literature, and its relevance to the nature of the data examined. Content analysis is an analytical technique that enables the systematic examination of textual or visual materials according to specific coding categories. In the analysis of user-generated content and new media-based texts, content analysis is often employed to explore meanings and patterns within the context of the research topic. In the literature, studies analyzing online reviews of accommodation facilities have employed content analysis to examine various topics such as green hotel practices [29], priority service characteristics [24], review quality [22], and hotel service attributes and customer satisfaction [17,82], demonstrating that content analysis has been applied using both mixed-method and single-method approaches. Depending on the research purpose, the method allows for the development of subjective coding categories, while the analytical framework can also be constructed based on prior studies in the literature [83].

The coding framework used in this study was developed through a deductive approach, grounded in previous research on hotel service quality, sustainability practices and cue types (Intrinsic/extrinsic cues). The main and sub-coding categories were organized under three primary themes: hotel service quality, sustainability practices, and cue types comprising a total of 25 subthemes. Table 1 presents detailed definitions and corresponding references for each subtheme. Each review was analyzed based on these predefined themes and categorized accordingly. This framework ensures the systematic classification of reviews and maintains consistency throughout the content analysis process.

Table 1. Analysis categories & descriptions.

Theme 1: Hotel Service Quality	Descriptions
1. Cleanliness	Hygiene, cleanliness, and order in rooms and common areas [16].
2. Comfort	Room comfort, furniture comfort, quietness/lighting level [15].
3. Staff Efficiency	Staff attitude, language skills, attentiveness, and problem-solving capacity [7,12,17,18].
4. Food & Beverage	Quality, variety, and presentation of food and beverages [9,17,71,84].
5. Location	Physical location, accessibility, centrality, and surrounding environment [7,19].
6. Price & Performance	The balance and perceived value between the price paid and the service received [17].
7. Accommodation Amenities	Room and facility amenities (e.g., room size, spa, fitness center, etc.) [10,16].
8. Service personalization	Meeting special guest requests, personalized gestures such as greetings or celebrations [72].
9. Safety & Security Measures	Measures, rules, and protocols ensuring guest safety, property protection, and health precautions [20,85].
10. Customer Experience and Overall Satisfaction	General satisfaction with accommodation experience, intention to revisit or recommend [13,14].

Table 1. Cont.

Theme 2: Sustainability Practices	Descriptions
1. Energy Efficiency	Technological and behavioral practices and equipment aimed at reducing energy consumption [28,29].
2. Water Efficiency	Technological and behavioral practices and equipment aimed at reducing water consumption [28,29].
3. Recycling	Processes of waste separation and reuse [28,29].
4. Sustainable Infrastructure	Environmentally sensitive building design using sustainable materials and architecture [30].
5. Cultural Heritage/Community support	Service delivery practices engaging local culture and communities [30].
6. Local Source/Product Usage	Procurement of products and services from local suppliers and producers [30].
7. Sustainable Cuisine/Food	Food services emphasizing local, organic, fair-trade, and waste-minimizing practices [30,86].
8. Sustainable Luxury Experience	Accommodation experiences combining luxury and sustainability [33,87].
9. Nature-based accommodation	Accommodation that harmonizes with the natural environment and encourages interaction with nature [27,78].
10. Educational and Awareness-Raising Practices	Programs designed to inform or educate guests about sustainability initiatives [29,88].
11. Sustainability Certifications and Labels	Certificates and labels verifying the implementation of sustainable practices (e.g., eco-certifications, green labels) [28].
12. Sustainability-driven customer dissatisfaction	Guest dissatisfaction caused by sustainability-based practices such as towel reuse, recycling, and the use of energy-saving lighting [31,32,89].
13. Distrust in sustainability claims	Skepticism toward sustainability claims, including greenwashing and green marketing distrust [79,80,90].
Cue Types	Descriptions
1. Intrinsic Cues	Personal experiences, emotional expressions, subjective service evaluations, (perceived comfort, staff interaction experiences, perceived value for money, expectation–experience comparisons, overall satisfaction or dissatisfaction statements, and intention-related expressions such as willingness to revisit or recommend, etc.) [5,34,41].
2. Extrinsic Cues	User reviews, certifications, photographs, videos, brand identity elements, social media visuals, official website information, location data, map visuals, and peer recommendations [5,6,34,41].

5.2. Sample

User reviews of the hotels listed among the 15 highest-ranked Sustainable Hotels, identified as OTP-listed hotels with sustainability certifications ranked by user choice, were selected as the sample. The 2024 sustainability-based hotel ranking was prepared in collaboration with the platform's sustainability data partner, which evaluates hotels based on 70 sustainability-related terms/categories identified within reviews published during the previous year. Among these, hotels demonstrating high overall guest experience scores were ranked as Best.

Table 2 presents the number of reviews per hotel and the regional distribution of reviews. The hotels in question are regionally distributed as follows: South Asia ($n = 4$), Southern Europe ($n = 5$), Northern Europe ($n = 3$), Central Europe ($n = 2$, 2.6%), and North America ($n = 1$). The fact that these regions have the highest international tourist flows according to data from [91] supports the representativeness of the sample selection and its capacity to reflect the population. A total of 20,820 online guest reviews were examined spanning the period from 2004 to 2024.

In addition to capturing changes in user perceptions over time, a longitudinal design was explicitly adopted to examine whether sustainability-related themes in hotel reviews reflect a short-term, event-driven discourse or a more structural and sustained shift. More specifically, the temporal dimension enables the identification of fluctuations associated with period-specific conditions as opposed to patterns that emerge consistently across subsequent periods. This analytical perspective allows for an assessment of whether sustainability functions primarily as a situational response to contextual influences or as an increasingly consolidated component of hotel practices and societal expectations.

Table 2. OTP-listed hotels with sustainability certifications ranked by user choice.

Region	No/Hotels	Number of Reviews by Hotel n/%	Number of Reviews by Region n/%
South Asia	1. B.B.T.E.	176/0.8	7018/33.7
	2. B.R.M.	823/4.0	
	3. F.B.A.M.	3010/14.5	
	4. A.P.H.T.R.	3009/14.5	
Southern Europe	5. I.O.	716/3.4	6525/31.3
	6. V.P.F.	736/3.5	
	7. H.B.D.	2123/10.2	
	8. B.H.	2322/11.2	
	9. M.W.E.H.	628/3.0	
Northern Europe	10. T.H.	1190/5.7	5469/26.3
	11. H.F.	1269/6.1	
	12. K.A.	3010/14.5	
Central Europe	13. A.H.P.	342/1.6	535/2.6
	14. H.L.	193/0.9	
North America	15. G.F.A.G.C.C.	1273/6.1	1273/6.1
Total		20,820	20,820

Note: Hotel names have been anonymized and are represented only by their initial letters in order to protect commercial identities and to comply with ethical considerations related to data reporting.

5.3. Data Collection Procedure

The data consisting of user reviews were obtained from the OTP, an online travel and review platform. This platform was selected because of its widespread global use for accommodation searches and its platform-level mechanisms for preventing fake reviews, such as automated detection systems, community rules, staff moderation, and the elimination of fraudulent content—which enhance data reliability.

On the selected OTP, each accommodation page presents user reviews in a structured format that includes an overall rating on a fixed scale (e.g., 1 to 5), a review title, the complete review text, and the review creation date. In addition, the platform provides supplementary metadata, including the traveler’s stated stay date, travel type, and self-reported location. Reviews are publicly accessible and can be sorted by recency or relevance using built-in filtering options. These functional characteristics enable the systematic identification and extraction of comparable review fields across accommodations and support the replicability of the data collection procedure.

The extensive scope of the research, spanning the years 2004–2024, necessitated a rigorous and long-term data collection process. This process was conducted by an expert academic research team consisting of five (5) members over a period exceeding six months. To ensure full compliance with the terms of use and ethical standards of online travel platforms (OTPs), the team accessed only publicly available content and adhered strictly to established research guidelines. In total, 20,820 reviews covering the period from 2004 to 2024 were collected. The data collection process involved the archival of publicly accessible User-Generated Content (UGC) available on the platform. The dataset was compiled exclusively for academic research purposes using non-intrusive, system-safe automated data access techniques that did not interfere with platform operations. This process adhered strictly to fair use principles; no private user data were accessed, and all reviewer identities were fully anonymized.

The data collection procedure followed a fully automated approach conducted through a licensed third-party API service. User reviews and basic hotel information for the

selected hotels were retrieved via RapidAPI, following the creation of a subscription to a licensed commercial data extraction API and acquisition of an API key. Data retrieval was performed using standard academic data mining protocols (utilizing Python 3.10) to manage authorized requests compliant with the platform's structure. The API responses were returned in JSON format and processed using the JSON and Pandas libraries. For each hotel, variables including hotel name, review creation date, review title, review text, and stay date were extracted, structured into a `pandas.DataFrame`, and exported in Microsoft Excel format for subsequent analysis. To strictly prioritize user privacy, no personal identifiers (such as usernames, avatars, or profile URLs) were collected or stored. As the data were accessed exclusively through a licensed API-based mechanism, the procedure complied with the terms of service of online travel platforms (OTPs) and did not involve unauthorized automated extraction or direct web scraping. The platform name is anonymized to adhere to ethical research standards regarding commercial proprietary data and to avoid potential conflicts. Given that the analyzed content consists solely of publicly available, user-generated reviews, involves no interaction or intervention with users, and does not constitute human subject research, ethical committee approval was not required [92,93]. Accordingly, an official waiver stating that formal ethical approval was not required for this study was obtained from the Kocaeli University Social and Human Sciences Ethics Committee, and an Author Declaration on Ethical and GDPR Compliance signed by the authors has also been submitted. Further details regarding ethical procedures and data protection measures are reported in the Institutional Review Board Statement and Data Protection and GDPR Compliance sections following the Conclusions and Implications section.

No temporal or language restrictions were imposed on the dataset, as the study aimed to explore how often and during which periods service-quality- and sustainability-related cues appeared in user reviews. Therefore, all accessible reviews of the listed hotels were included. Following the approach of Lee et al. [11], who conducted a longitudinal analysis of online travel platform reviews, this study was structured as longitudinal, acknowledging that user experiences may evolve over time. To analyze multilingual user reviews, non-English OTP comments written in 25 different languages ($n = 5031$, 24.2%) were translated into English using ChatGPT (GPT-4 model), an AI-based translation model developed by OpenAI. The translation process was carried out between 2 and 5 May 2025. The translation process was guided by previous studies in the tourism domain that used machine translation (MT) applications for multilingual reviews [94] and supported by research demonstrating that AI-based translation systems can preserve semantic integrity in user-generated texts [95,96]. All translations were subsequently reviewed and verified by a professional translation agency. To ensure translation quality and semantic accuracy, all translated texts underwent a systematic quality control procedure. Specifically, the translations were reviewed and verified in full by a professional translation agency, which assessed semantic equivalence, contextual coherence, and potential meaning shifts between the source texts and the English translations. Any identified discrepancies were corrected prior to analysis.

Although machine translation may introduce minor lexical or stylistic variations, such effects are generally more consequential in analyses focusing on fine-grained linguistic features than in those examining higher-level thematic structures and overall sentiment. In the present study, thematic and sentiment analyses were conducted at an aggregated level, reducing the likelihood that translation-related variations would systematically bias the findings. Furthermore, the use of a single translation model across all non-English reviews ensured procedural consistency, while the subsequent professional verification helped minimize potential semantic shifts. Accordingly, any translation-related impact on

theme identification or sentiment polarity is expected to be minimal and unlikely to affect the overall interpretation of the results.

5.4. Coding and Inter-coder Reliability

The qualitative content analysis was conducted using MAXQDA (version 24) software. Although a closed coding approach was adopted, the potential subjectivity in classifying intrinsic and extrinsic cues warranted the use of a consensus coding strategy [97,98]. To establish the initial clarity and consistency of the coding scheme, two expert coders independently analyzed a 5% subsample of the dataset as a pilot study, yielding a raw agreement rate of 91%. Following this pilot validation, the coding process followed a three-step validation framework to increase consistency of judgment, minimize interpretation discrepancies, and ensure inter-coder reliability. In the first stage, the full dataset ($n = 20,820$) was systematically coded by the first coder. Each review was coded according to its contextual relevance using word groups, sentences, and conceptually coherent text blocks, applying a multiple-coding technique [99]. In the second stage, a second coder reviewed the coding output to identify inconsistencies and ambiguities. This step aligns with Guba's [100] cross-check logic to enhance coding accuracy in qualitative research. In the final stage, any remaining discrepancies were discussed in consensus meetings with a third adjudicator coder, where unresolved codes were reviewed collaboratively until agreement was reached. The overall reliability of this framework was confirmed by a Cohen's Kappa coefficient of 0.87, calculated using the inter-coder agreement module of MAXQDA (version 24). Since these values exceed the thresholds commonly accepted in the literature [101] the research results were established as methodologically robust.

5.5. Statistical/Data Analysis

The coding process was carried out systematically using MAXQDA (version 24), a widely used qualitative data analysis software. Descriptive statistical techniques, including frequency, percentage, and cross-tabulation analyses, were employed to identify relationships between themes. To visualize conceptual relationships and meaning patterns among themes, Leximancer software was used to generate theme-based concept maps. Sentiment analysis was then conducted to determine the emotional orientation of the themes, and compound scores were obtained using the VADER algorithm.

5.6. Methodological Limitations

Despite the methodological rigor applied throughout the research process, several limitations should be acknowledged. First, the sample selection is limited to user reviews obtained from a single online travel platform and from hotels recognized for their sustainability practices within that platform. Although the selected hotels are geographically distributed across regions with high international tourism flows, the findings may not be fully generalizable to all accommodation types, destinations, or review platforms. User perceptions and review patterns may vary across platforms with different user bases, rating systems, and review cultures.

Second, source anonymization constitutes an additional limitation. In line with ethical research standards and to avoid potential commercial sensitivity, hotel names and the platform identity were anonymized. While this approach protects institutional confidentiality, it also restricts the possibility of conducting hotel-specific or brand-level comparisons and limits the interpretation of findings in relation to individual organizational characteristics.

Third, the use of machine translation for non-English reviews represents a further methodological constraint. Although all translated texts were reviewed and verified by a professional translation agency and analyses were conducted at an aggregated thematic and sentiment level, minor semantic or stylistic nuances may not have been fully preserved.

in translation. Such nuances could, in some cases, influence the expression of emotional tone or subtle meaning in user-generated content. Nevertheless, given the consistency of the translation procedure and the focus on higher-level thematic patterns, any potential translation-related effects are considered limited and unlikely to alter the overall conclusions of the study.

6. Results

6.1. Findings Regarding the Themes Identified in User Reviews

In total, 20,820 user reviews were analyzed within the framework of the hotel service quality and sustainability themes (RQ1). Table 3 presents the distribution of the reviews across these themes and their subthemes. Percentages are calculated based on the total number of coded thematic instances, rather than the number of reviews, due to the use of multiple coding. However, when the same code was expressed across multiple sentences within a single review, it was treated as a single thematic instance for that review. The majority of the reviews (76%) were found to be related to hotel service quality, while 25.6% were associated with sustainability.

Table 3. The percentage distributions of the themes in the comments.

Hotel Service Quality	n	%
Staff Efficiency	15,825	76.0
Food & Beverage	13,040	62.6
Customer Experience and Overall Satisfaction	12,171	58.5
Accommodation Amenities	10,823	52.0
Location	9147	43.9
Comfort	8001	38.4
Cleanliness	4796	23.0
Service Personalization	3474	16.7
Price & Performance	2443	11.7
Safety & Security Measures	369	1.8
Sustainability	n	%
Nature-based accommodation	5324	25.6
Sustainable Luxury Experience	769	3.7
Local Source/Product Usage	403	1.9
Sustainable Cuisine/Food	288	1.4
Sustainability-Driven Customer Dissatisfaction	236	1.1
Sustainable Infrastructure	236	1.1
Energy Efficiency	147	0.7
Cultural Heritage/Community Support	140	0.7
Educational and Awareness-Raising Practices	99	0.5
Recycling	45	0.2
Water Efficiency	39	0.2
Sustainability Certifications and Labels	32	0.2
Distrust in Sustainability Claims	10	0.01

The findings obtained from the analysis of user reviews of sustainable hotels (RQ1) indicate that users predominantly evaluate their hotel experiences based on elements of service quality.

The distribution of user reviews across subthemes shows considerable variations. Among the reviews related to hotel service quality, the subtheme with the highest frequency was staff efficiency ($n = 15,825$; 76%), followed by food & beverage ($n = 13,040$; 62.6%), customer experience and overall satisfaction ($n = 12,171$; 58.5%), and accommodation amenities ($n = 10,823$; 52%). Less than half of the reviews contained references to

location (n = 9147; 43.9%), comfort (n = 8001; 38.4%), cleanliness (n = 4796; 23%), service personalization (n = 3474; 23%), price & performance (n = 2443; 11.7%), and safety & security measures (n = 369; 1.8%). These results indicate that, in online reviews, guests' evaluations of service quality primarily emphasize facility amenities and staff attentiveness, while other themes receive comparatively less emphasis. The findings are consistent with previous research that analyzed hotel reviews in the context of service quality, identifying staff efficiency, food & beverage, and accommodation/room amenities as key determinants of customer satisfaction compared to other subdimensions [7,16,17,24].

When examining the subthemes of sustainability practices, it was found that the subtheme with the highest frequency in user reviews was nature-based accommodation (n = 5324; 25.6%). In the analysis, it was determined that the other subthemes showed a low frequency distribution. The subthemes are listed as sustainable luxury experience (n = 769; 3.7%), local source/product usage (n = 403; 1.9%), sustainable cuisine/food (n = 288; 1.4%), sustainable infrastructure (n = 236; 1.1%), energy efficiency (n = 147; 0.7%), cultural heritage/community support (n = 140; 0.7%), educational and awareness-raising practices (n = 99; 0.5%), recycling (n = 45; 0.2%), water efficiency (n = 39; 0.2%), and sustainability certifications and labels (n = 32; 0.2%).

The findings are consistent with the results reported in the analyses of sustainable hotel reviews conducted by Ali et al. [89] and Pacheco et al. [28]. In both studies, subthemes related to sustainability practices were found to appear only to a limited extent in guest reviews. The fact that the majority of the analyzed reviews focus on tangible elements—such as staff, food & beverage, and accommodation amenities—that shape the overall guest experience indicates, as emphasized by Aliyah et al. [81] in their study on consumer reviews of green hotels, that general service quality dimensions play a more decisive role in determining customer satisfaction. Approximately 1.1% of the analyzed reviews (n = 236) indicated that the sustainability practices adopted by hotels caused guest dissatisfaction. These results are consistent with the findings of Ali et al. [89], who identified that certain sustainable hotel practices led to dissatisfaction among some guests. Although at a relatively low rate (n = 10; 0.01%), there were also comments indicating that the sustainability practices of the hotels were perceived as insincere or as instances of “greenwashing”.

Figure 1 presents a concept map illustrating co-occurrence patterns among the most frequently mentioned words across all user reviews. This map provides valuable insight into which concepts are emphasized by guests when evaluating their hotel experiences and how these concepts are interrelated. The analysis identified five main thematic clusters, namely “staff,” “stay,” “room,” “hotel,” and “breakfast.” One of the largest clusters, “staff,” is associated with words such as “service” (n = 7670, 35%), “friendly” (n = 6350, 29%), and “helpful” (n = 4516, 21%), which describe how guests perceive and characterize hotel staff and the quality of their service. Within this cluster, links between the word “staff” (n = 14,803, 68%) and terms such as “restaurant” (n = 5250, 24%), “quality” (n = 2193, 10%), and “dinner” (n = 1899, 9%) indicate that the service quality provided by staff working in food and beverage service areas is also highly valued in guest reviews. The “stay” cluster relates to experience (n = 3941; 18%), place (n = 3619; 17%), recommend (n = 4569; 21%), resort (n = 4071; 19%), perfect (n = 3148; 15%), and villa (n = 2291; 11%), reflecting its association with customer experience and overall satisfaction. The “room” cluster includes comfortable (n = 3820; 18%), bed (n = 1936; 9%), clean (n = 4096; 19%), area (n = 3130; 14%), and views (n = 2392; 11%), while the “hotel” cluster highlights location (n = 5490; 25%), city (n = 2229; 10%), walking (n = 1890; 9%), and walk (n = 4043; 19%). These findings indicate that room-related attributes are assessed mainly through tangible aspects such as cleanliness, comfort, and view, while hotel-related evaluations are largely linked to location. The relatively smaller “breakfast” cluster mainly consists of guest evaluations related to

food and beverage themes, which can be attributed to the fact that most of the hotels offer bed-and-breakfast services.

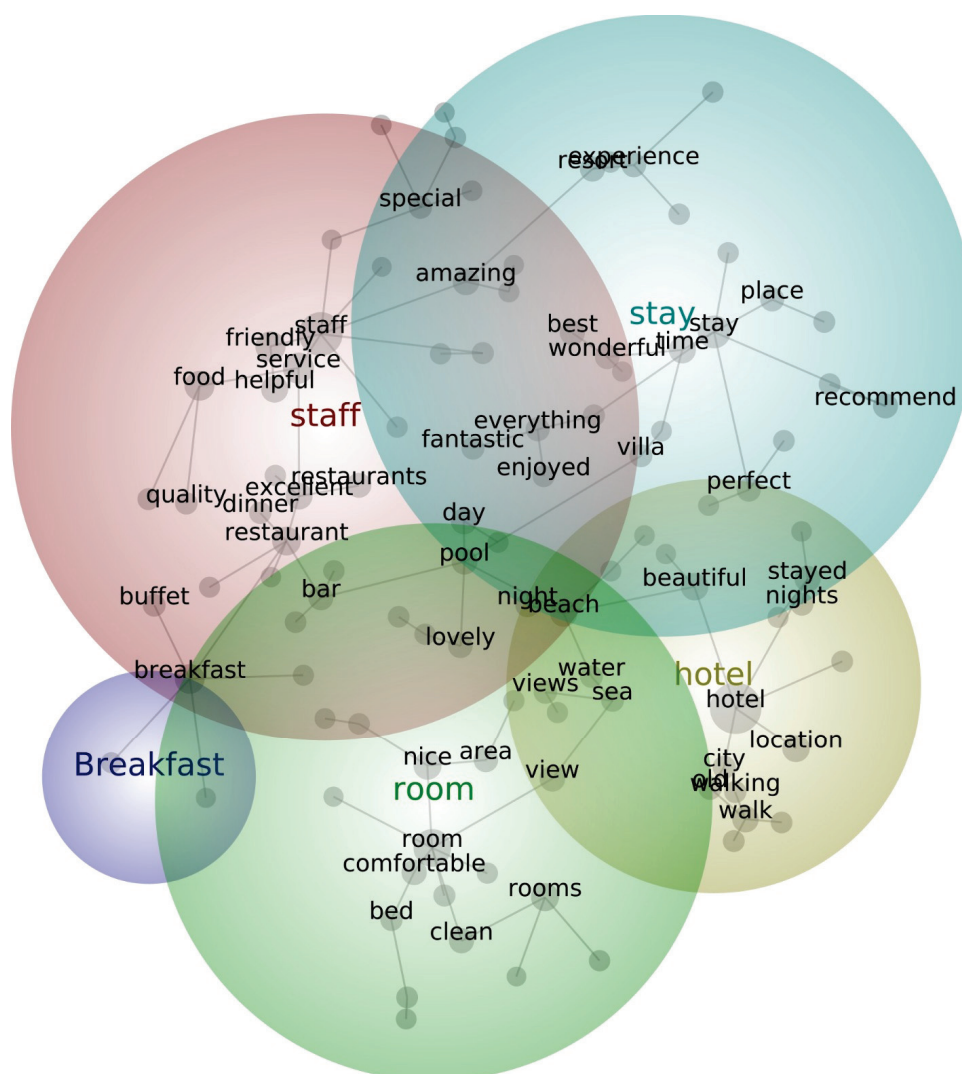


Figure 1. Theme-based concept map of user comments.

When the interconnections between clusters were analyzed, it was found that the “staff” and “stay” clusters intersected through words such as “amazing” ($n = 4597$; 21%), “best” ($n = 3865$; 18%), and “fantastic” ($n = 2396$; 11%). This finding indicates that the stay experience is closely associated with staff attentiveness. At the intersection of the “staff” and “room” clusters, connections were found through words such as “bar” ($n = 3060$; 14%), “beach” ($n = 4686$; 22%), and “pool” ($n = 3852$; 18%). This finding suggests that, in guest evaluations, both hotel and room facilities, as well as staff working across different departments, play a significant role in shaping perceptions. Between “stay” and “hotel” clusters, beautiful ($n = 5147$; 24%) and perfect ($n = 3148$; 15%) emerged as key adjectives, implying that customer experiences are positively shaped by hotel attributes. The “hotel” and “room” clusters highlight the prominence of words such as “beach” ($n = 4686$; 22%), “water” ($n = 2312$; 11%), “view” ($n = 3653$; 17%), and “sea” ($n = 2107$; 10%), indicating that both hotel and room features are evaluated in terms of amenities such as scenic views and proximity to the sea or beach. When the intersections between the clusters are analyzed overall, it is observed that positive adjectives such as “special” ($n = 2390$; 11%), “amazing” ($n = 4597$; 21%), “enjoyed” ($n = 1843$; 9%), “best” ($n = 3865$; 18%), “lovely” ($n = 3031$; 14%), “beautiful” ($n = 5147$; 24%), and “perfect” ($n = 3148$; 15%) are predominantly present across

different interconnections between clusters. This finding indicates that guests' overall experiences within the "staff," "stay," "hotel," and "room" clusters are predominantly positive. The concept map analysis reveals that the "room" cluster is characterized by tangible factors related to basic room features, the "staff" cluster includes descriptive words reflecting staff attentiveness, the "stay" cluster captures dimensions of guest experience, and the "hotel" cluster is primarily associated with location-based evaluations. These findings align with the concept map results of Pacheco et al. [28], who analyzed guest reviews of green hotels. This result suggests that guest reviews of sustainable hotels also tend to focus on tangible elements that are directly experienced and observed by customers.

Figure 2 presents a concept map of co-occurrence patterns among frequently mentioned words within sustainability-themed reviews. The analysis revealed six main thematic clusters: "wildlife," "island," "beautiful," "water," "beach," and "views." The "wildlife" cluster, which is one of the largest groups, is associated with words such as "wildlife" (n = 1860; 24%), "resort" (n = 1105; 14%), and "walk" (n = 933; 12%). This distribution indicates that guests describe their nature-based accommodation experiences through references to wildlife and the natural environment. The "beach" cluster shows high frequency and strong interconnections with ocean (n = 1398; 18%) and sea (n = 1087; 14%). The presence of adjectives such as "stunning" (n = 932; 12%) and "amazing" (n = 777; 10%) further indicates that guests perceive ocean, sea, and beach experiences positively within the context of nature-based accommodation. Words like access (n = 699; 9%), elevator (n = 621; 8%), and cliff (n = 544; 7%) reflect the importance of accessibility within nature-based accommodation contexts. In the "views" cluster, the words "views" (n = 1500; 19%), "view" (n = 1200; 15%), and "room" (n = 1000; 13%) appear with high frequency. The words "rooms" (n = 850; 11%) and "balcony" (n = 751; 10%) also stand out, while "overlooking" (n = 621; 8%) shows relatively lower frequency and connection strength. This distribution indicates that, in sustainable hotels, nature-based accommodation experiences are shaped through the integration of tangible property features, such as room view, overall scenery, and balcony view, with elements of the natural environment. The "island" cluster is characterized by the word "island" (n = 1002; 13%), which stands out as the most prominent term shaping its overall structure.

The fact that the word "island" forms an independent cluster is associated with the presence of several island-based sustainable hotels in the dataset. This distribution indicates that guests evaluated their accommodation experiences in these hotels through the natural and environmental elements provided by island geographies. The "beautiful" cluster is centered around the word "beautiful" (n = 850; 11%), with other highly weighted and strongly connected words such as "wonderful" (n = 698; 9%) and "villa" (n = 622; 8%), indicating that as a positive adjective, "beautiful" reflects guests' overall favorable evaluations of the accommodation experiences offered by sustainable hotels. The water cluster, organized around water (n = 752; 10%), includes beaches (n = 698; 9%) and sand (n = 620; 8%). The results show that natural elements enhancing the guest experience, such as the sea, beach, and sand, are considered integral components of the accommodation experience in reviews of sustainable hotels.

The analysis of interconnections between clusters showed that the "wildlife" and "beach" clusters intersect through the words "walk" (n = 903; 12%) and "area" (n = 852; 11%). This finding indicates that guests associate nature-based accommodation experiences with walking activities and the environmental features of the surrounding area. The analysis of interconnections between clusters revealed that the overlap between the "beach" and "views" clusters was higher compared to other clusters. The two clusters intersect through the words "ocean" (n = 1398; 18%), "sea" (n = 1087; 14%), "view" (n = 1200; 15%), "room" (n = 1000; 13%), and "overlooking" (n = 621; 8%). The high quantitative

frequency of intersecting words indicates that guests evaluate the environmental features of accommodation facilities, such as beaches, together with the properties' views and spatial location in a holistic framework. In contrast, the intersections among other clusters are more limited. The intersection between the “wildlife” and “beautiful” clusters through only the word “resort” ($n = 1105$; 14%) suggests that the wildlife experience is positively perceived when integrated with the facilities of the resort. Similarly, the overlap between the “beautiful” and “beach” clusters through the words “amazing” ($n = 777$; 10%) and “villa” ($n = 622$; 8%) indicates that guests evaluate their accommodation experiences positively in relation to tangible features such as the resort's seaside location and scenic views. Overall, these findings demonstrate that guest reviews of sustainable hotels emphasize both the tangible and intangible characteristics of the facilities and their natural surroundings. This result supports Brochado and Pereira's [27] observation that the accommodation experience is evaluated as a multidimensional construct encompassing the experiential elements offered by the natural environment.

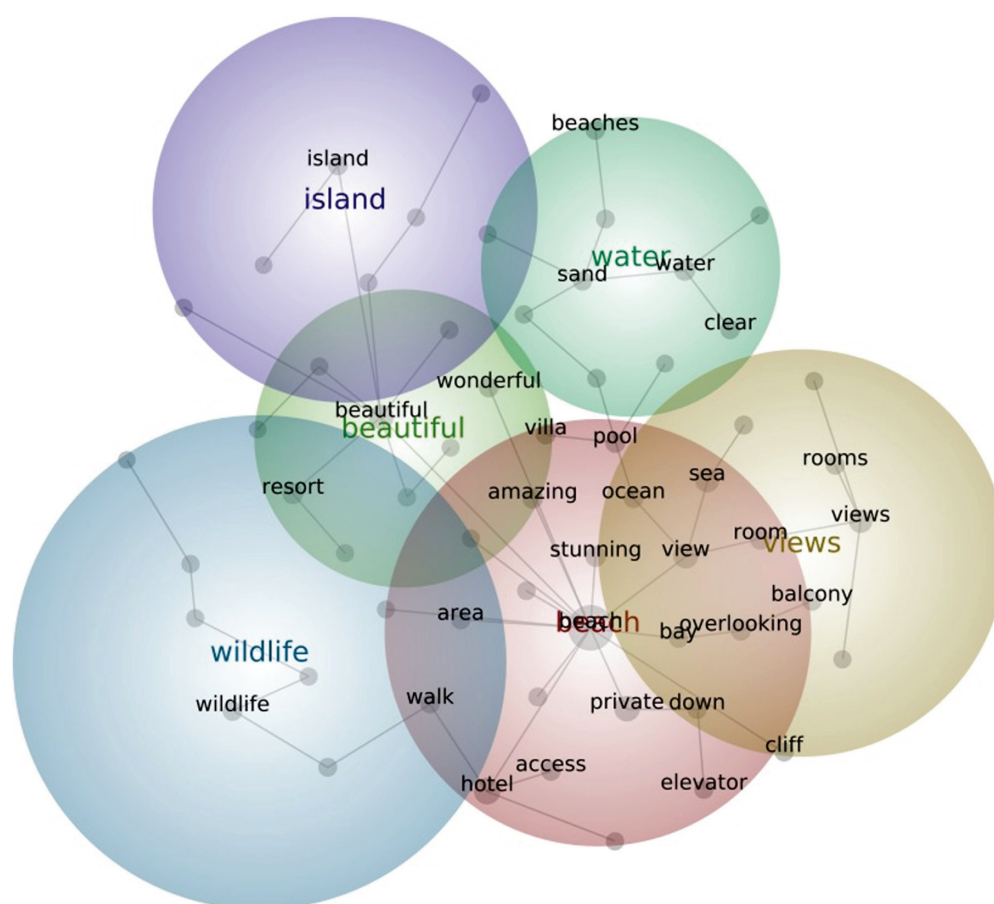


Figure 2. Theme-based concept map of user comments among sustainability themes.

6.2. Findings on the Change in Themes in User Reviews over the Years

The identification of annual variation rates in the dominant themes of user reviews (RQ2) is of critical importance for predicting consumer trends and improving service quality in line with these trends. In this context, Chart 1 illustrates the percentage change in the distribution of the “Hotel Service Quality” and “Sustainability” themes between 2004 and 2024. Thematic change analyses (RQ2) across years indicate that hotel service quality themes have remained markedly more dominant than sustainability themes in user reviews over the long term. Throughout the 2004–2024 period, the consistently high

proportional distribution of service-quality-related themes indicates that guests prioritize tangible service elements that they directly experience in their online evaluations.



Chart 1. Distribution of hotel service quality and sustainability themes over the years.

The findings show that the proportion of comments associated with the hotel service quality theme is considerably higher than that of comments related to sustainability practices. These results are consistent with the findings of Aliyah et al. [81], who analyzed green hotel reviews between 2022 and 2024, and Pacheco et al. [28], who examined 2023 green hotel reviews within the context of sustainability and hotel service quality themes. Another notable finding of the analysis is the sharp decline in service-quality-related comments in 2020, following an upward trend that had begun in the 2010s. This result is linked to the social restrictions and measures implemented globally in accommodation facilities due to the COVID-19 pandemic. As Xu et al. [20] also emphasize, the nature of user reviews regarding accommodation facilities changed significantly between pre- and post-COVID-19 periods. Beginning in 2021, as the global effects of the pandemic subsided and travel restrictions eased, comments emphasizing hotel service quality attributes once again showed an upward trend. In contrast, the sustainability practices theme displayed a low proportional distribution throughout all analyzed years. The comments containing this theme showed a relatively increasing trend starting from 2015, reaching 4.7% in 2019. In 2020, sustainability-oriented reviews experienced a sharp decline due to the impacts of the COVID-19 pandemic. However, starting from 2021, as the effects of the pandemic diminished, sustainability-themed reviews also began to show an upward trend, similar to the overall hotel service quality theme. Another important finding is that, between 2023 and 2024, comments related to this theme reached their highest level across the years, approaching 6%. Throughout the 2004–2024 period, the proportionally higher distribution of the Hotel Service Quality theme compared to the Sustainability theme indicates that guests emphasized tangible service elements derived from their direct experiences more strongly than relatively abstract attributes such as sustainability in their online reviews.

Chart 2 displays the yearly variation in hotel service quality sub-themes. The user reviews associated with all sub-themes show a general upward trend until 2019, with this increase becoming more pronounced during 2016–2019. In this period, themes such as service personalization, comfort, price & performance, customer experience and overall satisfaction, food & beverage, location, and staff efficiency exhibited a noticeable rise. However, beginning in 2020, the reviews related to general service quality sub-themes showed a downward trend, which continued through 2021. This trend can be explained by

the travel restrictions implemented worldwide and the social distancing measures imposed on service delivery in the hospitality sector during the COVID-19 pandemic.

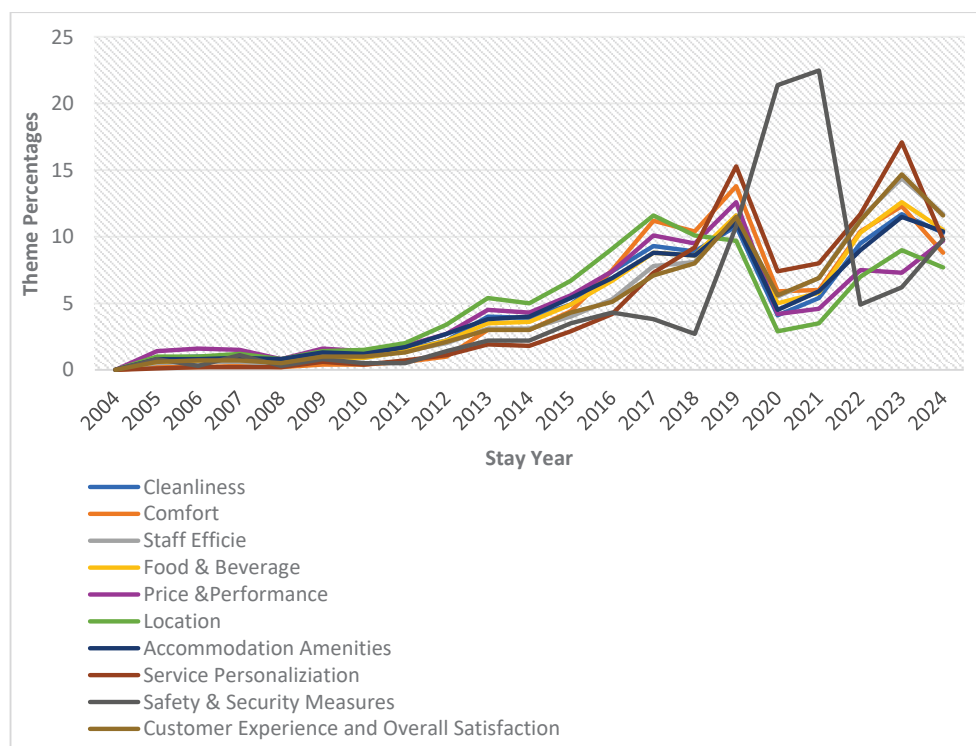


Chart 2. Distribution of hotel service quality sub-themes over the years.

One of the key findings identified in the analysis is that the safety & security measures theme reached its highest rate during 2020–2021. These results align with Xu et al. [20], who found that during the COVID-19 period, guests placed greater emphasis on health and safety attributes when evaluating hotels. However, all dimensions of general service quality began to rise again starting in 2022. Among these dimensions, the relatively high proportions of service personalization, staff efficiency, customer experience and overall satisfaction, and food & beverage indicate, as Jang et al. [102] suggest, that guests' evaluation criteria for service quality dimensions have not significantly changed over time. Overall, the findings reveal that while the core dimensions of service quality remain dominant in the long term, themes such as safety and hygiene tend to gain prominence during crisis periods.

Chart 3 presents the yearly distribution of sub-themes related to sustainability. The findings indicate that between 2004 and 2010, all sub-themes exhibited relatively low representation in guest reviews. In contrast to the steady increase observed in hotel service quality sub-themes, sustainability-related sub-themes displayed a more fluctuating pattern over the years. Sudden spikes were observed in specific sub-themes, including water efficiency (2013), energy efficiency (2014), sustainable cuisine/food (2017), sustainable luxury experience (2018), and recycling (2021). Another significant finding is that, similar to general service quality sub-themes, sustainability-related sub-themes experienced a decline in 2020 due to the COVID-19 pandemic after a period of consistent growth until 2019. This is consistent with Xu et al. [20], who highlighted that during the COVID-19 period, guest evaluations shifted toward health-focused concerns, leading to fewer assessments of broader, more abstract service attributes such as sustainability.

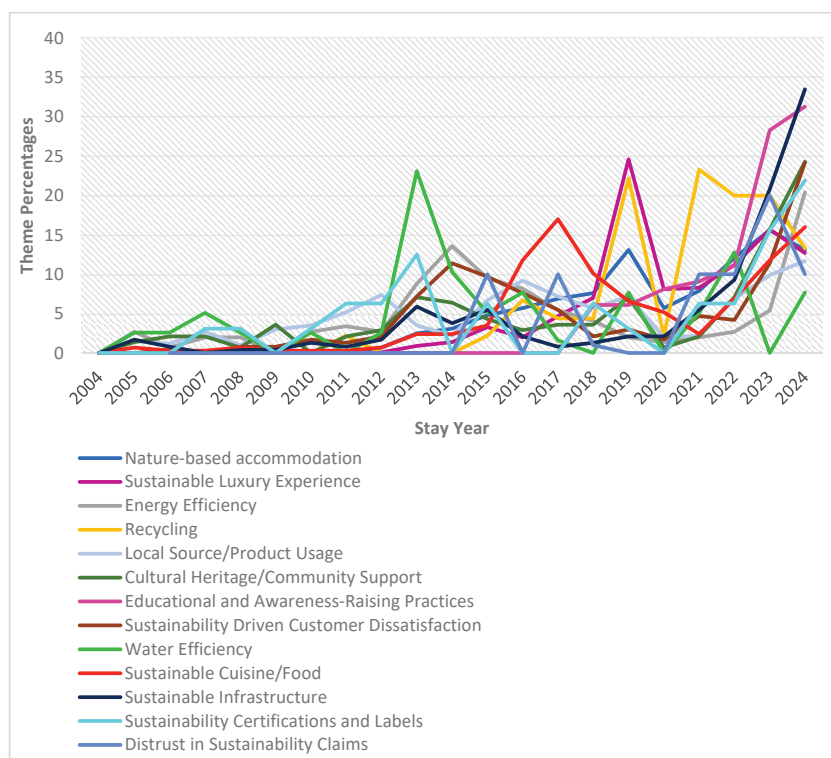


Chart 3. Distribution of sustainable sub-themes over the years.

The nature-based accommodation sub-theme exhibited a steady upward trend between 2012 and 2019, then declined during the pandemic years (2019–2021), and began to rise again from 2022 onward. Apart from these sub-themes, educational and awareness-raising practices, energy efficiency, sustainable infrastructure, cultural heritage/community support, sustainable certifications and labels, sustainable cuisine/food, and sustainable luxury experience sub-themes have shown an upward trend in the post-COVID-19 period. In the graph, the relatively high distribution of nature-based accommodation and sustainable luxury experience categories, particularly starting from 2018, can be interpreted—consistent with Brochado and Pereira [27]—as reflecting the integration of sustainability practices with hotel facilities, making them an integral part of the sustainable tourism experience. The increasing representation of environmentally related sub-themes of sustainability in recent years parallels the findings of Aliyah et al. [81], who reported rising guest attention to sustainability practices in green hotels. Furthermore, the upward trend observed in socially oriented sustainability sub-themes such as local source/product usage and cultural heritage/community support indicates, as highlighted by Brazytė et al. [30], that social dimensions are gaining importance alongside environmental ones in consumer evaluations of sustainable tourism.

Another key finding of this study is that the distrust in sustainability claims and sustainability-based dissatisfaction sub-themes exhibited periodic increases, including in the post-COVID-19 period. This result aligns with Ali et al. [89], who found that certain sustainability practices in accommodation, such as towel reuse, motion-sensitive lighting, and keycard or sensor-controlled systems, may reduce perceived service quality and lead to guest dissatisfaction. Distrust in sustainability claims can be interpreted, as highlighted by Ali et al. [89], as stemming from guests' perceptions that a hotel's sustainability practices are inadequate, and—as noted by Lv et al. [79]—from an increase in negative evaluations toward hotels that may reinforce suspicions of greenwashing.

6.3. Findings on the Variation in Themes Based on Intrinsic and Extrinsic Cues

The findings regarding the frequency of intrinsic and extrinsic cues across the hotel service quality and sustainability themes (RQ3) indicate that nearly all user reviews ($n = 20,358$; 97.8%) contained intrinsic cues, while the number of reviews including extrinsic cues was notably low ($n = 1094$; 5.3%). Accordingly, intrinsic cues ratios are generally higher than extrinsic cues ratios across all sub-themes. These results suggest that guests tend to focus more on core attributes, such as hotel features and service quality, than on external factors that are not directly related to the product or service when evaluating their accommodation experiences.

Table 4 presents the distribution of intrinsic (attributes inherent to the product/service itself) and extrinsic (attributes external to the product/service) cues across hotel service quality and sustainability practices sub-themes. Figure 3, which illustrates the Code Co-occurrence Model, depicts the relational structure and intersections between these themes around intrinsic/extrinsic cues, enabling a multidimensional analysis of guest evaluations regarding overall service quality and sustainability practices. An examination of Table 4 reveals that, within the hotel service quality theme, the sub-themes most strongly associated with intrinsic cues are staff efficiency ($n = 15,505$; 76.2%), food & beverage ($n = 12,753$; 62.2%), customer experience and overall satisfaction ($n = 11,934$; 58.6%), and accommodation amenities ($n = 10,569$; 51.9%). These results indicate that guest evaluations are predominantly shaped by tangible service quality elements. Given that staff performance is a critical determinant of perceived service quality [7,18,19]; that food & beverage directly influences satisfaction through taste, restaurant service, and presentation quality [17,71,84]; and that room/facility amenities [16] serve as fundamental components in assessing comfort, functionality, and aesthetics, these three sub-themes emerge as prominent intrinsic cues influencing perceived service quality and overall satisfaction [13,14].

Table 4. Distribution of intrinsic and extrinsic cues across themes.

Hotel Service Quality	Intrinsic Cues		Extrinsic Cues	
	n	%	n	%
Cleanliness	4664	22.9	309	28.2
Comfort	7793	38.3	362	33.0
Staff Efficiency	15,505	76.2	807	73.8
Food & Beverage	12,753	62.6	732	66.9
Price & Performance	2350	11.5	264	24.1
Location	8975	44.1	628	57.4
Accommodation Amenities	10,569	51.9	752	68.7
Service Personalization	3342	16.4	187	17.1
Safety & Security Measures	359	1.8	35	3.2
Customer Experience and Overall Satisfaction	11,934	58.6	679	62.1
Sustainability Practices	Intrinsic Cues		Extrinsic Cues	
	n	%	n	%
Nature-based accommodation	5158	25.3	179	15.5
Sustainable Luxury Experience	752	3.7	16	1.5
Energy Efficiency	144	0.7	22	2.2
Recycling	44	0.2	4	0.4
Local Source/Product Usage	394	1.9	36	3.3
Cultural Heritage/Community Support	137	0.7	18	1.6
Educational and Awareness-Raising Practices	94	0.5	3	0.3
Sustainability-Driven Customer Dissatisfaction	229	1.1	44	4.0
Water Efficiency	38	0.2	12	1.1
Sustainable Cuisine/Food	282	1.4	25	2.3
Sustainable Infrastructure	224	1.1	25	2.3
Sustainability Certifications and Labels	31	0.2	3	0.3
Distrust in Sustainability Claims	10	0.01	0	0

Note: Due to the use of multiple coding, a single review may contain both intrinsic and extrinsic cues; therefore, the combined frequencies of these cue types within a given theme may exceed the total frequency of that theme.

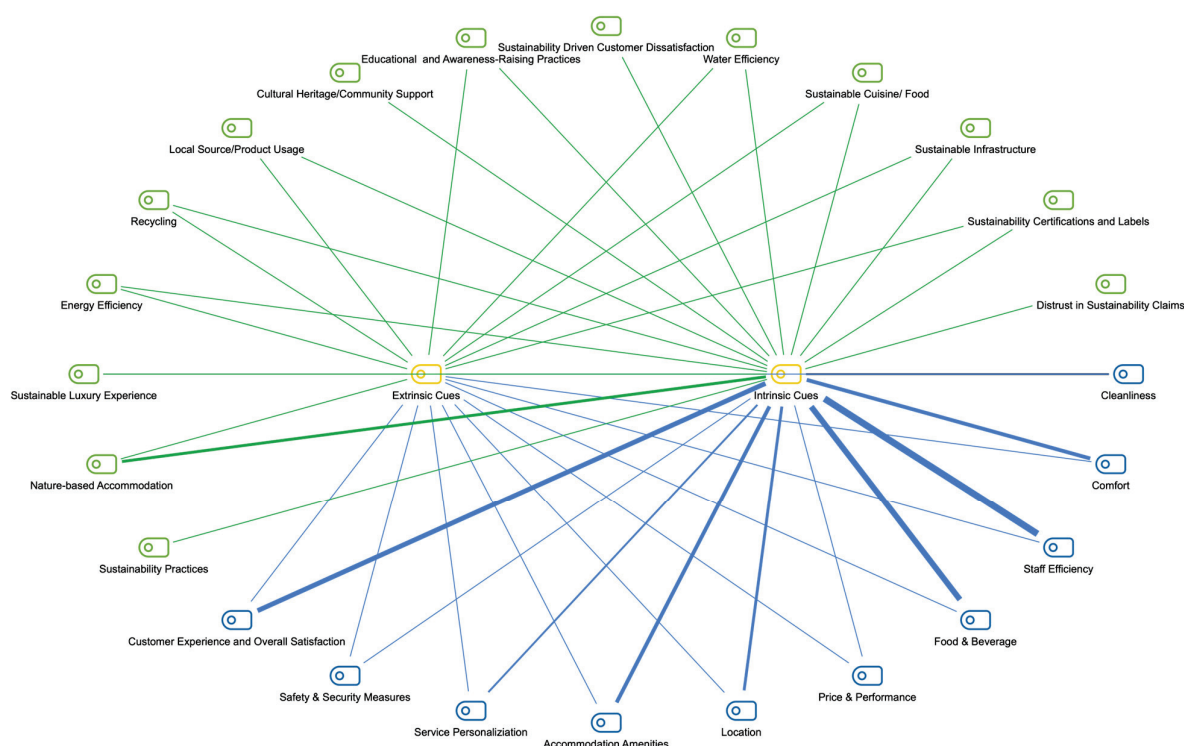


Figure 3. Code co-occurrence model depicting the distribution of intrinsic and extrinsic cues among themes.

In Table 4, it is observed that within the main theme of hotel service quality, extrinsic cues exhibit a proportional distribution similar to that of intrinsic cues. Although the quantitative distribution of these sub-themes is lower compared to intrinsic cues, the high presence of extrinsic cues in user reviews related to accommodation amenities ($n = 752$, 68.7%), staff efficiency ($n = 807$, 73.8%), food & beverage ($n = 732$, 66.9%), and customer experience and overall satisfaction ($n = 679$, 62.1%) indicates that guests' perceptions of service quality are shaped not only by tangible elements directly experienced, but also by factors such as hotel image, brand value, environmental context, and references to other user reviews. Additionally, the relatively high rate of location ($n = 628$; 57.4%) among extrinsic cues indicates that guests evaluate hotel location not only experientially but also through external factors such as environmental appeal and regional prestige. Considering Hossain et al. [34], who emphasized the joint influence of intrinsic and extrinsic cues on guest satisfaction in tourism destinations, the present findings similarly indicate that guest evaluations of certain sub-themes reflect both cue types simultaneously, illustrating the multidimensional structure of perceived service quality.

In the context of the Code co-occurrence model, when the relationship between intrinsic and extrinsic cues and the general service quality sub-themes is examined, it is observed that the sub-themes staff efficiency, food & beverage, accommodation amenities, and customer experience and overall satisfaction have a strong association with the intrinsic cue cluster. Another important finding identified in the model is that sub-themes such as comfort, cleanliness, location, and service personalization, which serve as tangible service evaluation criteria, are also moderately associated with the intrinsic cue cluster. The Code co-occurrence model also shows that the extrinsic cue cluster is connected to the general service quality sub-themes in a way similar to the intrinsic cue cluster. However, the associations between extrinsic cues and these sub-themes are not as strong as those observed for the intrinsic cues. These results align with the findings of Aliyah et al. [81] and Pacheco et al. [28], who demonstrated that guest evaluations of green hotels are primarily

shaped by personal experiences involving tangible service elements. However, the model indicates that both intrinsic and extrinsic cues are linked to the sub-themes. In this context, while intrinsic cues primarily shape customers' overall service quality evaluations, extrinsic cues appear to play a complementary role in the process.

According to Table 4, within the sustainability practices theme, intrinsic cues ($n = 20,358$; 97.8%) display a proportionally higher distribution than extrinsic cues ($n = 1094$; 5.3%), similar to the pattern observed in general service quality. The sub-themes most closely associated with intrinsic cues are nature-based accommodation ($n = 5158$; 25.3%) and sustainable luxury experience ($n = 752$; 3.2%). These results reveal that guests evaluate their accommodation experiences based on variables such as the degree of integration between the facility and the natural environment, and luxury accommodation opportunities combined with sustainability principles. Moreover, as emphasized by Brochado and Pereira [27], the integration of sustainability practices with hotel amenities contributes to the creation of the overall guest experience, which explains why the reviews often reflect this experience through intrinsic cues. In other sub-themes such as local source/product usage, sustainable cuisine/food, and sustainability-driven customer dissatisfaction, intrinsic cues were found to have a lower distribution. The reviews under these sub-themes generally reflect guest evaluations of directly experienced processes, such as food and beverage services, use of local products, architectural features, and dissatisfaction arising from sustainability-related practices.

A similar proportional trend is observed among extrinsic cues, with nature-based accommodation ($n = 179$; 15.5%) emerging as the sub-theme with the highest rate. This finding is associated with guests' references to destination image, marketing communications emphasizing "nature," and mentions of environmental or natural features in other users' reviews. In line with Feng et al. [35], who found that brand familiarity and online reviews can influence hotel booking decisions, this result suggests that extrinsic cues may also shape guest evaluation processes. Furthermore, the coexistence of intrinsic and extrinsic cues—despite quantitative differences—within the nature-based accommodation sub-theme aligns with the findings of Hossain et al. [34], who demonstrated that guest evaluation processes in tourism destinations are shaped by the interaction between both types of cues. Another important finding is that the sustainability-driven customer dissatisfaction ($n = 44$; 4.0%) sub-theme displays a relatively high representation among extrinsic cues. Considering its moderate distribution among intrinsic cues as well, it can be inferred that dissatisfaction with sustainability-oriented practices arises both from direct negative experiences and from indirect variables such as hotel image, website and social media messages, and other users' reviews.

In the Code Co-occurrence Model presented in Figure 3, the relationship between intrinsic and extrinsic cues and the sub-themes of sustainability practices shows that only nature-based accommodation demonstrates a strong association with the intrinsic cue cluster. While both cue types are linked to all sustainability sub-themes, these associations generally remain limited. This indicates that sustainability practices are often perceived as secondary components in guest evaluations, exerting a lower influence compared to general service quality sub-themes. Nevertheless, similar to service quality, both intrinsic and extrinsic cues are found to be associated with sustainability sub-themes, suggesting that guest evaluations of sustainability practices are primarily shaped by intrinsic cues, while extrinsic cues serve a complementary role in the evaluation process.

6.4. Findings on the Emotional Distribution of Themes in User Reviews

Chart 4 presents the descriptive statistics, VADER compound score distribution, and TextBlob analysis results used to determine the emotional tone of user reviews. Each review

was categorized into three main sentiment classes—positive, negative, and neutral—based on its overall emotional orientation. This sentiment analysis reveals how guests' evaluations are shaped emotionally, providing a deeper understanding of the data. Findings based on the sentiment analysis (RQ4) reveal that user comments predominantly display a strongly positive emotional tone, indicating that customer satisfaction follows a homogeneous and high-intensity distribution.

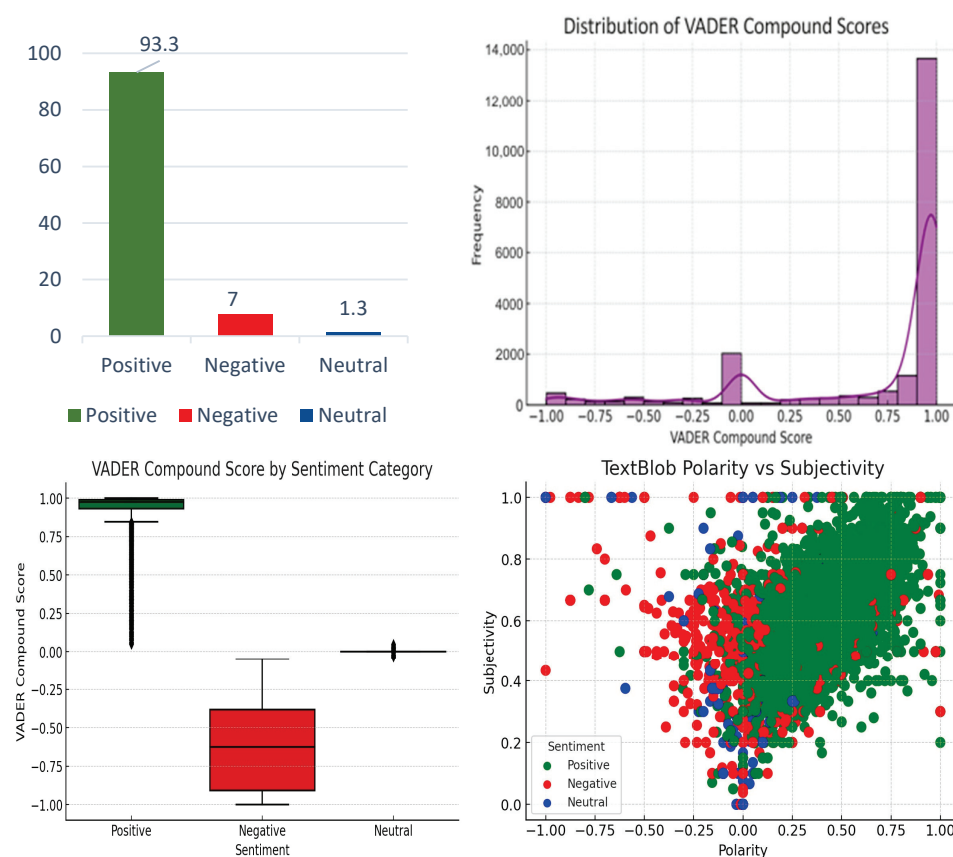


Chart 4. Descriptive statistics and VADER compound scores of sentiment analysis among themes.

An examination of Chart 4 shows that nearly all guest reviews demonstrate a clearly positive orientation. Among the analyzed reviews, 93.3% ($n = 19,427$) have a positive orientation, 7.6% ($n = 1585$) a negative orientation, and 1.3% ($n = 268$) a neutral orientation. The VADER compound score distribution indicates that scores cluster between +0.75 and +1.00. This indicates that a large proportion of the comments exhibit a distinctly strong positive emotional tone. Negative scores, on the other hand, are fewer in number and are distributed between -0.25 and -1.00 . These findings reveal that overall guest satisfaction levels are high, while guest dissatisfaction remains limited and is concentrated in specific sub-themes related to both general service quality and sustainability practices. Neutral comments, on the other hand, are concentrated around 0 within a narrow range in the VADER compound score graph. This result shows that these comments are mainly informative or descriptive in nature (e.g., location, accommodation amenities, food & beverage, etc.).

The VADER Compound Score by Sentiment Category graph further shows that positive sentiment has a narrow distribution, with a median score approaching 0.9. Given the high mean and low variance of positive compound scores, these reviews display a homogeneous emotional intensity and consistently high guest satisfaction. The negative sentiment category shows a wide distribution, with the median value ranging between -0.5 and -0.6 . Considering that the average compound scores of these negative comments are low and their variance is high, it is observed that the intensity of negative emotions

displays a heterogeneous pattern. This result indicates that while some evaluations are highly critical, others contain only a mild negative tone, showing that the level of customer dissatisfaction varies from one comment to another. Neutral comments; however, are clustered within a very narrow range with a median value close to 0. This shows that these comments are more descriptive in nature and do not convey a clear emotional orientation in terms of guest satisfaction or dissatisfaction.

In the Textblob polarity vs. subjectivity graph, positive reviews predominantly occupy the +0.25 to +1.00 polarity range, with subjectivity levels concentrated between 0.60 and 1.00. This indicates that positive comments are largely subjective, shaped by personal experiences and emotional expressions. Hence, guest satisfaction is mainly articulated through personal and affective narratives. Negative comments are positioned on the polarity axis between −1.00 and −0.05, while their subjectivity values show a wide distribution between 0.20 and 1.00. These results indicate that both strong and mild criticisms coexist within negative comments. In addition, the broad spread of negative comments reveals that these evaluations are made both subjectively and objectively, based on personal experiences and observable issues. In this context, it is seen that guest dissatisfaction is expressed in a more heterogeneous way through both subjective and objective assessments. Neutral comments, on the other hand, are generally located between −0.05 and +0.05 on the polarity axis, with subjectivity values mostly distributed between 0.00 and 0.40. These results show that, due to the minimal emotional orientation of neutral comments, they carry a more descriptive character. The analysis results indicate that guest satisfaction in the reviews is generally shaped by subjective and emotional factors, while dissatisfaction is influenced by both subjective and objective elements.

These findings are consistent with the results of Le et al. [25], who conducted a sentiment analysis of OTPs' hotel reviews focusing on polarity and subjectivity. That study found that despite the high number of reviews, polarity values were mostly concentrated in the positive range (+0.25–0.35), while subjectivity values clustered between 0.40 and 0.60. Similarly, Rita et al. [26] showed in their sentiment analysis of OTPs' hotel reviews that negative comments could address both tangible service quality aspects, such as hotel features, and subjective factors, such as personal experiences. As seen, the findings of both studies align with the results of this research, supporting that customer satisfaction is predominantly expressed through subjective and emotional statements, whereas dissatisfaction is conveyed through both subjective evaluations based on personal experiences and objective elements such as facilities and service quality.

Table 5 presents the sentiment-based distribution of positive, negative, and neutral reviews across hotel service quality and sustainability practices. The results show that positive guest evaluations significantly outnumber negative and neutral assessments. Within the hotel service quality theme, the sub-themes receiving the highest proportions of positive feedback are staff efficiency ($n = 15,072$; 77.6%), food & beverage ($n = 12,348$; 63.6%), customer experience and overall satisfaction ($n = 11,776$; 60.6%), and accommodation amenities ($n = 10,066$; 51.8%). Moderate positive evaluations cluster around location ($n = 8646$; 44.5%) and comfort ($n = 7543$; 38.8%). The sub-themes that received the highest level of negative evaluations under the main theme of hotel service quality were identified as accommodation amenities ($n = 940$, 59.3%), staff efficiency ($n = 936$, 59.1%), and food & beverage ($n = 870$, 54.9%), respectively. Moderate concentrations of negative sentiment appear in location ($n = 671$; 42.3%), customer experience and overall satisfaction ($n = 539$; 34%), price & performance ($n = 520$; 32.8%), and comfort ($n = 493$; 31.2%). However, the quantitative distribution of negative reviews is lower compared to positive ones. The fact that the sub-themes of staff efficiency, food & beverage, and accommodation amenities show a high proportional distribution in both positive and negative reviews indicates that

tangible service elements play a critical role in shaping the customer experience [7,18]. Hence, these sub-dimensions serve as dual determinants of satisfaction and dissatisfaction. The quantitative distribution of neutral reviews is considerably lower compared to positive and negative ones. Similar to those categories, the sub-themes that received the highest level of neutral evaluations are listed as staff efficiency ($n = 145$, 54.1%), food & beverage ($n = 161$, 60.1%), and accommodation amenities ($n = 151$, 56.3%), respectively. Customers' neutral evaluations of these sub-categories can be explained by their tendency to perceive these sub-themes as routine elements related to service quality [17].

Table 5. Distribution of emotions across themes/Sentimental analysis.

Themes	Positive		Negative		Neutral	
Hotel Service Quality	n	%	n	%	n	%
Cleanliness	4441	22.9	424	26.8	63	23.5
Comfort	7543	38.8	493	31.2	119	44.4
Staff Efficiency	15,072	77.6	936	59.1	145	54.1
Food & Beverage	12,348	63.6	870	54.9	161	60.1
Price & Performance	2012	10.4	520	32.8	53	19.8
Location	8646	44.5	671	42.3	110	41
Accommodation Amenities	10,066	51.8	940	59.3	151	56.3
Service Personalization	3129	16.1	356	22.5	42	15.7
Safety & Security Measures	322	1.7	62	3.9	7	2.6
Customer Experience and Overall Satisfaction	11,776	60.6	539	34	44	16.4
Sustainability Practices	n	%	n	%	n	%
Nature-based Accommodation	5114	26.3	209	13.2	48	17.9
Sustainable Luxury Experience	744	3.8	24	1.5	6	2.2
Energy Efficiency	134	0.7	35	2.2	0	0
Recycling	37	0.2	11	0.7	1	0.4
Local Source/Product Usage	393	2	27	1.7	4	1.5
Cultural Heritage/Community Support	137	0.7	15	0.9	0	0
Educational and Awareness-Raising Practices	95	0.5	5	0.3	1	0.4
Sustainability-Driven Customer Dissatisfaction	5	0.01	105	6.6	0	0
Water Efficiency	30	0.2	17	1.1	0	0
Sustainable Cuisine/Food	273	1.4	28	1.8	4	1.5
Sustainable Infrastructure	225	1.2	26	1.6	1	0.4
Sustainability Certifications and Labels	29	0.1	5	0.3	0	0
Distrust in Sustainability Claims	4	0.01	6	0.4	1	0.4

The high proportional distribution of the staff efficiency theme in positive reviews aligns with the findings of Peres & Paladini [7], Padma & Ahn [19], and Thu [18], who analyzed positive, negative, and neutral customer evaluations in the context of service quality dimensions. Likewise, the proportional strength of food & beverage, location, and accommodation amenities mirrors the findings of the same authors, while comfort corresponds with the results of Padma & Ahn [19]. In negative hotel reviews, the finding that the accommodation amenities and staff efficiency sub-themes exhibit high quantitative distribution, while location and price sub-themes show an average level of distribution, is consistent with the studies of Cenni [103]. The findings of the study reveal that tangible service quality elements are

decisive in the guest evaluation process, and that the customer experience is shaped around these sub-themes in both positive and negative reviews [7,18,19,103].

In the context of the code co-occurrence model, when the relationships between positive, negative, and neutral reviews and the general service quality sub-themes are evaluated, it is observed that staff efficiency, food & beverage, customer experience and overall satisfaction, and accommodation amenities show a high level of association with the positive review cluster, while location, comfort, and cleanliness are moderately associated with it (Figure 4). In the code co-occurrence model, the clusters of negative and neutral reviews are also connected to the general service quality sub-themes. However, the connections between negative and neutral reviews and these sub-themes are not as strong as those of the positive review cluster. These findings align with the results of Aliyah et al. [81], who found that positive consumer evaluations of green hotels are primarily based on tangible service elements. Nevertheless, the model also indicates relationships between positive, negative, and neutral reviews and the general service quality sub-themes. Therefore, the fact that the same sub-themes establish varying levels of association across positive, negative, and neutral review clusters can be interpreted as a reflection of the multidimensional nature of customer perception.

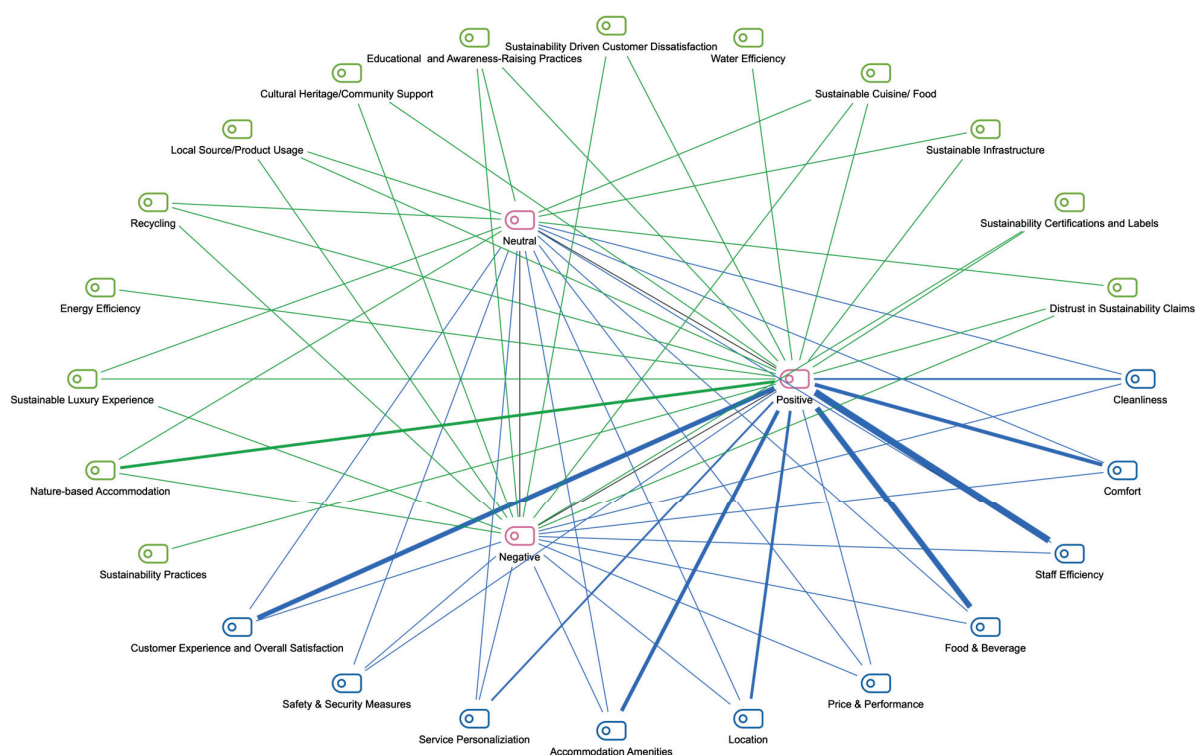


Figure 4. Code co-occurrence model depicting the distribution of emotions among themes.

Table 5 shows that positive reviews related to the main theme of sustainability practices are quantitatively higher than negative and neutral reviews, except for the sub-themes distrust in sustainability claims and sustainability-driven customer dissatisfaction. In addition, no neutral reviews were identified in the subcategories of energy efficiency, cultural heritage/community support, sustainability-driven customer dissatisfaction, water efficiency, and sustainability certifications and labels. Among positive reviews, the most frequent sub-themes are nature-based accommodation ($n = 5114$; 26.3%), sustainable luxury experience ($n = 744$; 3.8%), local source/product usage ($n = 393$; 2%), and sustainable cuisine/food ($n = 273$; 1.4%). It is observed that moderate positive evaluations are concentrated in the sub-themes of sustainable infrastructure ($n = 225$, 1.2%), energy efficiency ($n = 134$, 0.7%),

and cultural heritage/community support ($n = 137$, 0.7%). Although limited, the fact that guests made positive evaluations regarding categories such as sustainable infrastructure, energy efficiency, cultural heritage/community support, local source/product usage, and sustainable cuisine/food indicates, as emphasized by Aliyah et al. [81], that a portion of guests are aware of the sustainable initiatives implemented by these hotels. Comments on the sustainability practice sub-themes are generally positive in nature but display a more limited distribution compared to overall service quality sub-themes. This finding supports the results of Brazytė et al. [30] and Aliyah et al. [81], who found that while customers tend to evaluate sustainability practices positively, these practices play a more indirect role in customer satisfaction compared to service quality factors. In positive reviews, the high frequency of evaluations related to nature-based accommodation and sustainable luxury experience subcategories can be interpreted, as emphasized by Brochado and Pereira [27], as being associated with the integration of sustainability practices into hotel amenities, which enhances the overall consumer experience. Among negative reviews, the sustainability sub-themes with the highest distribution are nature-based accommodation ($n = 209$, 13.2%) and sustainability-driven customer dissatisfaction ($n = 105$, 6.6%). Although there are also negative evaluations related to other sub-themes, their quantitative distribution remains quite limited. For neutral reviews, the sustainability sub-theme with the highest distribution is nature-based accommodation ($n = 48$, 17.9%), while other sub-themes show very low quantitative representation. However, the analysis revealed that negative reviews, though limited, appeared across all sustainability sub-themes, with higher concentration in nature-based accommodation and sustainability-driven customer dissatisfaction. This aligns with the findings of Ali et al. [89], who identified that a segment of guests evaluated sustainable hotel practices negatively. In this context, to avoid guest dissatisfaction, it is essential for hotels to communicate their sustainability practices transparently and clearly with guests and align these policies with guest expectations throughout the implementation process.

In the context of the code co-occurrence model, the relationship between positive, negative, and neutral reviews and the sub-themes of the sustainability practices category shows that the nature-based accommodation sub-theme has a more pronounced association with the positive review cluster compared to other sub-themes. Within the code co-occurrence model, both positive and negative review clusters are associated with all sub-themes related to sustainability practices. However, the neutral review cluster shows a weaker connection with these sub-themes and lacks association with some of them. The model indicates that the relationships formed by the sustainability practice sub-themes in positive, negative, and neutral guest evaluations are generally more limited compared to those formed by the general service quality sub-dimensions. This finding reveals, as noted by Brazytė et al. [30], Pacheco et al. [28], and Aliyah et al. [81], that guests tend to assign relatively lower importance to sustainability practices in their sentimental evaluations compared to general service quality factors. However, enhancing guest awareness of these practices and integrating them with general service quality components would contribute to a more holistic improvement of the overall customer experience. These results are consistent with the findings of Aliyah et al. [81], who demonstrated in their study on green hotel reviews that positive consumer evaluations are primarily based on tangible service elements. Nonetheless, the model also reveals that positive, negative, and neutral reviews are all connected with general service quality sub-themes. Therefore, the varying degrees of association that these sub-themes form across different sentiment clusters suggest that customer perception is shaped by a multidimensional structure.

7. Discussion

The development of new communication technologies has made online travel platforms one of the primary marketing communication channels in the tourism industry. However, in these digital environments, consumers' decision-making processes involve uncertainty due to the intangible nature of services. Because hotel quality cannot be directly experienced before purchase, guests tend to rely on secondary information sources such as online reviews and ratings when forming their decisions [3,43,44]. At this point, the interaction between intrinsic and extrinsic cues plays a key role in shaping perceptions of the product or service. Yet, studies that examine guest evaluations in hotel reviews through the lens of these cues are still limited [34,35]. Accordingly, there is a gap in understanding which types of cues underpin guest evaluations in online reviews of sustainability-oriented hotels. In this context, the present study adopts Cue Utilization Theory to investigate how frequently intrinsic and extrinsic cues are used in user reviews of sustainable hotels, how they are distributed across themes, and how they relate to message tone, thereby interpreting these reviews in terms of guest perception and satisfaction.

The analysis shows that, in online reviews of sustainable hotels, greater emphasis is placed on tangible dimensions of service quality such as staff efficiency, food and beverage quality, and accommodation amenities. The consistency of these findings with prior research examining online hotel reviews through service quality dimensions [7,16,17,24] indicates that guest satisfaction in sustainable hotels is likewise primarily shaped by tangible service quality attributes. The finding that sustainability practices occupy a more limited place in guest reviews supports prior work in this field [28,89]. As noted by Pacheco et al. [28], this may be associated with guests' lack of awareness of sustainability practices, their tendency to prioritize tangible elements in their evaluations, greenwashing concerns, or the failure of hotel managers and staff to sufficiently integrate sustainability practices into operational processes. In this regard, it is recommended that sustainable hotels enhance guest awareness, integrate sustainability initiatives into overall service perceptions, and reduce greenwashing concerns by transforming sustainability practices into visible and measurable service quality attributes and by developing strategic and tactical practices that embed this mindset at both staff and managerial levels. In addition, integrating these practices into strategic communication processes is crucial for increasing guests' awareness of sustainability features. The findings further show, in line with Brochado & Pereira [27], that guests tend to define sustainable hotel experiences in a multi-layered way through their interactions with the natural environment, and that sustainability is associated less with an abstract environmental attitude and more with observable environmental characteristics. This suggests that sustainability strategies in the accommodation sector should be designed in ways that also highlight the natural elements guests actually experience.

Across the 2004–2024 period, the persistently high proportional distribution of service-quality-related themes and the more fluctuating pattern of sustainability-related sub-themes indicate that guests tend to prioritize directly experienced tangible service attributes in their online reviews. The service-quality findings support Jang et al. [102], who argued that the criteria underpinning service quality perceptions do not change dramatically over time. However, the decline in comments on both service quality and sustainability during the COVID-19 period, alongside the sharp rise in the "safety & security" sub-theme, aligns with Xu et al. [20], who reported that guest evaluations shifted toward health- and safety-oriented considerations during the pandemic. In this respect, it is suggested that, in times of crisis, sustainable hotels should restructure strategic management and communication processes in line with guest expectations while preserving "sustainability" as a core organizational value. The analysis also shows that, in the post-pandemic period, social sustainability themes have risen alongside environmental sustainability. This trend

is consistent with the findings of Aliyah et al. [81], who observed an upward trajectory in sustainability-related comments in green hotels. In this context, it is essential to regularly analyze guests' evolving perceptions of sustainability and the changing trends within the sector so that hotel management can align their strategic planning, service development, and communication policies with current expectations. On the other hand, the periodic increase in sub-themes related to dissatisfaction and distrust toward sustainability practices indicates, as emphasized by Lv et al. [79], that greenwashing perceptions remain a persistent risk for sustainable hotels and, as noted by Ali et al. [89], that sustainability initiatives can sometimes have a negative impact on customer satisfaction. To minimize these risks, sustainable hotels should communicate their initiatives transparently and directly to guests, systematically promote awareness-raising and educational programs, and turn guests into active participants in the sustainability process. Moreover, strengthening engagement with different guest segments through communication strategies tailored to demographic and sociocultural variables is recommended.

The thematic analysis of intrinsic and extrinsic cues shows that user reviews tend to evaluate both service quality and sustainability practices primarily through intrinsic cues. These findings support Kim & Kim [13] and Zhang & Kim [14], who found that service quality is shaped by directly experienced tangible indicators such as staff, room/facility amenities and food and beverage. However, the fact that external cues also show a relatively high proportional distribution in similar sub-themes indicates that these cues play a supportive role in guest satisfaction. This is consistent with Hossain et al. [34], who highlighted the complementary influence of intrinsic and extrinsic cues in the evaluation of accommodation facilities. In this context, sustainable hotels should not only strengthen the tangible service-quality elements that shape intrinsic cues, but also manage extrinsic cues—such as user reviews, certifications, hotel photographs and videos—effectively within their strategic communication policies. A similar pattern is observed for sustainability practices: reviews are largely structured around intrinsic cues relating to nature-based accommodation and eco-luxury experiences. The finding that extrinsic factors play a more limited role in these evaluations is in line with Aliyah et al. [81] and Pacheco et al. [28], who reported that sustainability-related guest comments are predominantly based on personal experiences. At the same time, the prominent position of nature-based accommodation among extrinsic cues suggests, as emphasized by Feng et al. [35], that other guests' reviews can meaningfully influence booking decisions. Accordingly, it is recommended that sustainable hotels manage external cues such as green certifications, destination image, visual materials and user reviews as part of an integrated sustainability communication strategy.

The sentiment analysis indicates that user reviews overall exhibit a positive emotional tone and that guest satisfaction is high. Negative reviews form a more heterogeneous pattern and are grounded both in subjective experiences and in service shortcomings. Both positive and negative evaluations tend to focus on the same tangible service attributes, particularly staff efficiency, food and beverage quality and accommodation amenities. This supports the findings of Peres & Paladini [7], Padma & Ahn [19] and Thu [18], who showed that guest satisfaction is anchored in tangible service quality. In this regard, it is important that sustainable hotels prioritize improvements in core service quality dimensions. Given the subjective and varied structure of negative reviews, it is also recommended that hotels establish a dynamic quality management system that continuously monitors online reviews. Although comments on sustainability practices are numerically more limited than those on service quality, they too are predominantly positive in tone, suggesting, as argued by Aliyah et al. [81], that at least a subset of guests possesses a positive sustainability awareness. In this context, it is important for sustainable hotels to design communication activities within an informative, participatory and trust-based framework that raises guest

awareness and strengthens favorable perceptions. On the other hand, the fact that some negative reviews cluster around sub-themes such as “sustainability-driven customer dissatisfaction” and “nature-based accommodation” indicates, as highlighted by Ali et al. [89], that sustainability practices may constrain satisfaction for certain guests. Accordingly, it is necessary to identify sustainability-based practices that may limit customer satisfaction in hotel services and to plan improvement solutions. In addition, to maintain the balance between hotels’ sustainability values and guest experience, it is recommended to develop feedback mechanisms that measure the impact of sustainability policies and practices on guest satisfaction.

8. Conclusions and Implications

This study examined online user reviews of sustainable hotels through the lens of Cue Utilization Theory, revealing which types of cues play a stronger role in shaping guest evaluations. The primary findings show that online reviews generally carry a strongly positive emotional tone, yet intrinsic cues—such as service quality, which are directly experienced—are far more influential in shaping guest perceptions than sustainability practices. In contrast, extrinsic cues such as visual materials and sustainability certifications play a complementary role in reinforcing guest perceptions. The findings indicate that sustainability practices create a strong impression only when they are visible, experiential, and fully integrated into the overall service experience.

The secondary findings demonstrate that the factors shaping guest perceptions in the context of sustainable hospitality vary over time and according to conditions. In particular, the prominence of safety, hygiene, and social sustainability in reviews during the post-pandemic period shows that guest expectations are dynamic and that sustainability strategies must be updated in ways that are sensitive to such changes. In this regard, the results underscore the importance of giving simultaneous emphasis not only to environmental aspects but also to tangible service elements directly experienced by guests, social responsibility practices, and trust-based communication in sustainability-focused service design. The study highlights that online reviews should be systematically evaluated as a strategic source of feedback both for service improvement and for sustainability communication. In doing so, it offers a holistic contribution to the tourism and hospitality literature from both theoretical and practical standpoints.

8.1. Theoretical Implications

The Cue Utilization Theory perspective adopted in this study provides a theoretical foundation for understanding which cues and themes exert stronger effects on guest perceptions in online evaluations of sustainable hotels—an area that remains limited in the existing literature—and serves as a guide for future research. The findings demonstrate that guests prioritize tangible and directly experienced cues in their evaluations, thereby revealing a concrete pattern that demonstrates the theory’s applicability within the hospitality sector. Furthermore, the prominence of certain themes during periods such as the pandemic draws attention to the dynamic nature of cues and creates opportunities to examine the theory in temporal contexts. In this regard, the study is expected to offer a valuable theoretical framework for future research that compares intrinsic and extrinsic cues across different destination types, cultural contexts, and digital platforms.

8.2. Practical Implications

The findings of the research offer significant practical implications for sustainable hotels aiming to improve strategic management and communication practices. Since service quality

is the primary determinant of guest satisfaction, hotels must prioritize improving processes related to staff efficiency, food and beverage quality, and accommodation amenities.

To increase guest awareness of sustainability practices, these initiatives should be made visible, measurable, and experienceable. To reduce perceptions of greenwashing, it is essential to communicate sustainability efforts transparently and to consistently manage extrinsic cues such as user reviews and visual materials.

The findings also show that guest expectations change during crisis periods such as the pandemic. This situation highlights the importance of hotel resilience and indicates that communication and service policies must be structured in a way that preserves sustainability values while adapting to changing conditions. Accordingly, hotel managers should strategically employ both intrinsic and extrinsic cues to integrate sustainability messages into the guest experience, thereby both enhancing customer satisfaction and strengthening the perceived value of sustainability practices. Moreover, considering that the emotional tone of reviews overwhelmingly reflects service-quality-based factors, sustainability initiatives and related communication activities should be designed in alignment with the positive emotions generated by service quality and in ways that foster a similar emotional connection.

8.3. Limitations and Future Research

This research has certain limitations. Since the analysis was conducted on a single online platform, the findings may not be generalizable to all digital environments or cultural contexts. Sentiment analysis may limit the contextual depth of reviews, and differences may exist between users' actual behaviors and the content of their reviews.

Future studies may conduct comparative analyses of intrinsic and extrinsic cues across different platforms and destination types. Guest awareness of sustainability and perceptions of green hotels may be tested through experimental designs. The influence of cultural differences, demographic characteristics, and motivational factors on cue utilization may be examined in greater depth.

In light of these limitations, the study provides an important starting point for future research aiming to understand the relationship between sustainable hotels, consumer behavior, and online evaluations.

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References

1. Ert, E.; Fleischer, A. Mere position effect in booking hotels online. *J. Travel Res.* **2016**, *55*, 311–321. [CrossRef]
2. Kunst. Sources of Information about Products in the U.S. 2025. Statista. Available online: <https://www.statista.com/forecasts/997051/sources-of-information-about-products-in-the-us> (accessed on 5 November 2025).

3. Shin, S.; Chung, N.; Xiang, Z.; Koo, C. Assessing the impact of textual content concreteness on helpfulness in online travel reviews. *J. Travel Res.* **2018**, *58*, 579–593. [CrossRef]
4. Bigné, E.; William, E.; Soria-Olivas, E. Similarity and consistency in hotel online ratings across platforms. *J. Travel Res.* **2019**, *59*, 742–758. [CrossRef]
5. Szybillo, G.J.; Jacoby, J. Intrinsic versus extrinsic cues as determinants of perceived product quality. *J. Appl. Psychol.* **1974**, *59*, 74–78. [CrossRef]
6. Miyazaki, A.D.; Grewal, D.; Goodstein, R.C. The effect of multiple extrinsic cues on quality perceptions: A matter of consistency. *J. Consum. Res.* **2005**, *32*, 146–153. [CrossRef]
7. Kaveski Peres, C.; Pacheco Paladini, E. Exploring the attributes of hotel service quality in Florianópolis-SC, Brazil: An analysis of tripadvisor reviews. *Cogent Bus. Manag.* **2021**, *8*, 1926211. [CrossRef]
8. Kalnaovakul, K.; Promsivapallop, P. Hotel service quality dimensions and attributes: An analysis of online hotel customer reviews. *Tour. Hosp. Res.* **2023**, *23*, 420–440. [CrossRef]
9. Ban, H.-J.; Choi, H.; Choi, E.-K.; Lee, S.; Kim, H.-S. Investigating key attributes in experience and satisfaction of hotel customer using online review data. *Sustainability* **2019**, *11*, 6570. [CrossRef]
10. Suvachart, N. Content analysis for promoting accommodation services business. *KKBS J. Bus. Adm. Account.* **2021**, *5*, 1–20.
11. Lee, C.K.H.; Tse, Y.K.; Zhang, M.; Ma, J. Analysing online reviews to investigate customer behaviour in the sharing economy: The case of Airbnb. *Inf. Technol. People* **2020**, *33*, 945–961. [CrossRef]
12. Chittiprolu, V.; Samala, N.; Bellamkonda, R.S. Heritage hotels and customer experience: A text mining analysis of online reviews. *Int. J. Cult. Tour. Hosp. Res.* **2021**, *15*, 131–156. [CrossRef]
13. Kim, Y.-J.; Kim, H.-S. The impact of hotel customer experience on customer satisfaction through online reviews. *Sustainability* **2022**, *14*, 848. [CrossRef]
14. Zhang, X.; Kim, H.-S. Customer experience and satisfaction of disneyland hotel through big data analysis of online customer reviews. *Sustainability* **2021**, *13*, 12699. [CrossRef]
15. Choi, T.Y.; Chu, R. Determinants of hotel guests' satisfaction and repeat patronage in the Hong Kong hotel industry. *Int. J. Hosp. Manag.* **2001**, *20*, 277–297. [CrossRef]
16. Magnini, V.P.; Crotts, J.C.; Zehrer, A. Understanding customer delight: An application of travel blog analysis. *J. Travel Res.* **2011**, *50*, 535–545. [CrossRef]
17. Zhou, L.; Ye, S.; Pearce, P.L.; Wu, M.-Y. Refreshing hotel satisfaction studies by reconfiguring customer review data. *Int. J. Hosp. Manag.* **2014**, *38*, 1–10. [CrossRef]
18. Thu, H.N.T. Measuring guest satisfaction from online reviews: Evidence in Vietnam. *Cogent Soc. Sci.* **2020**, *6*, 1801117. [CrossRef]
19. Padma, P.; Ahn, J. Guest satisfaction & dissatisfaction in luxury hotels: An application of big data. *Int. J. Hosp. Manag.* **2020**, *84*, 102318. [CrossRef]
20. Xu, J.; Wang, X.; Zhang, J.; Huang, S.S.; Lu, X. Explaining customer satisfaction via hotel reviews: A comparison between pre- and post-COVID-19 reviews. *J. Hosp. Tour. Manag.* **2022**, *53*, 208–213. [CrossRef]
21. Chua, A.Y.K.; Banerjee, S. *Reliability of Reviews on the Internet: The Case of Tripadvisor*; World Congress on Engineering and Computer Science: San Francisco, CA, USA, 2013.
22. Fong, L.H.N.; Lei, S.S.I.; Law, R. Asymmetry of hotel ratings on tripadvisor: Evidence from single- versus dual-valence reviews. *J. Hosp. Mark. Manag.* **2017**, *26*, 67–82. [CrossRef]
23. Ma, S.; Kirilenko, A. How Reliable is Social Media Data? Validation of Tripadvisor Tourism Visitations Using Independent Data Sources. In *Information and Communication Technologies in Tourism 2021*; Wörndl, W., Koo, C., Stienmetz, J.L., Eds.; Springer: Cham, Switzerland, 2021; pp. 286–293. [CrossRef]
24. Atabay, L.; Çizel, B. Comparative content analysis of hotel reviews by mass tourism destination. *J. Tour. Serv.* **2020**, *11*, 147–166. [CrossRef]
25. Le, H.T.M.; Phan-Thi, T.-A.; Nguyen, B.T.; Nguyen, T.Q. Mining online hotel reviews using big data and machine learning: An empirical study from an emerging country. *Ann. Tour. Res. Empir. Insights* **2025**, *6*, 100170. [CrossRef]
26. Rita, P.; Ramos, R.; Borges-Tiago, M.T.; Rodrigues, D. Impact of the rating system on sentiment and tone of voice: A booking.com and tripadvisor comparison study. *Int. J. Hosp. Manag.* **2022**, *104*, 103245. [CrossRef]
27. Brochado, A.; Pereira, C. Comfortable experiences in nature accommodation: Perceived service quality in glamping. *J. Outdoor Recreat. Tour.* **2017**, *17*, 77–83. [CrossRef]
28. Pacheco, L.; Ramazanov, M.; Carvalho, J.M.S.; Nogueira, S.; Durão, M. How do guests evaluate eco-certified hotels? An analysis of guests' reviews of Portuguese hotels. *Tour. Hosp. Res.* **2024**, 14673584241264776. [CrossRef]
29. Yi, S.; Li, X.; Jai, T.-M. Hotel guests' perception of best green practices: A content analysis of online reviews. *Tour. Hosp. Res.* **2018**, *18*, 191–202. [CrossRef]
30. Brazyté, K.; Weber, F.; Schaffner, D. Sustainability management of hotels: How do customers respond in online reviews? *J. Qual. Assur. Hosp. Tour.* **2016**, *18*, 282–307. [CrossRef]

31. Robinot, E.; Giannelloni, J.-L. Do hotels' "green" attributes contribute to customer satisfaction? *J. Serv. Mark.* **2010**, *24*, 157–169. [CrossRef]
32. Berezan, O.; Raab, C.; Yoo, M.; Love, C. Sustainable hotel practices and nationality: The impact on guest satisfaction and guest intention to return. *Int. J. Hosp. Manag.* **2013**, *34*, 227–233. [CrossRef]
33. Ríos-Martín, M.Á.; Folgado-Fernández, J.A.; Palos-Sánchez, P.R.; Castejón-Jiménez, P. The impact of the environmental quality of online feedback and satisfaction when exploring the critical factors for luxury hotels. *Sustainability* **2019**, *12*, 299. [CrossRef]
34. Hossain, M.E.; Quaddus, M.; Shanka, T. Effects of intrinsic and extrinsic quality cues and perceived risk on visitors' satisfaction and loyalty. *J. Qual. Assur. Hosp. Tour.* **2015**, *16*, 119–140. [CrossRef]
35. Feng, Y.; Cao, W.; Shin, G.C.; Yoon, Y. The external effect of international tourism on brand equity development process of multinational firms (MNFs). *J. Brand Manag.* **2021**, *28*, 578–595. [CrossRef]
36. Phillips, P.; Barnes, S.; Zigan, K.; Schegg, R. Understanding the impact of online reviews on hotel performance: An empirical analysis. *J. Travel Res.* **2016**, *56*, 235–249. [CrossRef]
37. Oduro, S.; De Nisco, A.; Petruzzellis, L. Country-of-origin image and consumer brand evaluation: A meta-analytic review. *J. Prod. Brand Manag.* **2023**, *33*, 108–124. [CrossRef]
38. Cox, D.F. The Sorting Rule Model of the Consumer Product Evaluation Process. In *Risk Taking and Information Handling in Consumer Behavior*; Graduate School of Business Administration, Harvard University: Boston, MA, USA, 1967; pp. 324–369.
39. Olson, J.C. Cue Utilization in the Quality Perception Process: A Cognitive Model and an Empirical Test. Ph.D. Thesis, Purdue University, West Lafayette, IN, USA, 1972; pp. 1–207.
40. Stumpf, S.A.; Chaudhry, P.E.; Perretta, L. Fake: Can business stanch the flow of counterfeit products? *J. Bus. Strategy* **2011**, *32*, 4–12. [CrossRef]
41. Langan, R.; Besharat, A.; Varki, S. The effect of review valence and variance on product evaluations: An examination of intrinsic and extrinsic cues. *Int. J. Res. Mark.* **2017**, *34*, 414–429. [CrossRef]
42. Akdeniz, B.; Calantone, R.J.; Voorhees, C.M. Effectiveness of marketing cues on consumer perceptions of quality: The moderating roles of brand reputation and third-party information. *Psychol. Mark.* **2013**, *30*, 76–89. [CrossRef]
43. Pop, R.-A.; Săplăcan, Z.; Dabija, D.-C.; Alt, M.-A. The impact of social media influencers on travel decisions: The role of trust in consumer decision journey. *Curr. Issues Tour.* **2021**, *25*, 823–843. [CrossRef]
44. Assaker, G.; O'Connor, P. eWOM platforms in moderating the relationships between political and terrorism risk, destination image, and travel intent: The case of Lebanon. *J. Travel Res.* **2020**, *60*, 503–519. [CrossRef]
45. Zhang, J.; Zheng, W.; Wang, S. The study of the effect of online review on purchase behavior: Comparing the two research methods. *Int. J. Crowd Sci.* **2020**, *4*, 73–86. [CrossRef]
46. Liu, Z.; Lei, S.; Guo, Y.; Zhou, Z. The interaction effect of online review language style and product type on consumers' purchase intentions. *Palgrave Commun.* **2020**, *6*, 11. [CrossRef]
47. Ananda, P.D.V.; Yasa, N.N.K.; Ekawati, N.W.; Warmika, I.G.K. Online customer review, online customer rating, and payment guarantee influence on purchase intention. *J. Ekon. Bisnis Jagaditha* **2023**, *10*, 125–133. [CrossRef]
48. Hasrul, A.F.; Suharyati, S.; Sembiring, R. Analisis pengaruh online customer review dan rating terhadap minat beli produk elektronik di tokopedia. In Proceedings of the Konferensi Riset Nasional Ekonomi Manajemen dan Akuntansi, Jakarta, Indonesia, 12–13 August 2021; Volume 2.
49. Zheng, D.; Luo, Q.; Ritchie, B.W. The role of trust in mitigating perceived threat, fear, and travel avoidance after a pandemic outbreak: A multigroup analysis. *J. Travel Res.* **2021**, *61*, 581–596. [CrossRef]
50. Filieri, R. What makes online reviews helpful? A diagnosticity-adoption framework to explain informational and normative influences in e-WOM. *J. Bus. Res.* **2015**, *68*, 1261–1270. [CrossRef]
51. Xu, X.; Pratt, S. Social media influencers as endorsers to promote travel destinations: An application of self-congruence theory to the Chinese generation Y. *J. Travel Tour. Mark.* **2018**, *35*, 958–972. [CrossRef]
52. Murphy, R. Local Consumer Review Survey: How Customer Reviews Affect Behavior. BrightLocal. Available online: <https://www.brightlocal.com/research/local-consumer-review-survey/> (accessed on 13 November 2025).
53. Faridah, N.; Julius, A.; Gracious Kaazara, A. An evaluation of the effects of advertising on consumer brand awareness in an organization, a case study of Mukwano Group of Companies. *Int. J. Acad. Pedagog. Res.* **2023**, *7*, 206–212.
54. Christopher, T.; Mackline, N.; Prudence, K.; Paschal, T.; Nelson, A.; Christopher, F. Financial distress among manufacturing companies in Uganda. *Int. J. Acad. Multidiscip. Res.* **2022**, *6*, 104–110.
55. Manning, T. Indicators of tourism sustainability. *Tour. Manag.* **1999**, *20*, 179–181. [CrossRef]
56. Lu, J.; Nepal, S.K. Sustainable tourism research: An analysis of papers published in the journal of sustainable tourism. *J. Sustain. Tour.* **2009**, *17*, 5–16. [CrossRef]
57. Mondal, S.; Samaddar, K. Responsible tourism towards sustainable development: Literature review and research agenda. *Asia Pac. Bus. Rev.* **2021**, *27*, 229–266. [CrossRef]

58. Peng, X.; Wang, H.; Fang, P.; Song, W.; Zhou, D. Mapping progress in hospitality CSR research: A bibliometric review from 2006 to 2023. *J. Hosp. Tour. Manag.* **2023**, *57*, 284–302. [CrossRef]
59. Clarke, J. A Framework of approaches to sustainable tourism. *J. Sustain. Tour.* **1997**, *5*, 224–233. [CrossRef]
60. Hashemkhani Zolfani, S.; Sedaghat, M.; Maknoon, R.; Zavadskas, E.K. Sustainable tourism: A comprehensive literature review on frameworks and applications. *Econ. Res. Ekon. Istraživanja* **2015**, *28*, 1–30. [CrossRef]
61. Yfantidou, G.; Matarazzo, M. The future of sustainable tourism in developing countries. *Sustain. Dev.* **2017**, *25*, 459–466. [CrossRef]
62. Liu, C.-H.; Tzeng, G.-H.; Lee, M.-H.; Lee, P.-Y. Improving metro–airport connection service for tourism development: Using hybrid MCDM models. *Tour. Manag. Perspect.* **2013**, *6*, 95–107. [CrossRef]
63. Nurjaya, I.N. Global principles of sustainable tourism development ecological, economic and cultural. *Sociol. Jurisprud. J.* **2022**, *5*, 97–106. [CrossRef]
64. Butowski, L. Sustainable tourism: A human-centered approach. *Sustainability* **2021**, *13*, 1835. [CrossRef]
65. Jitmaneeroj, B. Reform priorities for corporate sustainability: Environmental, social, governance, or economic performance? *Manag. Decis.* **2016**, *54*, 1497–1521. [CrossRef]
66. Niavis, S.; Papatheochari, T.; Psycharis, Y.; Rodriguez, J.; Font, X.; Martinez Codina, A. Conceptualising tourism sustainability and operationalising its assessment: Evidence from a mediterranean community of projects. *Sustainability* **2019**, *11*, 4042. [CrossRef]
67. Ali, B.J.; Gardi, B.; Jabbar Othman, B.; Ali Ahmed, S.; Burhan Ismael, N.; Abdalla Hamza, P.; Mahmood Aziz, H.; Sabir, B.Y.; Sorguli, S.; Anwar, G. Hotel service quality: The impact of service quality on customer satisfaction in hospitality. *Int. J. Eng. Bus. Manag.* **2021**, *5*, 14–28. [CrossRef]
68. Top, C.; Ali, B.J. Customer satisfaction in online meeting platforms: Impact of efficiency, fulfillment, system availability, and privacy. *Amazon. Investig.* **2021**, *10*, 70–81. [CrossRef]
69. Marković, S.; Raspor Janković, S. Exploring the relationship between service quality and customer satisfaction in croatian hotel industry. *Tour. Hosp. Manag.* **2013**, *19*, 149–164. [CrossRef]
70. Rao, P.S.; Sahu, P.C. Impact of service quality on customer satisfaction in hotel industry. *J. Humanit. Soc. Sci.* **2013**, *18*, 39–44. [CrossRef]
71. Kim, B.; Kim, S.; Heo, C.Y. Analysis of satisfiers and dissatisfiers in online hotel reviews on social media. *Int. J. Contemp. Hosp. Manag.* **2016**, *28*, 1915–1936. [CrossRef]
72. Lei, S.S.I.; Wang, D.; Fong, L.H.N.; Ye, S. Recipe for perceived personalization in hotels. *Tour. Manag.* **2024**, *100*, 104818. [CrossRef]
73. Jayawardena, C.; Pollard, A.; Chort, V.; Choi, C.; Kibicho, W. Trends and sustainability in the Canadian tourism and hospitality industry. *Worldw. Hosp. Tour. Themes* **2013**, *5*, 132–150. [CrossRef]
74. Moise, M.-S.; Gil-Saura, I.; Ruiz-Molina, M.-E. Effects of green practices on guest satisfaction and loyalty. *Eur. J. Tour. Res.* **2018**, *20*, 92–104. [CrossRef]
75. Chang, R.; Chanda, R.C.; Vafaei-Zadeh, A.; Hanifah, H.; Gui, A. Assessing green practices on eco-friendly hotel customer loyalty: A partial least squares structural equation modeling and fuzzy-set qualitative comparative analysis hybrid approach. *Sustainability* **2024**, *16*, 3834. [CrossRef]
76. Gerdt, S.-O.; Wagner, E.; Schewe, G. The relationship between sustainability and customer satisfaction in hospitality: An explorative investigation using eWOM as a data source. *Tour. Manag.* **2019**, *74*, 155–172. [CrossRef]
77. Galati, A.; Thrassou, A.; Christofi, M.; Vrontis, D.; Migliore, G. Exploring travelers' willingness to pay for green hotels in the digital era. *J. Sustain. Tour.* **2023**, *31*, 2546–2563. [CrossRef]
78. Moreno Brito, Y.L.; Ban, H.-J.; Kim, H.-S. Ecological hotels' customer satisfaction through text mining of online reviews: A case of ecuador hotels. *J. Hosp. Tour. Insights* **2024**, *7*, 1532–1552. [CrossRef]
79. Lv, L.; Liu, G.G.; Zhou, W.; Yu, J.J. Morality or hypocrisy: The effect of hotel sustainability labels varies across different online review valence. *Int. J. Hosp. Manag.* **2024**, *122*, 103838. [CrossRef]
80. Yoon, D.; Chen, R.J.C. A Green shadow: The influence of hotel customers' environmental knowledge and concern on green marketing skepticism and behavioral intentions. *Tour. Anal.* **2017**, *22*, 281–293. [CrossRef]
81. Aliyah, U.; Williady, A.; Kim, H.-S. An evaluation of green hotels in Singapore, Sentosa Island: A big data Study through online review. *Tour. Hosp.* **2025**, *6*, 24. [CrossRef]
82. Li, H.; Ye, Q.; Law, R. Determinants of customer satisfaction in the hotel industry: An application of online review analysis. *Asia Pac. J. Tour. Res.* **2013**, *18*, 784–802. [CrossRef]
83. Krippendorff, K. *Content Analysis: An Introduction to Its Methodology*, 3rd ed.; SAGE Publications: Thousand Oaks, CA, USA, 2012.
84. Brochado, A.; Brochado, F. What makes a glamping experience great? *J. Hosp. Tour. Technol.* **2019**, *10*, 15–27. [CrossRef]
85. Chan, E.S.W.; Lam, D. Hotel safety and security systems: Bridging the gap between managers and guests. *Int. J. Hosp. Manag.* **2013**, *32*, 202–216. [CrossRef]
86. Park, E.; Chae, B.; Kwon, J.; Kim, W.-H. The effects of green restaurant attributes on customer satisfaction using the structural topic model on online customer reviews. *Sustainability* **2020**, *12*, 2843. [CrossRef]

87. Kunz, J.; May, S.; Schmidt, H.J. Sustainable luxury: Current status and perspectives for future research. *Bus. Res.* **2020**, *13*, 541–601. [CrossRef]
88. Šimková, E.; Kořínková, B.; Obršálová, K. Environmental education of tourists for sustainable tourism development. *Czech J. Tour.* **2023**, *12*, 1–19. [CrossRef]
89. Ali, U.; Arasli, H.; Arasli, F.; Saydam, M.B.; Capkiner, E.; Aksoy, E.; Atai, G. Determinants and impacts of quality attributes on guest perceptions in Norwegian green hotels. *Sustainability* **2023**, *15*, 5512. [CrossRef]
90. Chen, H.; Bernard, S.; Rahman, I. Greenwashing in hotels: A structural model of trust and behavioral intentions. *J. Clean. Prod.* **2019**, *206*, 326–335. [CrossRef]
91. UN Tourism. UN Tourism World Tourism Barometer Global Tourism Statistics. UN Tourism. Available online: <https://www.untourism.int/un-tourism-world-tourism-barometer-data> (accessed on 17 December 2025).
92. Cheng, M.; Jin, X. What do airbnb users care about? An analysis of online review comments. *Int. J. Hosp. Manag.* **2019**, *76*, 58–70. [CrossRef]
93. Saydam, M.B.; Borzyszkowski, J.; Karatepe, O.M. An exploration of employees' experiences of online food delivery: Evidence from employee reviews. *Int. J. Contemp. Hosp. Manag.* **2024**, *36*, 2909–2931. [CrossRef]
94. Rosa-Sorlozano, C.; Candel-Mora, M.Á. Machine translation of tourism reviews: Quality assessment and localization. *Transl. Translanguaging Multiling. Contexts* **2025**, *11*, 48–64. [CrossRef]
95. Koka, N.A.; Akan, F.; Ibrahim Kana'n, B.H.; Khan, M.R.; Zulfiquar, F.; Jan, N. Impact of artificial intelligence (AI) on translation quality: Assessment and evaluation. *J. Southwest Jiaotong Univ.* **2023**, *58*, 907–918. [CrossRef]
96. Popovic, M.; Lapshinova-Koltunski, E.; Koponen, M. Effects of Different Types of Noise in User-Generated Reviews on Human and Machine Translations Including ChatGPT. In *Proceedings of the Ninth Workshop on Noisy and User-Generated Text (W-NUT 2024)*; San Giljan, Malta, 22 March 2024; van der Goot, R., Bak, J., Müller-Eberstein, M., Xu, W., Ritter, A., Baldwin, T., Eds.; Association for Computational Linguistics: San Giljan, Malta, 2024; pp. 17–30.
97. Cascio, M.A.; Lee, E.; Vaudrin, N.; Freedman, D.A. A Team-based approach to open coding: Considerations for creating intercoder consensus. *Field Methods* **2019**, *31*, 116–130. [CrossRef]
98. Miles, M.B.; Huberman, A.M. *Qualitative Data Analysis: An Expanded Sourcebook*, 2nd ed.; Sage Publications: Thousand Oaks, CA, USA, 1994; 338p.
99. Campbell, J.L.; Quincy, C.; Osserman, J.; Pedersen, O.K. Coding in-depth semistructured interviews: Problems of unitization and intercoder reliability and agreement. *Sociol. Methods Res.* **2013**, *42*, 294–320. [CrossRef]
100. Guba, E.G. Criteria for assessing the trustworthiness of naturalistic inquiries. *ECTJ* **1981**, *29*, 75–91. [CrossRef]
101. Lacy, S.; Riffe, D. Sampling error and selecting intercoder reliability samples for nominal content categories. *Journal. Mass Commun. Q.* **1996**, *73*, 963–973. [CrossRef]
102. Jang, S.; Liu, T.; Kang, J.H.; Yang, H. Understanding important hotel attributes from the consumer perspective over time. *Australas. Mark. J.* **2018**, *26*, 23–30. [CrossRef]
103. Cenni, I. Sharing travel experiences on tripadvisor: A genre analysis of negative hotel reviews written in French, Spanish and Italian. *J. Pragmat.* **2024**, *221*, 76–88. [CrossRef]

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Article

Sustainable Disorder: The Hybrid Logic of “Sense of Place” Construction in Tourist Spaces—A Case Study of Harbin Morning Market

Yujia Guo ¹, Zengyu Li ² and Xuhua Chen ^{1,*}¹ Department of Sociology, Harbin Institute of Technology, Harbin 150001, China; 2022113272@stu.hit.edu.cn² School of Social Development and Public Policy, Fudan University, Shanghai 200032, China; 25110730040@m.fudan.edu.cn

* Correspondence: chenxuhua@hit.edu.cn

Abstract

Taking Harbin morning market as a case study, this study explores sustainable production schemes for generating sense of place in urban spaces amid the trend of modernization. Employing grounded theory, it develops an analytical model consisting of three components: space, humans, and materials. The findings reveal that place identity emerges from functional redundancy and self-organizing spatial layouts, where the hybrid logic of spatial design, the non-programmed interactions of human actors, and the material networks together enable tourists to transform from spectators into embodied participants. Theoretically, this study proposes a hybrid logic and challenges high modernism. It emphasizes that fully mobilizing the spontaneous vitality of every actor in the space is more effective than unilaterally improving rules and functions, offering a sustainable path for nurturing localized cultural ecosystems against homogenization.

Keywords: high modernism; sense of place; hybrid logic; grounded theory

1. Introduction

In the context of modernization and globalization, the dissolution and reconstruction of local identity have emerged as central concerns in tourism sociology research, with the sustainable development of regional culture and tourism spaces being a key objective of this field. Contemporary urban development, driven by functionalist and efficiency-oriented logics, often pursues “pure and orderly” urban landscapes through spatial compartmentalization and regulated governance. This approach has led to the submersion of local cultural symbols under standardized and homogenized frameworks, resulting in a nationwide crisis of “indistinguishable streetscapes” in tourist destinations. Commercialization has encroached excessively on cultural spaces, reducing tourist experiences to mere commodity consumption rather than profound engagements with regional heritage. Against this backdrop, the morning market culture in Harbin, Heilongjiang Province, has emerged as a countercurrent, exemplifying the reconstruction of a sense of place.

According to a survey conducted by the Heilongjiang Provincial Bureau of Statistics on over 200 key tourism projects in the province involving nearly 40,000 business entities during the 2025 ice–snow tourism season, Harbin received 90.357 million tourist visits, generating CYN 137.22 billion in revenue, marking year-on-year increases of 9.7% and 16.6% compared to the previous two years. These survey data are mainly calculated based on the daily passenger flow and consumption volume of each business entity [1,2].

Notably, grassroot spaces like Hongzhuan Street Morning Market have become viral attractions, celebrated for their “everyday vitality” and “human warmth.” Tourists no longer settle for passive “spectatorial gazing” through glass partitions but instead seek immersive interactions in authentic urban real-life worlds, craving tactile encounters with the city’s lived textures [3]. This phenomenon not only reflects a paradigm shift in tourist attractions—from “landscape consumption” to “lived experience”—but also unveils the dynamic negotiation between tradition and modernity in constructing place identity. The entrance map of Hongzhuan Street Morning Market is shown in Figure 1.



Figure 1. The entrance of Hongzhuan Street Morning Market.

The cultural tourism transformation of Harbin’s morning markets epitomizes a tactical expression of locality under modernizing pressures. Through policies such as the Harbin Municipal Policies on Boosting Development Confidence and Promoting Comprehensive Economic Recovery and Improvement, the municipal government has strategically endorsed “disorderly” spaces like morning and night markets as urban cultural icons, balancing livelihood preservation with economic revitalization [4,5]. By integrating localized symbolic practices with institutional governance, Hongzhuan Street Morning Market has been reconfigured into an affective arena fostering socio-spatial bonds [6]. As scholars such as Sun Jiuxia have pointed out, the construction of locality, informal order, and negotiation among multiple subjects in tourist sites has contributed to the success of Harbin’s tourism industry [7]. Wang Shusheng also argues that the development of the emotional value of the “hospitality” folk custom is of great significance in tourism development [8]. Wen Xin also took the tourism industries of Harbin, Zibo, and other places as examples, and summarized the importance of embodied experience and non-institutionalized environments [9]. These consensus indicate that this hybrid space simultaneously satisfies tourists’ quest for “authenticity” and sustains the city’s distinctive local nature, forming a sustainable reproductive structure of “cultural performance–spatial construction–economic development.”

Therefore, taking Harbin’s morning markets as an entry point, this study attempts to propose a theoretical framework of “postmodern locality production.” It explores how

urban neighborhoods can resist the risk of locality dissolution under the trend of modernization through multiple dimensions, including space, human actors, and non-human actors. Furthermore, it reveals the dynamic negotiation mechanism between tradition and modernity in the construction of a sense of place, aiming to provide a new path for the preservation of locality in the process of global urbanization.

2. Literature Review

2.1. High Modernism and the Erosion of Locality in Tourism

High modernism, as the ideological core of modern social engineering, seeks to construct a myth of linear progress through the absolutization of technological rationality. As James C. Scott notes in *Seeing Like a State*, “High Modernism is best conceived as a strong, one might even say muscle-bound, version of the self-confidence about scientific and technical progress, the expansion of production, the growing satisfaction of human needs, the mastery of nature (including human nature), and above all, the rational design of social order” [10]. High modernism dismisses local practices as “disordered chaos,” attempting to erase the organic nature of place-based cultures through functional zoning and spatial discipline, ultimately leading to the alienation and dissolution of locality. In tourism, this manifests as the instrumental transformation of local cultures. On one hand, functional zoning logic reduces place-based cultures to quantifiable “traditionality concentration” metrics, fabricating essentialist cultural imaginaries [11]. On the other hand, informal urban landscapes like markets and street vendors are deemed “misplaced existences,” subjected to a spatial discipline that strips them of cultural significance [12]. Consequently, local cultures are fragmented into modularized consumption experiences, and their authenticity is dismembered by technocratic governance, culminating in homogenized tourism spaces [13].

Existing studies under the high modernist paradigm primarily follow three interventions: First is the exclusion of “disordered” urban spaces through rigid functional zoning. For instance, Huang Gengzhi and Xue Desheng’s study on Guangzhou’s street vendor governance reveals how “vending zones” compress mobile vendors into surveilled administrative units [14]. Sun Zhijian advocates “strategic, politicized, and rule-based governance” to phase out informal vendors [15], while Zhuo Chengxia and Guo Caiqin critique such practices as reducing grassroot life into “standardized modules” compliant with modernist urban esthetics, erasing their organic cultural networks [16].

Second is the overemphasis on technological solutions in tourism development. Chen Rong argues that modern technologies expand tourism markets but threaten traditional landscapes [17]. Li Jingyi et al. critique the techno-fetishism in “smart tourism,” highlighting how reliance on systemic technologies formats cultural ecosystems [18]. Such contradictions expose tourism’s modernist project as simplifying cultural complexity into governable objects [19].

Third, the fusion of high modernism with linear historiography reinforces a “traditional-modern” binary, polarizing landscape production. Jiang Keke and Xiong Zhengxian’s study on cultural tourism towns highlights developers simplifying rural cultures into homogenized “pastoral fantasies” for urban consumers [20]. Guo Weifeng critiques modernity’s “rational gaze” disciplining landscapes into commodified stereotypes [21], while Peng Dan and Huang Yanting attribute Lijiang Ancient Town’s loss of authenticity to excessive commercialization and formulaic development [22].

2.2. Theoretical Pathways for Reconstructing a Sense of Place

The concept of sense of place originates from human geography’s philosophical distinction between “space” and “place.” Yi-Fu Tuan, in *Space and Place*, defines “space” as a

neutral physical arena and “place” as a geographical unit imbued with human emotion, memory, and practice—a “center of meaning” [23]. Edward Relph’s authentic sense of place theory emphasizes the stability of place identity, contingent on the continuity of material landscapes, social relations, and cultural traditions [24]. Clifford Geertz’s local knowledge framework posits that place-specific cognitive systems are shaped by long-term environmental and socio-structural interactions, characterized by situatedness (embeddedness in context), non-universality (heterogeneous experience), and embodied praxis (knowledge reproduction through daily acts) [25]. Traditional theories assume that place identity relies on the sustained reproduction of local knowledge via community participation, oral traditions, and material preservation.

To counter tourism’s homogenization crisis, scholars propose reconstructing a sense of place through three pathways: First is narrative reconstruction via media. Tang Shunying and Zhou Shangyi argue that travel guides and blogs reinforce tourists’ cognitive and emotional engagement with cultural symbols across pre-trip anticipation, on-site experience, and post-trip reflection [26]. Gao Caixia et al. demonstrate how digital media transforms locality into communicable symbols, forging “imagined communities” among tourists [27]. Qi Yuan similarly highlights the media’s role in shaping tourists’ place perceptions [28]. Second is destination image design. Shaykh-Baygloo Raana’s study on Shiraz, Iran, proves that attraction quality strengthens place attachment through visual, functional, and affective dimensions [29]. Wen Yongwei advocates blending historical memory with contemporary practices in red tourism to achieve “traditional-modern” equilibrium [30]. Tang Wenyue and Zhang Ji measured tourists’ place identity in Jiuzhaigou, identifying natural landscapes as the primary affective driver [31]. Third is embodied place-making. Zeng Li, Gao Quan, and Chen Xiaoliang propose “embodied reconstruction,” where physical acts like walking and handicrafts internalize cultural memory [32]. Gao Yuhong and Xiang Lanlin find that traditional village homestays activate multisensory interactions to align with local aesthetics [33]. Wang Le and Zhang Ying’s study on Shaanxi’s Yuanjia Village shows how immersive experiences foster holistic cultural engagement and collective identity [34].

2.3. Morning Markets as Informal Spaces for Place Identity Generation

As informal economic spaces, morning markets create unique spatial narratives through ritualized performances of daily life. These vernacular spaces defy functionalist urban planning, carving elastic cultural fields within modernist efficiency regimes.

Current research identifies three mechanisms for place identity generation in morning markets: First, spatial reappropriation by mobile vendors transforms transit zones into hybrid spaces of commerce and social interaction, enriching tourist experiences [35]. Second, resistant symbolic systems—local dialects, artisanal skills, and street aesthetics—form a cultural grammar countering standardization. These multisensory symbols sustain place memory, offering tourists deeper cultural engagement beyond commodified spectacles [36,37]. Third, non-contractual vendor–customer interactions reproduce trust mechanisms rooted in local ethics. Such social networks foster tourist belonging, embedding emotional bonds within flexible spatial practices [38].

2.4. A Critical Evaluation of the Existing Literature

Existing studies, while revealing high modernism’s erosion of place identity and proposing reconstruction pathways, remain trapped in modernist paradigms. Three limitations persist: overemphasis on “participation” and “interaction” as foundational to locality, without addressing the sustainability of such processes; quantification of local knowledge—reducing place identity to calculable variables under institutional norms erodes its spontaneity; persistent social engineering logic—programmatic “orderliness”

excludes “disordered” spaces like markets, neglecting their potential as living repositories of local knowledge.

These limitations reflect a theoretical blind spot: framing place-making as an “ordering project,” while overlooking the generative value of hybridity, redundancy, and self-organization. By analyzing Harbin’s morning markets, this study demonstrates how functional hybridity and surface disorder convert “inefficient redundancy”—vilified by high modernism—into mechanisms of place uniqueness. This challenges the “order participation,” proposing that place identity can arise not only in the absence of controlled interactions, but also in conjunction with the adaptive resilience observed in seemingly disordered environments. Such insights offer a new cognitive framework for sustaining locality in global urbanization.

3. Materials and Methods

3.1. Methodology

This study employs grounded theory [39], a qualitative methodology closely aligned with sociological inquiry, to uncover fundamental social processes underlying observed phenomena. Grounded theory bridges theoretical and empirical research by suspending pre-existing frameworks, prioritizing theory generation over verification, and emphasizing sociological creativity—making it ideal for under-theorized domains like informal tourism spaces, and the specific framework is shown in Figure 2. Crucially, while this study presents its theoretical stance upfront for clarity, the research process strictly adhered to grounded theory principles, avoiding a priori assumptions.

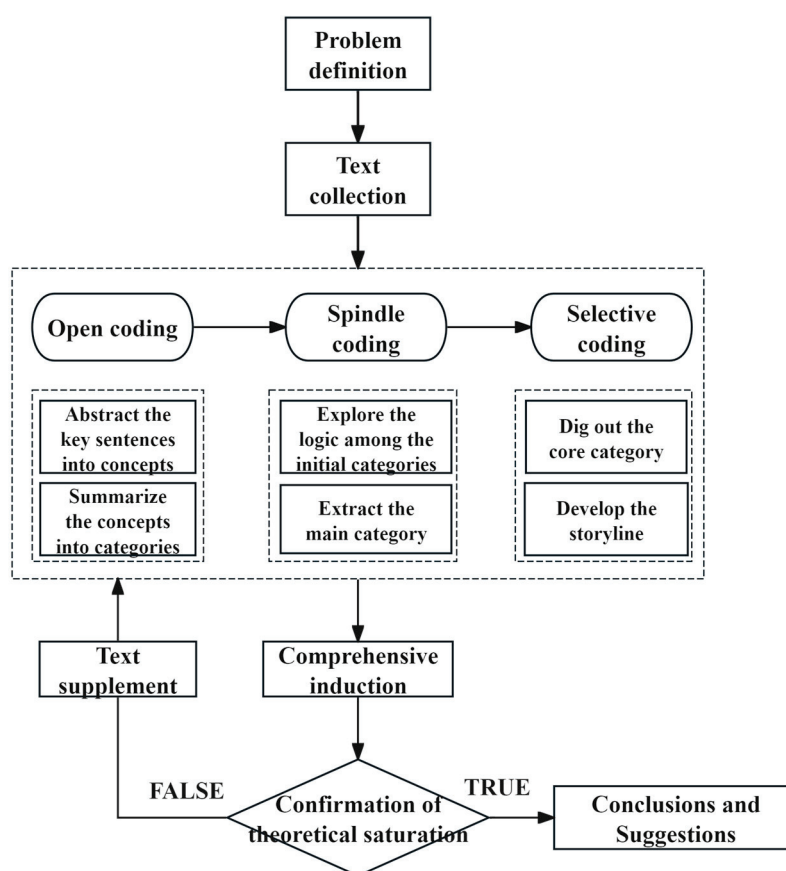


Figure 2. Flowchart of grounded theory research.

3.2. Data Sources

This study employed one-on-one semi-structured interviews to collect empirical data. To ensure the representativeness and scientific rigor of the sample, the research team carefully considered participants' demographic backgrounds and personal characteristics. A purposive sampling strategy—a non-random sampling method guided by the researchers' expertise and the study's objectives—was adopted to select participants. In-depth interviews were conducted with 13 participants, utilizing multiple formats including face-to-face meetings, WeChat voice calls, and Tencent video conferences. Prior to each interview, participants were informed of the study's purpose and provided with privacy protection assurances, ensuring confidentiality through informed consent protocols.

Participants were recruited through online social media platforms and travel forums. Strict inclusion criteria were adopted. All participants must have visited Hongzhuan Street Morning Market during the designated study window (2025 winter season) to ensure the authenticity and timeliness of their experiences. To mitigate potential recall bias, we controlled the time intervals between market visits and interviews, with all time intervals not exceeding one month. For details, please refer to the table below. Preliminary data analysis and coding were conducted for the first 10 participants (FT-01 to FT-10), initially reaching theoretical saturation. The final three participants (FT-11 to FT-13) were recruited and interviewed as validation steps to confirm that no new substantive topics emerged, thereby strengthening the robustness of the research results. The following table provides detailed demographic information and key time data for all 13 participants.

The research process also involved numerous elements within the morning market field, such as vendors, market stewards, facilities, and commodities. The functions performed by these elements in the morning market space are often immediate and contextual. On the one hand, these functions are presented through the statements made by tourists in interviews, which serve as the basic data for grounded theory construction. On the other hand, from 1 January 2025 to 7 February 2025 (the end of the statutory Spring Festival holiday), the researchers visited Hongzhuan Street Morning Market twice a week at irregular intervals to conduct field observations. While conducting fragmented interviews with on-site tourists and vendors, the researchers observed processes such as commodity transactions and dispute resolution and watched tourists dining and wandering; they then compiled field memos. These field materials and the interviewees' statements mutually corroborate each other. The demographic characteristics of the research participants are shown in Table 1.

Table 1. Demographic characteristics of study participants.

Number	Gender	Age	Occupation	Place of Residence	Confirmation of Entry into Morning Market	Interview Time	Time of Interview in Relation to the Visit to Hongzhuan Street
FT-01	Male	26	Middle school teacher	Tianjin City	Yes	7 January 2025	4 weeks
FT-02	Male	20	Undergraduate student	Heilongjiang Province	Yes	11 January 2025	1 week
FT-03	Male	27	Engineer	Shandong Province	Yes	3 January 2025	2 weeks
FT-04	Female	31	Financial practitioners	Zhejiang Province	Yes	10 January 2025	3 weeks
FT-05	Female	24	Postgraduate student	Fujian Province	Yes	1 January 2025	3 days

Table 1. Cont.

Number	Gender	Age	Occupation	Place of Residence	Confirmation of Entry into Morning Market	Interview Time	Time of Interview in Relation to the Visit to Hongzhuan Street
FT-06	Female	30	International Chinese language teacher	Batan Island, Indonesia	Yes	10 February 2025	3 weeks
FT-07	Female	23	Middle school teacher	Hebei Province	Yes	2 February 2025	3 days
FT-08	Male	22	Undergraduate student	Shaanxi Province	Yes	23 January 2025	1 week
FT-09	Female	20	Undergraduate student	Beijing City	Yes	13 January 2025	3 weeks
FT-10	Male	24	Self-media blogger	Zhejiang Province	Yes	30 January 2025	2 weeks
FT-11	Male	28	Freelance photographer	Sichuan Province	Yes	5 February 2025	5 days
FT-12	Male	32	Company staff	Shanghai Province	Yes	24 February 2025	1 weeks
FT-13	Female	24	Master's degree candidate	Gansu Province	Yes	10 February 2025	5 days

3.3. Open Coding

As the initial phase in grounded theory methodology, open coding involves decomposing raw data and extracting representative phenomena and statements to form primary concepts which are then categorized to achieve intuitive clarity of materials. All three authors participated in the coding, extracting, and condensing of the data collected during the interviews into semantic labels and refined them through coding elements to establish a preliminary conceptual framework. Through iterative coding cycles, revisions, and optimization, including regular discussions and peer reporting meetings to address coding differences and reach consensus, the team ultimately produced 68 key concepts. Guided by the core research propositions and logical connections between concepts, these were further synthesized into 21 distinct categories. This coding framework was subsequently proposed at the annual meeting of the Chinese Sociological Association and was recognized by peers, thus ensuring the rigor and credibility of its analysis. A representative example of open coding is presented in Table 2 (due to space constraints, similar textual materials are represented by single excerpts with one category group retained).

Table 2. Example of open coding.

Raw Text	Conceptualization	Categorization
“When eating, I overhear conversations between strangers nearby—they are very enthusiastic and lively. Some tourists, after finishing their meals, would say, ‘Take my seat here, I’m leaving’, offering their spots or making way for others. These small interactions make everyone feel kind and create a sense of human warmth.”	Seat-sharing among strangers	Spontaneous Care Network
“There is frequent interaction with tourists. For instance, when people gather at food stalls, especially during busy times, they start chatting—sharing where they are from, why they traveled to Harbin, and exchanging their pre-planned itineraries.”	Collaborative travel tip exchanges	

3.4. Axial Coding

Axial coding builds upon open coding by synthesizing inductive and deductive approaches to distill core categories that best encapsulate the research themes. The research team revisited the primary concepts and categories generated during open coding, systematically analyzing their logical relationships—such as inclusion, parallelism, and causality—within the original textual data. Through this iterative process, six core categories were identified: functional hybridity of space, multiple role practices of vendors, hybrid production of goods, non-standardized provision of facilities, improvised formation of stranger communities, and multi-dimensional role practices of market stewards. The axial coding framework is presented in Table 3.

Table 3. Axial coding framework.

Core Category	Subordinate Category	Concepts
Functional Hybridity of Space	Spatial Hybridity and Redundancy	Diverse morning market activities; Lively ambiance within the space; Coexistence of unrelated construction projects; Mixed spatial functions; Blended architectural styles; Historical significance of stone-paved streets
	Construction of Flexible Order	High spatial fluidity; Self-organized crowd flow; Orderly environment; Spontaneous spatial maintenance by visitors
	Embeddedness in Urban Space	Participation of local residents; Rational spatial circulation; Central urban location
	Production of Spatial Meaning	Festive atmosphere; Lively and novel experiences; Urban entrepreneurial spirit
Multiple Role Practices of Vendors	Non-Programmed Interaction Networks	Joy of bargaining; Emotional softness; Transparent price negotiations; Affectionate terms like “brother” or “girl”; Vendor attentiveness; Casual conversations with vendors
	Unscripted Cultural Output	Breakfast culture; Distinctive clothing styles; Symbolic derivatives of the morning market
	Vendor Relationship Networks	Inter-vendor competition; Inter-vendor collaboration
	Non-Standardized Promotion	Toys attracting customers; Influencer-driven popularity; Amiable dialect-based hawking
	Distinctive Vendor Personalities	Vendor authenticity; Vendor warmth; Infectious enthusiasm of vendors
	Transmission of Local Knowledge	Vendor-led instruction; Traditional production methods; Introduction to local customs
Multi-Dimensional Role Practices of Market Stewards	Flexible Enforcement Strategies	Gesture-based guidance instead of penalties; Tolerance of temporary occupancy; Repeated soft negotiations with vendors
	Participation in Cultural Performances	Patrol officers wearing Northeastern Chinese floral-patterned jackets; Maintaining order using local dialects; Special Lunar New Year decorations
Hybrid Production of Goods	Diversity of Product Types	Goods infused with Russian and Northeastern Chinese elements; Abundant product quantities; Heterogeneous product categories
	Symbolic Significance of Goods	Emotionally resonant products; Unique characteristics of food fillings
	Unplanned Consumer Behaviors	Experiential engagement in production processes; Free tastings; Observing craftsmanship
Non-Standardized Provision of Facilities	Pluralistic Facility Supply	Official trash bins and vendor cleaning tools; Utilization of cold climate features; Ingeniously designed small stalls; Provision of hot water
	Hybrid Signage Systems	Official thematic signage; Folk dialect-based signs; Informal banners
	Self-Organization in Disorder	Community-led adjustments; Rational vendor spatial arrangements; Unplanned spatial practices

Table 3. Cont.

Core Category	Subordinate Category	Concepts
Improvised Formation of Stranger Communities	Emotional Bonds Among Strangers	Shared dining tables; Influencer-fan interactions; Tourist-to-tourist exchanges
	Collective Memory Production	Connections to childhood nostalgia; Festive ambiance; Formation of place identity
	Spontaneous Care Networks	Seat-sharing among strangers; Collaborative travel tip exchanges

3.5. Selective Coding and Framework

Selective coding involves analyzing relationships between core categories, developing a storyline that synthesizes all observed phenomena, and identifying a central category that unifies all concepts through constant comparative analysis. The storyline, based on the collected data and derived concepts/categories, succinctly captures the essence of the studied phenomenon. This study's storyline revolves around "tourists' sense of place in Hongzhuan Street Morning Market," integrating six core categories into the following narrative: As tourists approach the market, the hybrid architecture (blending Chinese and Western elements) and historic cobblestone paths subtly introduce the area's "spatial hybridity." This visual complexity primes visitors for the multisensory experience ahead. Upon entering, the market's "embedded urban spatiality" becomes palpable: official signage mingles with improvised banners, stalls cluster in seemingly chaotic yet functionally coherent arrangements, and the cacophony of vendor calls merges with steam rising from insulated food containers, creating a resilient, self-organizing order. While queuing for snacks, spontaneous conversations arise between strangers. These unscripted interactions foster "emergent care networks"—passing tissues or sharing tips—that dissolve anonymity. At stalls, vendors engage in "non-scripted interactions," adapting to tourists' needs while imparting local knowledge and emotional warmth. Even law market stewards subvert expectations: clad in northeastern floral-patterned jackets, they mediate disputes with humor and folksy charm, embodying "improvised governance." As tourists explore, they encounter goods imbued with symbolic meaning beyond utility. Some stalls invite participation in craft-making, transforming consumption into cultural immersion. Gradually, the space shifts from backdrop to protagonist—its "spatial meaning-making" connects personal memories to collective narratives, elevating individual experiences into cultural belonging. The interconnection of six main categories yields the theoretical framework for "postmodern place-making." The theoretical generation flowchart is shown in Figure 3. Due to space limitations, only part of the original text conceptualization is presented. The bolded text in the figure represents the specific encoding process.

"Postmodern place-making" refers to dynamically and resiliently creating and maintaining local uniqueness, rather than aiming to pursue neatness, unity and efficient order, by embracing and utilizing the mixture of tradition and modernity, superficial chaos, and spontaneous activities. Within the "Postmodern Placeness Production" framework, three constitutive dimensions are evident: "topological space—embodied practice—material networks." The "Postmodern Placeness Production" framework is presented in Figure 4.

"Topological space" refers to an integrated whole where multiple social relations spontaneously intermingle, overlap, permeate, and transform while maintaining stability amid dynamics. Such a space does not emerge from functional planning or boundary design; instead, it exhibits functional redundancy and a flexible, random order. This definition derives from Henri Lefebvre's and Jane Jacobs' judgments on urban space. Lefebvre proposed that the core logic of spatial production lies in the triadic dialectical unity of "perceived space—representational spaces—spatial practice." He advocated the construction

of a coordinated and shareable urban space rooted in residents' daily lives, emphasizing the dynamic and practical nature of space as a social product [40–43]. Jane Jacobs further identified “urban vitality” as a crucial cornerstone of sustainable urban development [44]. She specifically pointed out that the primary need for mixed uses and small-block layouts, the preservation of historic buildings, and the necessity of crowd aggregation are all key elements in maintaining urban vitality [45,46]. This aligns with the focus of “topology” in mathematics on “dynamic stability preserved under continuous deformation,” facilitating the description of complex spatial structures in urban neighborhoods where multiple elements intermingle and flow while presenting a unified order of dynamic stability.

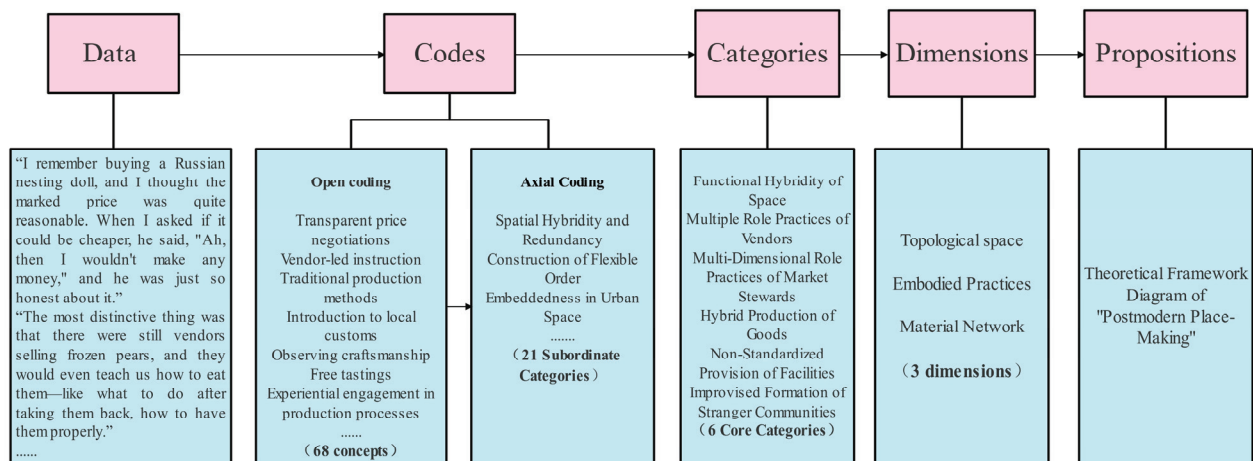


Figure 3. Theoretical generation flowchart.

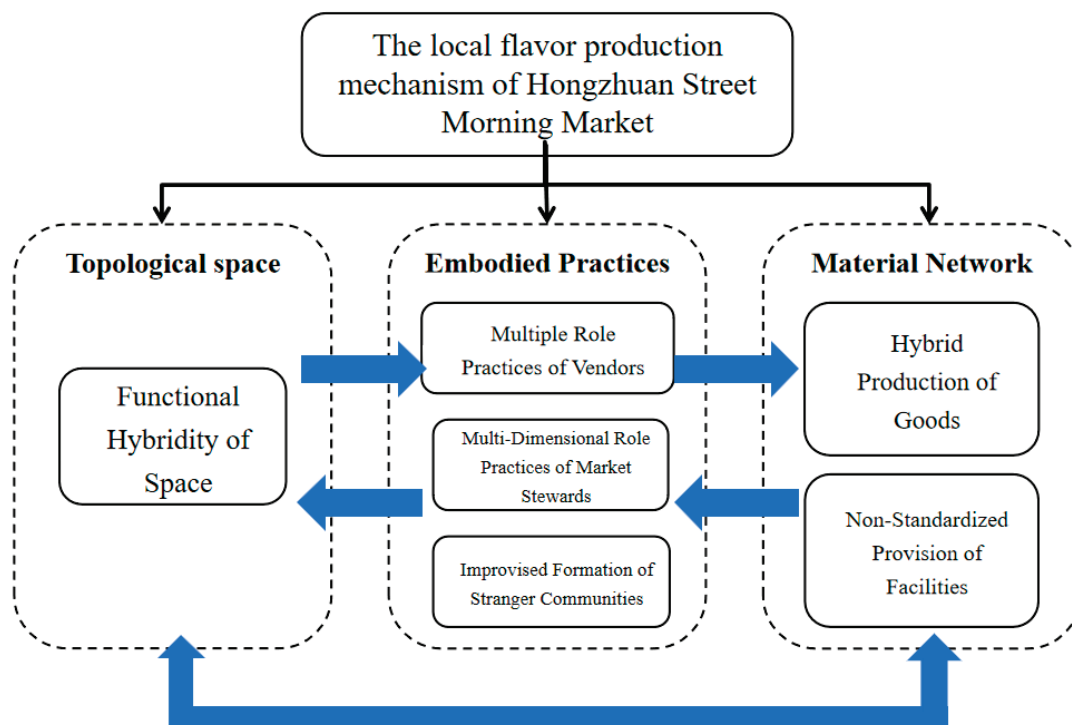


Figure 4. Theoretical framework of “Postmodern Place-Making”.

“Embodied practice” refers to the agentic subjects who participate in place-making through embodied practices. Using the body as the vehicle, they generate local knowledge through sensorial actions and spontaneous interactions that transcend prescribed roles. Embodiment originates from the critique of mind–body dualism, asserting that bodily

experience constitutes the fundamental source of cognition and mentality [47]. Other scholars have generally emphasized that humans are subjectively embodied in a real, interactive, and dynamic bodily process, rather than being statically confined to a physical body [48], thereby bringing “living human beings” into research across various fields [49]. Among these scholars, Chris Shilling argues that, on one hand, the body is a generative element of social life, and the embodied subject possesses a certain intentional capacity to influence the flow of daily life. On the other hand, the body is an entity with both materiality and sociality, capable of shaping society while also being shaped by society [50]. Following this theoretical tradition, this paper employs the dimension of “embodied practice” to demonstrate the dynamic process through which actors actively engage in space, experience space, and are shaped by space.

“Material networks” encompass material elements such as goods, facilities, and the climate. These elements are not merely passive backdrops; rather, they actively participate in the network of place meaning through cultural experience and practices of use. This dimension follows the Actor–Network Theory (ANT) proposed by Bruno Latour and others, which argues that non-human material entities themselves possess a certain degree of agency and dynamism [51]. Together with human actors, these non-human entities form a social action system and network, thereby shaping the patterns of our lives [52]. Tim Ingold’s “dwelling perspective” posits that the “environment” is no longer merely a separable surrounding entity that actors confront; instead, it continuously enters into actors’ activities through its characteristics and affordances, and mutually permeates and shapes actors. In this sense, actors and their environment constitute an indivisible whole, undergoing development together through interaction [53–55]. It should be noted that the “material network” dimension proposed in this paper employs the concept of “non-human actors” at a metaphorical level. Its purpose is to further demonstrate the dynamic co-construction between diverse human roles and material entities in the morning market, rather than being a strict application of the Actor–Network Theory.

This empirically derived “Postmodern Placeness Production” model is characterized by its core mechanism of hybridity logic. The “hybrid logic” referred to in this paper is a way of thinking that neither deliberately creates differentiation nor maintains order through coercive measures. Instead, it fully respects the overlapping nature of things’ functions, the spontaneity of actions, and the potential for self-organization. Existing research on place-making often falls into an ordered worship of “participation” and “interaction,” positing that standardized interactive behaviors and the accumulation of participatory opportunities suffice to construct a tourist community. This efficiency-driven logic is, in essence, a continuation of the “functionalist planning” critiqued by Jane Jacobs. Contemporary tourism planning strategies—such as adding interactive spaces and designing immersive experiences—ostensibly emphasize increased participation [46]. Yet they fundamentally remain within an efficiency-oriented, orderist framework. Interaction is presupposed as a standardized, replicable module, with the goal of achieving “predictable tourist experiences” through controlled variables. Harbin morning market, however, disrupts this paradigm through functional hybridity and surface-level disorder: vendors and customers, through various unplanned practices, form a spontaneously self-organized dynamic equilibrium among actors. This hybridity validates Jacobs’ assertion that urban diversity stems from the “continuous modification of countless unplanned actions” [46]. The market’s “disordered redundancies”—such as oil-stained floor tiles, tacit rules formed through competition for space, and colorful makeshift banners—precisely shape place distinctiveness by resisting homogenization. While mainstream practices obsessively eliminate incongruous elements, Harbin morning market successfully leverages this “disorder” and chaos. It demonstrates that authentic community-building lies not merely in increasing interaction and participa-

tion opportunities but in unleashing the self-organizing potential catalyzed by intersecting disorder, thereby developing the system's inherent capacity for elastic adaptation.

While revealing the mechanism of place attachment production in morning markets, this framework also provides practical guidance for constructing sustainable "third spaces" in urban areas. Edward Soja argues that the "third space" integrates the real and the imaginary, the material and the spiritual, the subject and the object, the abstract and the concrete, the knowable and the unknowable, and the repetitive and the differential, thus featuring complexity and openness [56]. Ray Oldenburg defines the "third space" as an open, accessible-to-all public gathering place for leisure and recreation beyond home and work environments, and it serves as an informal space for free social interaction [57]. This study draws on the spatial potential of this concept—specifically its ability to stimulate residents' social interaction, establish connections, and foster friendships and a sense of belonging [58]—and relies on the hybrid logic of sense of place production to offer insights for the further development of similar urban third spaces.

3.6. Theoretical Saturation Test

Glaser and Strauss did not explicitly propose indicators for judging theoretical saturation, but the fundamental principle is clear: when new data can no longer provide additional information and insights, this indicates that the themes currently generated are sufficient to cover the mechanisms and processes involved in the study, and the connections between the themes have also been fully clarified. To demonstrate the transparency and rigor of the research methodology, this paper takes the core category of "Multiple Role Practices of Vendors" as an example to present the generation trajectory of specific concepts within each subordinate category during the open coding and axial coding processes. At the same time, this paper presents text segments related to vendors from the 11th to 13th interviews, thereby enabling a more intuitive judgment of theoretical saturation. The concept generation memo is presented in Table 4.

FT-11: He cut off a small piece of Leba (a type of fermented food) for me and continued chatting: "Back in the day, there were many Russians in Harbin. This leba is an old local flavor here. My grandfather used to be an apprentice in a bakery run by Russians, and this skill has been passed down for three generations." Later, when I bought two, he specially wrapped them in kraft paper, drew a small snowflake on it, and said, "This is a symbol of Harbin—it'll look nice even if you take it back as a souvenir."

FT-12: When I travel to other places, buying things is just a matter of asking the price, paying, and leaving. But here, I can chat with vendors, learn to make local delicacies, and even get to know other vendors through them—it feels especially welcoming. It's like . . . I remember a vendor selling red sausage said, "What we sell at this morning market isn't just goods, but the warmth and humanity of Harbin." I think that's absolutely right—it's precisely because of these vendors that I feel, "This is the real Harbin."

FT-13: I asked the sugar painting master, "Where can I buy authentic Northeast frozen pears?" He directly pointed to a stall diagonally opposite and said, "Go find Uncle Zhang. He uses autumn pears to make them—they're sweeter than my sugar." When I went over to buy some, Uncle Zhang also said, "Did Master Li tell you to come here? His sugar paintings are really famous at this morning market." It didn't feel like they were competing for business; instead, they were like a family, helping each other out.

Only a portion of the interview transcripts are presented here, yet they are representative of the interviewees' overall statements. Theoretical saturation testing was conducted using the reserved interview texts, and no new concepts or categories were identified.

Therefore, it can be concluded that the conceptual model of this study achieves theoretical saturation.

Table 4. The concept generation memo of the “Multiple Role Practices of Vendors”.

	Non-Programmed Interaction Networks	Unscripted Cultural Output	Vendor Relationship Networks	Non-Standardized Promotion	Distinctive Vendor Personalities	Transmission of Local Knowledge
FT-01	Emotional softness, Vendor attentiveness	Breakfast culture, Symbolic derivatives of the morning market	No new concepts	Amiable dialect-based hawking	No new concepts	Vendor-led instruction, Introduction to local customs
FT-02	Transparent price negotiations	No new concepts	Inter-vendor collaboration	toys attracting customers, Influencer-driven popularity	No new concepts	No new concepts
FT-03	No new concepts	No new concepts	No new concepts	No new concepts	Infectious enthusiasm of vendors, Vendor warmth	No new concepts
FT-04	No new concepts	No new concepts	No new concepts	No new concepts	No new concepts	No new concepts
FT-05	Joy of bargaining	Distinctive clothing styles	No new concepts	No new concepts	No new concepts	No new concepts
FT-06	Casual conversations with vendors, Affectionate terms	No new concepts	No new concepts	No new concepts	No new concepts	No new concepts
FT-07	No new concepts	No new concepts	Inter-vendor competition	No new concepts	No new concepts	No new concepts
FT-08	No new concepts	No new concepts	No new concepts	No new concepts	No new concepts	Traditional production methods
FT-09	No new concepts	No new concepts	No new concepts	No new concepts	Vendor authenticity	No new concepts
FT-10	No new concepts	No new concepts	No new concepts	No new concepts	No new concepts	No new concepts

4. Results

4.1. The Topological Space in the Morning Market

In the “Postmodern Place-Making” model, spatial practices construct the material foundation of place uniqueness through the multi-layered superposition of physical environments. The functional redundancy of the morning market manifests in the composite nature of spatial uses: it serves as a venue for ingredient trading, a stage for folk cultural performances, and a repository of urban memory. The construction of flexible order maintains internal rules beneath surface-level disorder through dynamic equilibrium mechanisms, endowing the space with adaptable and orderly characteristics. Urban spatial embeddedness tightly connects the morning market to the broader urban context, making it an organic component of the city. Spatial meaning production, building on the above, stimulates tourists to perceive the vitality of the space through immersive experiences of festive ambiance, lively novelty, and urban entrepreneurial spirit. These elements are

not isolated but mutually permeate and reinforce one another. The richness of functional hybridity and the dynamism of flexible order provide raw materials and frameworks for meaning production, while urban embeddedness imbues the space with urban depth and belonging. Together, they act upon tourists, enabling them to deeply perceive a unique and irreplicable sense of place during their engagement with the market.

FT-05: Harbin's architectural landscape strikingly blends Russian influences with East-meets-West fusion. En route to the morning market, I passed an opulent music hall with gilded decorations, then abruptly transitioned to cobblestone streets of the market itself. This architectural juxtaposition feels intentional yet organic. The weathered bluestone bricks underfoot, preserved rather than replaced, whisper stories of history through their timeworn surfaces.

FT-06: Everyone seemed so positive and energetic. It gave me a special kind of experience—even with Harbin facing issues like population outflow and aging, Hongzhuan Street Morning Market left me feeling its uplifting, warm, and lively spirit. It felt so full of life and vitality—unlike the morning market I visited in Quzhou, where the vendors seemed somewhat listless.

Fieldwork Notes, 5 January 2025: This is a grilled sausage stall at Hongzhuan Street Morning Market. Behind the stall stands a typical Russian-style building, with elaborate reliefs decorating the window edges and a domed roof rising in the distance—an imposing and solemn sight rarely seen in other parts of China. At the base of the building, woks, grills, and steaming sausages fill the air with aroma. A red banner above the stall reads, “Welcome princesses and princes from across the nation to Hongzhuan Street Morning Market”—a phrase that embodies the Northeasterners’ sense of humor, as they seek to make visitors feel at home through such warm words. A loudspeaker at the stall’s edge repeats this message in the local dialect, often drawing chuckles from tourists. A long line has formed of customers waiting to buy, while two people in red waistcoats frequently interact with the crowd. These red waistcoats, once a nationally renowned characteristic costume of Heilongjiang Province, have evolved into a cultural symbol. Even locals rarely wear them in daily life, reserving them instead for casual at-home use. Here, solemnity mingles with leisure, humor with warmth, and the crisp cold air with the bustling energy of the scene. The Morning market streetscape is shown in Figure 5.



Figure 5. Morning market streetscape.

When tourists engage with this spatial system, they undergo an embodied transformation of meaning. Functional hybridity creates dense sensory stimulation, flexible order guides autonomous behavioral adaptation, and urban embeddedness provides a cultural decoding reference. Together, they complete the embodied conversion of symbolic meaning through fluid experiences. The sense of place arising from such spatial practices is neither a purely material attribute nor a unidirectional emotional projection. Instead, it is a dynamic relational network continuously generated through the interaction of multiple spatial elements. Its essence lies in the reshaping of tourists' cognitive schemas via the self-organizing system.

4.2. The Embodied Practices of Human Actors

Within the human actor dimension, vendors and market stewards dissolve the singular positioning of actors in traditional market contexts through hybrid role practices. Simultaneously, tourists undergo multi-dimensional meaning-capturing processes within the ritualistic field co-created by vendors, market stewards, and other actors. The non-programmed interaction networks they construct—such as using affectionate terms to build rapport, transparent price negotiations, and meticulous care—infuse warmth into transactional processes, fostering unique emotional bonds.

On one hand, vendors, as economic traders, cultural translators, and relational mediators, transform commercial activities into stages for ethical place-making through their hybrid roles. Their non-programmed interaction networks align with Jane Jacobs' "street ballet" theory: seemingly disordered competition reflects the market ecosystem's self-regulatory mechanisms. Non-standardized promotional strategies further amplify the market's uniqueness, constructing a dynamically balanced market ecology that dismantles standardized commercial logic. Meanwhile, role hybridity enables the embodied performance of local knowledge. Vendors, as "imperfect information providers," construct an anti-standardized "authenticity" through personalized hospitality and the transmission of local knowledge. Their bodies become mobile carriers of local chronicles, converting physical space into legible meaning systems through unscripted cultural outputs.

On the other hand, market stewards, as symbols of "order," participate in place-based ritual performances, softening the tension between state authority and grassroots spontaneity. Vendors and market stewards collectively act as performers of place-making. Despite their structural opposition, they enact shared cultural practices within the unique field of the morning market. These practices transform the market into a liminal "anti-structure" space [59], where tourists shed their "insider-outsider" identities and enter an egalitarian, ambiguous transitional state. This state incubates new social relations and becomes a vital source of the sense of place. This is exemplified by the following statements of one interviewee:

FT-06: When buying sticky rice dumplings, I nervously asked the vendor, "Are these sweet?" The auntie instantly reassured me with maternal warmth: "Don't fret, girl! These aren't sweet at all. Want even less sweetness? I'll wrap you a fresh batch right now!" Her enthusiasm embodied that quintessential Northeastern hospitality, turning a simple transaction into heartwarming cultural exchange.

FT-09: These market stewards are nothing like the "stern stewards" in people's impressions. They are more like old neighbors who have lived here for years—knowing every vendor by name and exactly what tourists might need. Instead of enforcing rules to control people, they exude the warmth of Harbin through their way of speaking, their readiness to help, and even the perfect measure of their jokes.

The improvised formation of stranger communities reveals the dissolution of role boundaries in the market. Through non-contractual mutual aid, bodily co-presence activates emotional relational networks. When ad hoc alliances form during conflicts, the self-organizing wisdom beneath apparent disorder becomes evident. Collective memory production allows individual experiences to intertextually overlap through cultural mediation, enabling tourists to dialectically reconcile regional differences and place identity, ultimately synthesizing fragmented interactions into holistic cultural recognition.

Tourists' interactions, mediated by the shared space of the morning market, position them as both service recipients and cultural participants. The joy of shared meals, resonance with influencing interactions, and fluid exchanges among strangers foster warmth and belonging in an unfamiliar environment. In collective memory production, the market's festive atmosphere intertwines with tourists' childhood nostalgia, evoking deep-seated emotions and forging unique place identity. The spontaneous care network exemplifies human warmth in the market, where acts of kindness dissolve urban alienation, constructing a vibrant community of strangers. Through participation, tourists profoundly internalize the market's unique sense of place.

FT-02: When there were no seats, I asked the vendor, 'How can I eat here?' He said, 'Wait, brother—I'll find you a spot.' Another tourist, finishing their meal, offered me their seat. Such small gestures made me feel the human warmth of this place.

FT-01: For instance, when I went to buy rice cakes over there, you could actually try pounding them yourself. Yeah, so I went over and gave it a try. The experience felt really unique, because rice cake pounding is probably a tradition or custom from nearby Korean ethnic culture. If I were in the south, I definitely wouldn't have encountered anything like freshly pounded rice cakes. So it felt very experiential—I got to participate in it.

The role hybridity of three actor groups (vendors, market stewards, strangers) collectively constitutes the dynamic mechanism of place-making. Vendors and market stewards weave place meaning through functional overlaps, while strangers activate experiential dimensions through identity fluidity. Here, disorder becomes the generative source of place uniqueness. In this dynamic interplay, surface-level chaos transforms into systemic resilience, with role redundancy and identity fluidity co-constructing a "homogenization-resistant locality".

4.3. The Material Network in the Morning Market

In the non-human actor dimension, the hybrid production of goods constructs a materialized representation system of local culture. The diversity of goods facilitates cross-cultural fusion, with their heterogeneity achieving cultural translation through symbolic encoding. When production processes are opened to tourist participation, physical consumption evolves into embodied practice, elevating goods into carriers of collective memory and place identity. This hybrid production essentially stages place uniqueness through the polyphonic narratives of commodity symbols, enabling tourists to reconstruct local cultural DNA.

Through tourist engagement, goods with hybrid traits deeply contribute to place-making. Their diversity reflects inclusive multiculturalism, satisfying varied preferences and showcasing the richness of local culture. The symbolic meanings of goods further amplify this sense of place. When selecting goods, tourists transcend materiality to touch the emotional core of local culture. Unplanned consumer behaviors transform consumption into deep cultural interaction, where goods act as cultural mediators guiding tourists to perceive place uniqueness.

FT-04: Visiting the morning market truly unveils Harbin's culinary DNA. Beyond the expected Northeastern staples, it's a living cultural mosaic—Russian influences manifest in da lieba (sourdough bread) stalls, Korean rice cake artisans pound rhythms into the frosty air, while universal Chinese breakfast classics like fried dough sticks anchor the scene. This edible diversity mirrors the city's historical crossroads identity. Even handicraft vendors contribute to the narrative, their intricate paper-cuts and birch bark carvings not mere souvenirs, but testaments to locals' philosophy: life's richness blooms through everyday artistry.

The non-standardized provision of facilities reveals the self-organizing logic of material environments. Official and grassroots facilities achieve a dynamic balance between institutional and spontaneous systems. Spatial practices beneath apparent disorder—rational vendor layouts and regular crowd flow—follow implicit rules derived from local experience. When facilities intervene in tourist perception as “agentic mediators,” their hybrid traits become tangible evidence of place vitality. The absence of standardization paradoxically strengthens the cognitive construction of authenticity.

Tourists perceive “controlled chaos” in hybrid facilities. Non-standardized supply breaks the monotony of uniform infrastructure, offering convenient and culturally distinctive experiences. Hybrid signage (official themes, dialect slogans, informal banners) creates unique visual cultural encounters. Self-organization in disorder reflects latent order: vendor layouts, though spontaneous, follow tacit spatial norms, forming the market's unique spatial character. These facility-related practices immerse tourists in a vibrant, place-specific ambiance.

FT-06: The stall signs themselves were cultural artifacts—“Gaga Xiang Egg Burger”, “Authentic Harbin Sausage—Fake? We'll Pay You 10,000×!”, and the pièce de résistance: “Northeast Na Gada Mega Rice Wrap”. These linguistic gems transformed storefronts into living dictionaries of Northeastern vernacular, where every character vibrated with unapologetic local pride.

Fieldwork Notes, 10 January 2025: On the flagstones of the early morning, nuts and spices in bamboo baskets and plastic basins spread out in a seemingly unruly “labyrinth of flavors”—amber-colored roasted peanuts nestle next to dark brown cassia bark, snow-white sunflower seeds sit beside crimson star anise, and price tags scrawled in chalk by vendors are crookedly stuck in the piles of goods. The nuts and spices sold at the morning market are shown in Figure 6. Yet they beckon tourists' fingertips to flit back and forth between different heaps. An aunt wearing a woolen hat squats in front of the roasted nuts stall, burying her face in the fragrant steam, and calls out to her companion in Northeastern dialect: “Smell these sunflower seeds! They taste just like the ones at the alley corner when we were kids!” At a nearby used goods stall not far away, dented aluminum lunch boxes, faded old flashlights, and tool pliers wrapped in tape are jumbled together on a plastic sheet. Several tourists and the vendor chat animatedly, ranging from “prices back in the day” to “craftsmanship nowadays”, and the distance between strangers quietly fades away amid these haphazardly placed old items. These small commodities, in their messy arrangement, make tourists willingly bend down and lean forward, and in the process of selecting, inquiring, and sharing, they become part of the morning market space. The used items and sundries sold in the morning market are shown in Figure 7.

The synergy between facilities and goods constitutes the non-human actor dimension of place-making. Non-standardized facilities provide the material basis for cultural translation, while symbolically hybrid goods enrich facility semantics. As tourists navigate greasy tiles and layered banners, they decode place uniqueness through material hybridity.

An authentic sense of place emerges not from meticulously designed scripts but from the cross-empowerment of material performances and human practices.



Figure 6. Nuts and spices sold in the morning market.

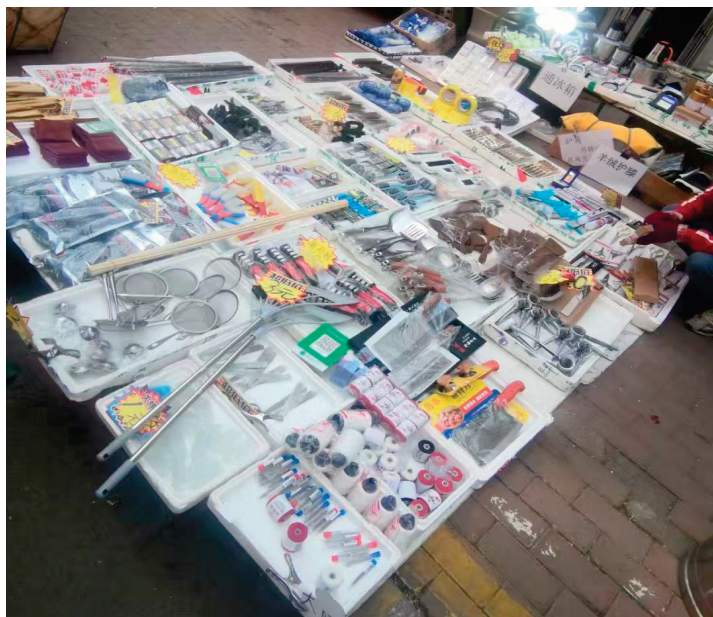


Figure 7. Used items and sundries sold in the morning market.

5. Conclusions

This study constructs a theoretical framework of “Postmodern Place-Making” through grounded theory, revealing the critical role of spontaneous order among diverse actors in the production of place meaning within the morning market. The key findings are as follows:

The generation of a sense of place does not rely on meticulously designed, ordered interactions but is closely associated with contexts characterized by functional redundancy and self-organizing potential within apparent disorder. In the triadic model, each dimension contains abundant hybrid and redundant elements. However, through interactions with tourists, these elements construct legible meaning networks that foster community

formation. Collectively, they demonstrate that place uniqueness is rooted in hybrid systems resistant to homogenization, rather than in formulaic spatial planning or interaction design. This research finding aligns with conclusions from the existing literature on topics such as the therapeutic function of “vitality and warmth” in tourist destinations, the spatial construction of “night culture” in Guangdong Province, and the sustainable development of traditional village spaces in Guizhou Province [60–62]. However, this study goes a step further by exploring the interactive relationships among the diverse actors that constitute such disordered spaces and their impacts on tourist experiences—rather than merely stopping at verifying the effectiveness of disorder and hybridity.

This study transcends the traditional “human–place” dualism in tourism sociology, uncovering the co-productive synergy of space, human actors, and non-human actors in generating place meaning through dynamic interactions. Spatial practices provide the material foundation and cultural context for human interactions; the performance of humans in their roles animates spaces and non-human elements with social vitality; and the symbolic encoding of non-human elements reciprocally enriches the depth of interpersonal interactions. This triadic cross-empowerment elevates tourists’ experiences from fragmented perceptions to holistic cultural identity. Scholars such as Wang Qiang and Yuan Chao have conducted in-depth analyses of the role of materials in translating the emotional atmosphere and complex interpersonal relationships within tourist spaces, and their findings resonate with this study. Building on this foundation, this study further demonstrates how the translation process of these materials acts upon tourists’ bodies and senses to shape their experiences. Meanwhile, we not only recognize the agency of materials in tourist spaces but also understand this agency within the context of local culture [63–65].

Different from the traditional image of tourists as one-sided “gazers,” this study details that tourists’ roles undergo a continuous transformation from onlookers to embodied participants. As tourists move from spatial wandering in the initial stage to embodied integration into the culturally symbolic space constructed by materials and the social relational network built by vendors and strangers, a sense of place is generated spontaneously and unreflectively in the process of continuous dialog between the body and space.

On this basis, this study aims to put forward a series of practical recommendations to assist operators and market stewards in further exploring the potential of disorderliness in the process of spatial production. This, in turn, will help to facilitate the shift in their fundamental strategies from “functional optimization” to “mediatic activation”—that is, to move away from the traditional approach of unilaterally emphasizing the optimization of interactive functions in tourist attractions, which has gradually led them into the predicament of functional convergence and formal standardization, and instead turn to the full utilization of diverse media such as bodies, materials, and spaces within urban neighborhoods. The specific recommendations are presented in Table 5.

By foregrounding relational materiality, embodied multiplicity, and self-organizing hybridity, this study redefines place-making as a dynamic, co-creative process where chaos and order, humans and non-humans, and memory and matter converge to forge irreplicable localities. Despite these theoretical and practical contributions, this study acknowledges several limitations that warrant consideration. First, the sampling strategy focused exclusively on tourists, potentially overlooking the equally critical perspectives of local residents, vendors, and market stewards, whose lived experiences and practices are fundamental to the social construction of the morning market. Second, while theoretical saturation was achieved with the initial sample and validated with additional participants, the relatively small size and the unique “viral” context of the case may influence the transferability of the findings to other, less prominent local markets. Third, the data

collection process conducted solely within the winter season might introduce a seasonal bias, as visitor motivations, market dynamics, and spatial practices could vary significantly during other times of the year. Future research would benefit from longitudinal designs that track the evolution of place-making across different seasons, incorporate a more diverse range of actor perspectives, and extend the inquiry to various types of markets to refine and test the proposed “Postmodern Place-Making” framework in broader contexts.

Table 5. Recommendations for construction of urban street space.

Main Dimensions	Targets of Recommendations	Specific Recommendations
Spatial Dimension	Space	1. Reject linear planning that market stewards strict separation of functional area. Adopt a “core area + expansion area” model: the core area retains basic operational functions, while the expansion area can be dynamically adjusted according to seasons and passenger flow. 2. Cultural elements can be embedded in the operational space to achieve functional superimposition. For example, set up “local old photo display stands” in the gaps between stalls to showcase the historical changes in the morning market.
Actor Embodied Practice Dimension	Vendors	1. Vendors establish a “Vendor Self-Governance Committee”, with senior vendors serving as representatives to be responsible for daily stall coordination, hygiene supervision, and dispute mediation, thereby fostering a community atmosphere among vendors. 2. Vendors should abandon the opposing market role of “operator-consumer”, and actively integrate consumers into the relational community formed by vendors to create a sense of “we-ness”. 3. Vendors can fully demonstrate operational skills with regional and individual characteristics, such as adjusting commodity displays according to seasons and attracting customers through dialect shouts.
	Market Stewards	1. Market stewards fully respect the individuality of vendors, abandon rigid regulations such as “unified stall size and fixed business hours”, and adopt a “negative list management” approach—only clarifying essential requirements such as fire safety and hygiene standards, while allowing vendors to flexibly adjust their operational methods according to actual needs. 2. Market stewards perform their duties in a people-friendly manner, such as adopting local characteristic language usage and clothing styles, and act as performers of local culture. 3. Market stewards avoid “one-size-fits-all” centralized rectification and large-scale closure/renovation, and instead implement incremental optimization of the street market.
Material Network Dimension	Commodities	1. Operators proactively engage tourists in the craftsmanship of their main business, such as joint cooking and collective painting. By enhancing tourists’ sense of experience, unplanned consumption and participation scenarios are created. 2. Commodities should emphasize “locality” to reflect the daily life (clothing, food, housing, and transportation) of local residents. Market stewards and vendors should reduce the commercialized style of the street area.
	Infrastructure	1. Core infrastructure (e.g., fire-fighting equipment, sanitation facilities) must meet bottom-line standards for safety and hygiene, while personalized design should be encouraged for leisure facilities and sign systems. For example, the use of dialect slang, hand-drawn, and self-made signs is encouraged. 2. Set up shared dining tables to encourage sharing and communication among tourists, vendors, and other tourists, thereby strengthening the “vitality of street social interaction”.

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References

1. Department of Culture and Tourism of Heilongjiang Province. Harbin Received 90.357 Million Tourists During the 2024–2025 Ice and Snow Season. 2025. Available online: https://wlt.hlj.gov.cn/wlt/c114212/202503/c00_31817830.shtml (accessed on 6 March 2025).
2. Heilongjiang Provincial Department of Culture and Tourism. Daily Passenger Flow at Mao'ershan Ski Resort Exceeded 3000 in February. Available online: https://wlt.hlj.gov.cn/wlt/c114212/202502/c00_31813483.shtml (accessed on 2 February 2025).
3. Harbin Municipal People's Government. Out-Of-Town Tourists Love the "Yanhuaqi" (Lively Atmosphere) of Ice City the Most. 2025. Available online: https://www.harbin.gov.cn/haerbin/c104696/202501/c01_1036652.shtml (accessed on 12 January 2025).
4. Harbin Municipal People's Government. Implementation Rules for Several Financial Policy Measures to Boost Development Confidence and Promote the Accelerated Recovery and Overall Improvement of the City's Economy. 2024. Available online: https://www.harbin.gov.cn/haerbin/c108433/202401/c01_960647.shtml (accessed on 16 January 2024).
5. Harbin Municipal People's Government. Ten Measures for Utilizing Urban Public Space to Invigorate Circulation and Promote Consumption in Harbin. 2020. Available online: https://www.harbin.gov.cn/haerbin/c104546/202007/c01_177199.shtml (accessed on 7 July 2020).
6. Harbin News Network. Hongzhuan Street Morning Market: Where the 'Yanhua' Rises, New Chapters of Traffic Begin. 2025. Available online: <https://baijiahao.baidu.com/s?id=1820414571761831797&wfr=spider&for=pc> (accessed on 5 January 2025).
7. Sun, J.X.; Zhang, L.Y. Co-created place: The reconstruction of ice-snow tourism destinations and the revitalization effect of Northeast China. *Geogr. Res.* **2025**, *44*, 1327–1341.
8. Wang, S.S. The construction of attractions, the creation of authenticity, and the development of emotions in the regional tourism boom: An investigation based on Heilongjiang Province and Harbin City. *Heilongjiang Soc. Sci.* **2025**, *1*, 50–62.
9. Wen, X. Local Reconstruction and Cultural Interpretation of the Urban Cultural Tourism Boom. *Tour. Trib.* **2025**, *40*, 75–86.
10. Scott, J.C. *Seeing Like a State: How Certain Schemes to Improve the Human Condition Have Failed*; Social Sciences Academic Press: Cambridge, MA, USA; Yale University Press: New Haven, CT, USA, 2004; Original work published 1998.
11. Feng, Y.; Zhou, L.; Xiao, H. Tourists' "ambivalence" towards modernity: A discussion based on linear and cyclical historical perspectives. *Tour. Trib.* **2024**, *39*, 132–140.
12. Bauman, Z. *Modernity and Ambivalence*; The Commercial Press: Shanghai, China, 2003; pp. 3–27; Original work published 1991.
13. Zolberg, V.L. Review of the book Culture and power: The sociology of Pierre Bourdieu, by D. Swartz. *Soc. Forces* **1999**, *77*, 1232–1234.
14. Huang, G.; Xue, D. Formalization of the informal economy: Spatial governance models and effects of street vending in Guangzhou. *Urban Dev. Stud.* **2015**, *22*, 51–57.
15. Sun, Z. "Marginal governance" of city governments: A comparative study of street vendor supervision policies. *Public Adm. Rev.* **2012**, *5*, 30–58+179–180.
16. Zhuo, C.; Guo, C. High modernism in national governance: Malpractices and remedies. *Henan Soc. Sci.* **2015**, *23*, 21–27.
17. Chen, R. Opportunities and challenges brought by the development of modern science and technology to the tourism industry. *J. Jiangxi Sci. Technol. Norm. Univ.* **2008**, *6*, 36–38.
18. Li, J.; Li, Y.; Ning, Z.; Chen, W. The concept and connotation of smart tourism from the perspective of rational choice. *Tour. Hosp. Prospect.* **2021**, *5*, 22–32.
19. Kamete, A.Y. Missing the point? Urban planning and the normalization of 'pathological' spaces in southern Africa. *Trans. Inst. Br. Geogr.* **2013**, *38*, 639–651. [CrossRef]
20. Jiang, K.; Xiong, Z. Research on homogenization problems and differentiation strategies of cultural tourism characteristic towns: Case studies of Anren Ancient Town and Luodai Ancient Town in Sichuan. *J. Yangtze Norm. Univ.* **2019**, *35*, 33–40.

21. Guo, W. From landscape gaze to lifestyle: The postmodern turn in tourism. *J. Sichuan Univ. Arts Sci.* **2013**, *23*, 142–146.
22. Peng, D.; Huang, Y. Research on the destination image of Lijiang Ancient Town: Content analysis based on online texts. *Tour. Trib.* **2019**, *34*, 80–89.
23. Tuan, Y.-F. *Space and Place: The Perspective of Experience*; China Renmin University Press: Beijing, China, 2017; Original work published 1977.
24. Relph, E. *Place and Placelessness*; The Commercial Press: Shanghai, China, 2021; Original work published 1976.
25. Geertz, C. *The Interpretation of Cultures*; Basic Books: New York, NY, USA, 2001; pp. 8–30.
26. Tang, S.; Zhou, S. The role of text in constructing tourists' sense of place: An analysis based on travel notes of Qufu. *Geogr. Geo-Inf. Sci.* **2013**, *29*, 100–104.
27. Gao, C.; Tao, H.; Liu, J.; Lü, N.; Zhang, X.; Xue, T. Digital place-making in tourist resorts from the perspective of media geography: A case study of Aranya in Qinhuangdao. *Tour. Trib.* **2024**, *39*, 151–162.
28. Qi, Y. Discussion on the influence of mass media on shaping local tourism image. *Frontline* **2015**, *7*, 118–119.
29. Shaykh-Baygloo, R. Foreign tourists' experience: The tri-partite relationships among sense of place toward destination city, tourism attractions and tourists' overall satisfaction—Evidence from Shiraz, Iran. *J. Destin. Mark. Manag.* **2021**, *19*, 100550. [CrossRef]
30. Wen, Y. Cultivating Sense of Place: A New Path for the Development of Red Sports Tourism Industry in Jiangxi Province. Master's Thesis, Gannan Normal University, Ganzhou, China, 2022.
31. Tang, W.; Zhang, J.; Luo, H.; Yang, X.; Li, D. Characteristics of tourists' sense of place in a natural sightseeing destination: A case study of Jiuzhaigou. *Acta Geogr. Sin.* **2007**, *62*, 599–608.
32. Zeng, L.; Gao, Q.; Chen, X. Place restructuring in traditional rural tourism destinations from the perspective of tourists' embodied experience: A case study of Wuyuan. *Tour. Trib.* **2021**, *36*, 69–79.
33. Gao, Y.; Xiang, L. Research on the place-making of rural homestays in traditional villages from an embodied perspective. In Proceedings of the 2023 China Urban Planning Annual Conference (16 Rural Planning) China Urban Planning Society, People's City, Planning Empowerment, Tianjin, China, 28 June–2 July 2023.
34. Wang, L.; Zhang, Y. Research on rural tourism experience from an embodied perspective: A case study of Yuanjia Village, Shaanxi. *J. Xianyang Norm. Univ.* **2022**, *37*, 46–52.
35. Wang, Q.; Hu, X.; Ai, S. Identity, mobility and power: Spatial practices of street vendors. *Hum. Geogr.* **2020**, *35*, 35–43.
36. Wei, C.; Wang, F. Street vendors and the city. *Huazhong Archit.* **2008**, *26*, 106–108.
37. Hu, J.; Suo, Y. Mobile vendors and popular culture in modern Chinese cities. *Gansu Soc. Sci.* **2012**, *176*, 164–167.
38. Ma, Z. Vitality and quality: The resilient production of urban vendor space and reflections on its governance. *Soc. Sci. Yunnan* **2021**, *188*, 139–146.
39. Glaser, B.G. *The Grounded Theory Perspective: Conceptualization Contrasted with Description*; Sociology Press: Mill Valley, CA, USA, 2001.
40. Fu, Y. Between space, relational sociology, and Lefebvre's critique of modernity: An understanding of relational spatiality in trans-actional perspective. *Sociol. Forum* **2024**, *40*, 342–356. [CrossRef]
41. Räcker, T.; Geiger, D.; Seidl, D. From coordinating in space to coordinating through space: A spatial perspective on coordinating. *Organ. Theory* **2024**, *5*, 26317877241270124. [CrossRef]
42. Lefebvre, H. *The Production of Space*; Blackwell Publisher: Hoboken, NJ, USA, 1991; pp. 38–39.
43. Pierce, J. How Can We Share Space? Ontologies of Spatial Pluralism in Lefebvre, Butler, and Massey. *Space Cult.* **2019**, *25*, 20–32. [CrossRef]
44. Dogan, O.; Lee, S. Jane Jacobs's urban vitality focusing on three-facet criteria and its confluence with urban physical complexity. *Cities* **2024**, *155*, 105446. [CrossRef]
45. Vidal Domper, N.; Hoyos-Bucheli, G.; Benages Albert, M. Jane Jacobs's Criteria for Urban Vitality: A Geospatial Analysis of Morphological Conditions in Quito, Ecuador. *Sustainability* **2024**, *15*, 8597. [CrossRef]
46. Jacobs, J. *The Death and Life of Great American Cities*; Vintage Books: New York, NY, USA, 1961; pp. 3+29–54.
47. Merleau-Ponty, M. *Phenomenology of Perception*; Taylor and Francis e-Library: Abingdon, UK, 2005; p. 43.
48. Waskul, D.D.; Vannini, P. *Body/Embodiment Symbolic Interaction and the Sociology of the Body*; Ashgate: Farnham, UK, 2006; p. 3.
49. Xuan, C.Q.; Feng, B.Y. The research dilemma and theoretical breakthrough of "embodiment". *Nankai J. (Philos. Humanit. Soc. Sci. Ed.)* **2023**, 114–125.
50. Shilling, C. Physical Capital and Situated Action: A New Direction Ore Corpo-Real Sociology. *Br. J. Sociol. Educ.* **2004**, *25*, 1473–1487. [CrossRef]
51. Latour, B. *Reassembling the Social: An Introduction to Actor-Network Theory*; Oxford University Press: Oxford, UK, 2005; pp. 63–86.
52. Zhang, J.Y. Garbage as a Dynamic Entity: A Study of Waste from the Perspective of Materiality. *Sociol. Stud.* **2021**, *36*, 204–224+230.
53. Tim, I. From science to art and back again: The pendulum of an anthropologist. *Anuac* **2016**, *5*, 5–23.
54. Tim, I. One world anthropology. *J. Ethnogr. Theory* **2018**, *8*, 158–171.

55. Bai, M.F. An Attempt to Transcend Nature and Humanity: On Tim Ingold's "Dwelling Perspective". *J. Qinghai Minzu Univ. (Soc. Sci. Ed.)* **2017**, *43*, 54–59.
56. Soja, E.W. *Thirdspace: Journeys to Los Angeles and Other Real-and-Imagined Places*; Blackwell Publisher: Hoboken, NJ, USA, 1996; pp. 1–6.
57. Oldenburg, R. *The Great Good Place: Cafes, Coffee Shops, Bookstores, Bars, Hair Salons, and Other Hangouts at the Heart of a Community*; DA CAPO Press: Boston, MA, USA, 1989; pp. 44–62.
58. Liu, Y. The Street as a Stage: A Study on the Construction of the "Third Space" in Youth Street Music Practice. *China Youth Study* **2025**, *8*, 14–22+40.
59. Turner, V. *The Ritual Process: Structure and Anti-Structure*; Jianbo, H.; Boyun, L., Translators; China Renmin University Press: Beijing, China, 2006; Original work published 1969.
60. Wu, Z.C.; Wu, X.N. A study on the therapeutic mechanism of "vitality and warmth" in tourist destinations: From the perspective of rhythm analysis. *Tour. Trib.* **2025**, *40*, 9–12.
61. Li, S.; Zhong, W.Q. A study on the formation mechanism of locality in urban night cultural and tourism consumption clusters: A case study of Foshan City, Guangdong Province. *World Reg. Stud.* **2025**, *34*, 178–194.
62. Xia, Y.M.; Ma, Y.Q. Research on the protection and development of traditional villages based on local knowledge: A case study of Xijiang Qianhu Miao Village. *Archit. Cult.* **2025**, *6*, 233–236.
63. Wang, Q.; Zhang, Y.F.; Chen, H.Y. Re-examining tourist experience: From the perspective of assemblage theory. *Chin. Ecotourism* **2025**, *15*, 219–229.
64. Yuan, C.; Xu, L.Z. Reconsidering tourist landscapes from the actor-network theory perspective: Theoretical origins, conceptual connotations, and research approaches. *Hum. Geogr.* **2025**, *40*, 175–183.
65. Xue, X.M.; Li, Y. Mobile place: The spatial construction of Xinduqiao inns led by tourism operators. *Hum. Geogr.* **2025**, *40*, 37–44.

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Article

Managing Consumer Attention to Sustainability Cues in Tourism Advertising: Insights from Eye-Tracking Research

Marek Józwiak

Department of Organizational Innovation Management, Faculty of Management, Bydgoszcz University of Science and Technology, 7 Professor S. Kaliski Avenue, 85-796 Bydgoszcz, Poland; marek.jozwiak@pbs.edu.pl

Abstract

Sustainable tourism requires balancing environmental protection, social equity, and economic viability, yet its effective promotion depends on communication strategies that genuinely capture travelers' attention. Despite growing emphasis on ecological responsibility in marketing, little is known about how sustainability-related content in tourism advertising is actually perceived. This study addresses this gap by examining visual attention to eco-oriented elements in promotional materials through eye-tracking technology. The research aimed to identify whether ecological certifications, slogans, and related cues attract attention and influence consumer choices, and to assess how these processes are moderated by individual ecological awareness. An experimental design was conducted with 23 young adults (aged 18–22) who viewed three tourism offers differing in their degree of sustainability messaging. Eye movements were recorded with the Gazepoint GP3 HD eye-tracker, focusing on predefined Areas of Interest (AOIs), including ecological certificates, pricing, and imagery. Heatmaps and fixation metrics were complemented by a post-exposure questionnaire. The results indicate that visually dominant components such as destination images and pricing consistently attracted the most attention, while sustainability cues were noticed but rarely prioritized. Participants with higher ecological awareness actively sought and recalled these elements, highlighting the moderating role of intrinsic motivation. The study contributes to both sustainable tourism and neuromarketing research by demonstrating how ecological values interact with perceptual behavior. Practically, it shows that eye-tracking can guide the optimal placement and design of sustainability cues in advertising. The exploratory nature and small, homogeneous sample are acknowledged as limitations, but they provide a valuable foundation for future large-scale studies.

Keywords: advertising perception; consumer behavior; eye-tracking; sustainable tourism; visual attention

1. Introduction

In the face of accelerating climate change, overexploitation of natural resources, and increasing social tensions in popular tourist destinations, the concept of sustainable tourism has gained significant prominence as an alternative to dominant mass tourism models. An increasing number of international institutions, industry organizations, and governments underscore the need to transform the tourism sector toward a more ethical, responsible, and sustainable trajectory. By definition, sustainable tourism is grounded in the balanced integration of three pillars: environmental protection, social equity, and long-term economic viability, while simultaneously respecting local communities and cultural heritage [1,2].

Despite broad strategic endorsement of these principles, the practical implementation of sustainability in tourism remains constrained by numerous challenges. One of the most pressing issues involves communication: how to effectively convey pro-environmental messages in ways that capture attention, are retained in memory, and influence consumer decision-making. In an era dominated by images and visual communication, particularly within digital media, the design of compelling marketing materials plays a critical role in shaping awareness, attitudes, and purchase intentions among tourists.

As a result, there is growing interest in examining the effectiveness of visualizing sustainability-related content both from aesthetic and cognitive perspectives. Visual elements such as images, symbols, color schemes, and graphic layouts possess the potential not only to elicit emotional responses but also to guide viewer attention and reinforce information retention. One of the most precise and objective methods for investigating how such content is perceived is eye-tracking technology, which enables researchers to monitor visual trajectories and identify the specific elements that attract the viewer's attention. By analyzing key metrics such as time to first fixation (TTFF), number of fixations, and heatmaps, researchers can assess which components of promotional messages are genuinely noticed and which remain unattended despite their presence.

Although previous studies have addressed sustainability communication and applied eye-tracking in advertising research, little is known about how ecological certifications and related cues are visually processed in the specific context of tourism offers. Most existing work relies on self-reported attitudes rather than direct measures of visual behavior, leaving a gap in understanding the perceptual mechanisms underlying attention to sustainability content. This discrepancy suggests that there may be a systematic divergence between declared environmental values and actual perceptual patterns, which constitutes a critical gap in understanding the effectiveness of sustainability communication. This study seeks to address this gap by combining eye-tracking metrics with survey responses to explore whether ecological elements in tourism advertising are capable of attracting visual attention and shaping consumer preferences. Accordingly, the research is guided by the following question: Do sustainability-related cues in tourism advertising attract visual attention and shape consumer preferences?

The aim of this article is to investigate patterns of visual attention directed toward sustainability-related content in tourism advertising materials using eye-tracking technology, and to evaluate the impact of such content on the perception and preferences of young consumers. Particular emphasis is placed on assessing the visual effectiveness of eco-oriented elements such as environmental certifications, slogans promoting responsible travel, and references to local, authentic experiences. The study also considers participants' self-reported ecological awareness, allowing for an evaluation of whether individuals with greater environmental engagement differ in their perceptual strategies and consumer choices.

The study employs an experimental design in which young adult participants were exposed to three visually differentiated tourism offers, each presenting varying degrees of sustainability-related content. During the exposure, eye-tracking data were collected, followed by a post-exposure questionnaire. This methodological approach enabled the identification of perceptual patterns and the assessment of whether eco-related elements were noticed, remembered, and factored into offer selection and consumer preference declarations.

The findings of this study contribute to a deeper understanding of how pro-environmental messages are perceived within the context of tourism marketing and offer practical recommendations for the design of more effective materials promoting sustainable tourism. More broadly, the article aligns with the growing interest in applying neuro-marketing tools to research on responsible consumption and supports the development

of methods for evaluating communication effectiveness in domains of high social and environmental relevance.

The remainder of this article is structured as follows: Section 2 reviews relevant literature on sustainable tourism, communication strategies, and eye-tracking research. Section 3 describes the methodology. Section 4 presents the results, followed by discussion in Section 5. Section 6 concludes with implications, limitations, and directions for future research.

2. Literature Review

2.1. Conceptual and Theoretical Framework

This study is grounded in the intersection of three complementary theoretical domains. Sustainable tourism research emphasizes the need to integrate environmental, social, and economic dimensions into tourism development, while simultaneously encouraging responsible consumer behavior and long-term destination resilience [3,4]. This perspective highlights not only the normative importance of sustainability principles but also the practical challenge of effectively communicating them to travelers.

Marketing communication theory underscores how message framing, visual design, and symbolic representation influence consumer perceptions, attitudes, and purchase intentions [5]. In the tourism context, communication strategies must capture attention in a competitive information environment, where consumers often make quick decisions based on visual impressions. Advertising effectiveness therefore depends not only on the presence of sustainability information but also on how this information is presented, positioned, and integrated with other salient attributes such as price and imagery.

Theories of visual attention provide an explanatory framework for understanding how individuals allocate cognitive resources to different elements within complex visual stimuli. According to this perspective, attention is drawn to features with high salience, such as vivid colors, contrasts, or central placement, which strongly influence gaze trajectories and information retention [6,7]. These mechanisms explain why peripheral or less visually dominant sustainability cues may struggle to attract attention, even when audiences express positive attitudes toward ecological values.

The integration of these three perspectives establishes the theoretical foundation for applying eye-tracking as a neuromarketing tool in the study of sustainable tourism advertising. While previous works have analyzed sustainability communication or advertising perception separately, few have combined these approaches to investigate how ecological certifications and related cues are actually processed in tourism offers. By linking sustainable tourism communication with marketing strategies and cognitive theories of attention, this study seeks to evaluate whether sustainability-related cues can effectively attract visual attention and shape consumer preferences. This theoretical integration directly informs the guiding research question: Do sustainability-related cues in tourism advertising attract visual attention and shape consumer preferences?

2.2. Sustainable Tourism—Definitions, Importance, Current Challenges

Sustainable tourism is an integrative framework within tourism development. It emphasizes environmental protection, social equity, and economic viability. This approach reduces the ecological degradation caused by tourism while maximizing socio-economic benefits for local communities and protecting cultural resources. Foundational definitions in the field stress that tourism should account for both short- and long-term economic, social, and environmental consequences, aligning with the expectations of tourists, industry stakeholders, and host communities [3,4].

The importance of sustainable tourism lies in its ability to counteract the negative impacts of conventional models, such as ecological degradation and the erosion of cultural authenticity. Beyond mitigation, it strengthens the adaptive capacity and socio-economic stability of host communities [8]. Growing global concern about the environmental and social costs of tourism has encouraged policymakers, industry actors, and local stakeholders to adopt development strategies that distribute benefits more fairly and preserve destination integrity. Recent trends show an increasing integration of sustainability principles into regional governance, reflecting a deeper recognition of the long-term risks associated with unsustainable tourism [9,10].

Despite its significance, sustainable tourism still faces major challenges. Overtourism intensifies environmental pressures, accelerates resource use, and often provokes resistance from local populations [11,12]. Tourism models remain dominated by short-term economic goals, frequently neglecting ecological, socio-cultural, and ethical considerations [8]. The COVID-19 pandemic further exposed structural vulnerabilities in the tourism sector. It highlighted the need for resilient and adaptable frameworks that safeguard both community well-being and the natural environment. The pandemic not only disrupted international mobility but also revealed the extent to which tourism systems are dependent on fragile global supply chains, seasonal employment patterns, and the continuous inflow of international visitors. These disruptions exposed structural imbalances in the sector, particularly the prioritization of short-term economic gains at the expense of long-term resilience. They also emphasized the need for governance models that can strengthen adaptive capacity, safeguard local communities, and integrate environmental sustainability into recovery strategies during systemic crises [13].

Collective action and stakeholder engagement are crucial for overcoming these challenges. Collaboration between local communities, governments, and tourism businesses supports sustainable livelihoods and helps preserve cultural and environmental resources [14,15]. Recent studies stress that the active participation of residents enhances the adoption of sustainable tourism practices, ensuring that development respects local interests and distributes benefits equitably [16]. Achieving such participation requires mechanisms that go beyond consultation and incorporate communities into decision-making processes from the outset. Practical strategies include participatory planning workshops, co-management of tourism resources, and revenue-sharing schemes that ensure tangible local benefits. While the full realization of these approaches may be challenging in destinations dominated by external investors or mass-market dynamics, evidence from community-based tourism initiatives demonstrates that they can be effective when supported by transparent governance, long-term institutional commitment, and culturally sensitive engagement practices.

Sustainable tourism also offers a framework for responding to global challenges such as climate change, globalization, and socio-cultural transformation. It shifts tourism away from growth-driven models toward long-term stewardship, social responsibility, and inclusivity. By addressing issues such as biodiversity loss, carbon emissions, and water resource management, while also fostering equity and protecting cultural heritage, sustainable tourism strengthens the resilience and viability of destinations [17,18].

The effective implementation of sustainable tourism depends on evidence-based and context-sensitive policies. It also requires collaboration across diverse stakeholders, including governments, industry professionals, local communities, and tourists themselves. In today's complex environment, shaped by changing consumer preferences, rapid technological innovation, and global crises, flexible and inclusive governance models are essential. Sustainable tourism not only responds to current challenges but also anticipates future

disruptions. This positions it as a central pillar in the transition toward more ethical and resilient tourism systems [19–21].

Although the strategic role of sustainable tourism is widely recognized, less attention has been paid to how sustainability principles are communicated and perceived in practice. This gap underscores the need to study the effectiveness of visual communication tools such as eye-tracking, which can reveal how ecological cues are noticed and processed by potential tourists. This perspective directly informs the guiding research question of the present study.

2.3. Marketing Communication of Pro-Ecological Content—Ways of Visualizing Sustainable Elements

The dissemination of environmentally conscious messages within the tourism industry is gaining prominence as a key mechanism for advancing sustainable practices. Strategic marketing communication serves as a powerful tool in influencing tourist attitudes and decision-making, especially in relation to environmentally responsible travel options. In particular, the visual portrayal of sustainability-related themes plays a crucial role in reinforcing the appeal and credibility of eco-friendly initiatives, thereby increasing the persuasive impact of sustainability-oriented marketing efforts [5,22].

One effective way to visualize sustainable elements is through sensory marketing, which taps into the emotional connections that resonate with tourists. Agapito et al. [23] discuss how diverse resources and aesthetic perspectives in tourism can be harnessed to create memorable experiences that promote destination loyalty and contribute to sustainable local development. This emphasizes the importance of not only the visual representation of eco-friendly practices but also the integration of sensory experiences that can enrich tourist memories. By employing images that evoke natural beauty and serene environments, marketers can effectively illustrate the sustainability narrative and appeal to tourists' desires for authentic and responsible travel experiences [24].

Incorporating sustainability into the development of tourism products necessitates a comprehensive framework that acknowledges the diverse and often contested interpretations of sustainability. As García-Rosell and Mäkinen [25] highlight, engaging with these varied discourses enables a more thorough and context-sensitive assessment of sustainability within tourism. Consequently, marketing strategies should be grounded in these interpretative frameworks, ensuring that promotional content conveys not only aesthetic appeal but also substantive meaning. Visual elements in tourism marketing, therefore, should go beyond superficial representations, offering insight into the sustainable values and practices embedded in the tourism experience. Through such representations, marketers can cultivate a more informed and emotionally resonant connection with prospective tourists, enhancing both awareness and commitment to sustainable travel [26,27].

Digital marketing plays a pivotal role in shaping how sustainable tourism is communicated and perceived, particularly through the visualization of environmentally responsible practices. As noted by Aman and Papp-Váry [28], leveraging digital marketing technologies allows tourism enterprises to effectively present their sustainability efforts to a wide and diverse audience, thereby strengthening their market position. Digital platforms facilitate innovative forms of visual storytelling, employing tools such as high-resolution imagery, infographics, and video content to depict practices like resource conservation, the use of renewable energy, and active community engagement. These visual narratives not only inform but also emotionally engage environmentally conscious tourists, fostering a sense of connection and encouraging travel choices aligned with sustainable values [29,30].

Challenges remain, however, in ensuring that marketing communication genuinely reflects sustainability practices without falling prey to “greenwashing,” where companies misrepresent their ecological efforts. Font and McCabe [31] discuss the paradoxes within

tourism marketing, emphasizing the need to carefully communicate sustainable practices while avoiding misconceptions. Transparency and authenticity in visual communication are essential to build trust and loyalty among consumers. Visual content that showcases real initiatives and the impacts of these actions can promote a sense of accountability and encourage a more meaningful connection between tourists and destinations [32,33]. In tourism marketing, this challenge appears particularly salient, as promotional materials frequently rely on idealized imagery. Consequently, sustainability communication may risk being perceived as superficial unless it is embedded in a transparent and credible narrative. This consideration is particularly relevant in the context of the present study, which demonstrates that ecological elements, while noticed, do not dominate visual attention unless strategically integrated into salient design features.

An essential component of effective sustainable tourism marketing lies in the meaningful inclusion of local communities in both content creation and representation. As key custodians of sustainable practices, community members contribute valuable perspectives that enhance the authenticity and credibility of promotional narratives. Lacmanović and Bulatović [34] emphasize that involving local populations in marketing efforts is fundamental to the success of community-based tourism initiatives. By integrating local voices, cultural traditions, and visual depictions of environmentally and socially responsible practices, marketing communications can establish a deeper emotional and ethical connection with tourists who prioritize authentic and immersive experiences [35,36]. In practice, such inclusion can be achieved through collaborative storytelling workshops, participatory photography and video projects, or the co-design of promotional materials in partnership with local stakeholders. These approaches enable residents to articulate their own perspectives and highlight culturally embedded sustainability practices. Empirical evidence from community-based tourism projects suggests that when locals are actively engaged in shaping narratives, the resulting materials not only enhance authenticity but also foster stronger community support and long-term commitment to sustainable tourism initiatives [37].

Visual representations of sustainable tourism can be further enhanced through the use of innovative technologies such as eye tracking systems. Eye tracking allows researchers and marketers to examine how viewers interact with visual content, providing insights into which sustainability elements draw attention and how effectively messages are conveyed. By identifying areas of focus within promotional materials, such as images of conservation activities or environmentally friendly infrastructure, marketers can refine visual designs to highlight important sustainable practices. This evidence-based approach not only improves the clarity of communication but also strengthens tourists' cognitive engagement with sustainability themes [38,39]. As Aman and Papp Vary [28] suggest, incorporating advanced digital tools can help present complex sustainability concepts in a more accessible and compelling manner than traditional marketing methods.

The communication of pro-environmental messages in the tourism sector can be substantially improved through the deployment of strategic visualizations that engage sensory perception, integrate locally grounded narratives, and employ advanced digital technologies. A multidimensional approach that foregrounds authenticity, actively involves local communities, and facilitates experiential engagement contributes to more meaningful connections between tourists and sustainability-oriented practices. In the evolving landscape of sustainable tourism, the effectiveness of marketing efforts depends on the capacity to adapt communication strategies in response to shifting consumer expectations and environmental imperatives. As such, sustained refinement and intentionality in message design are essential for fostering long-term support for sustainable tourism initiatives [40,41].

While sustainability communication relies heavily on visual and symbolic elements, it remains unclear how such content is actually perceived by audiences. To move be-

yond assumptions, objective methods are required to measure attention to ecological cues. Eye-tracking provides such a tool, offering empirical insights into how viewers process sustainability-related messages in tourism advertising.

2.4. Eyetracking in Advertising Perception Research—Applications, Typical Metrics

Eye-tracking is widely recognized as a powerful method in advertising research because it provides objective data on how consumers engage with visual stimuli. By recording gaze patterns, it reveals which elements capture attention and how these patterns influence recall, evaluation, and decision-making. This approach has been applied across various media, including print, digital, and video advertising, and it has become a cornerstone of neuromarketing studies [42–44]. A central contribution of eye-tracking is its ability to move beyond self-reported measures and uncover the unconscious processes that shape consumer behavior [45–47].

In the tourism domain, eye-tracking has been increasingly used to analyze the effectiveness of promotional materials and the perception of landscapes and cultural attractions. For example, research has shown how artificial or natural elements in advertisements can direct attention and alter the way destinations are perceived [48–50]. These applications confirm that eye-tracking is particularly suitable for studying how audiences process complex advertising layouts that combine imagery, text, and symbolic cues.

The method relies on several standard metrics. Time to first fixation (TTFF) indicates how quickly a stimulus attracts attention, while fixation duration reflects the depth of cognitive processing. The number of fixations provides insight into how attention is distributed across elements, and dwell time integrates both duration and frequency to indicate overall engagement. Heatmaps visually summarize attention hotspots, while scanpaths trace the sequence of viewing and reveal whether users follow the intended design hierarchy. Together, these measures allow researchers to identify dominant elements in an advertisement and detect cues that may be overlooked [51–59].

For sustainable tourism communication, these tools are particularly valuable. Ecological cues such as certifications, labels, or pro-environmental slogans may be included in advertising but remain peripheral to actual perception. Eye-tracking makes it possible to test whether such elements are noticed, how long they are processed, and whether they influence memory and preferences [60,61]. By applying this methodology, the present study addresses a gap in the literature: the limited understanding of how sustainability-related content is visually processed in tourism advertising. This integration of tourism, marketing communication, and visual attention research directly informs the guiding research question of the paper.

3. Materials and Methods

3.1. Participants

The study involved 23 young adults aged 18–22 years ($M = 20.22$). This demographic was deliberately chosen for several reasons. Young consumers represent a growing and influential segment of the tourism market, with increasing purchasing power and strong engagement in digital environments. They also typically demonstrate heightened ecological awareness and are more frequently exposed to sustainability messaging in media compared to older groups. Furthermore, their familiarity with online booking platforms makes them an appropriate target group for testing perceptions of tourism advertisements.

The study focused on a homogeneous group of young adults in order to minimize variability related to age, life stage, or travel experience. This design choice allowed for a more controlled assessment of visual attention patterns and reduced the influence of potential confounding factors. The intention was to ensure that observed differences in

perception were attributable primarily to the design of the advertising materials rather than to demographic heterogeneity.

Participants were recruited on a voluntary basis from a university setting using convenience sampling. All participants reported normal or corrected-to-normal vision and provided informed consent. Participation was voluntary, and each individual was informed that they could withdraw from the study at any time without consequences.

The relatively small and homogeneous sample reflects the exploratory and pilot character of the study. The aim was not to achieve representativeness but to generate preliminary insights into visual attention processes in the context of sustainable tourism advertising. While the limited sample size constrains statistical power and generalizability, this approach is consistent with pilot research in eye-tracking, where smaller samples have been sufficient to reveal meaningful attention patterns and to refine research designs prior to large-scale investigations.

Focusing specifically on young adults allowed the study to capture a demographic segment characterized by relatively high ecological awareness and digital literacy. This design choice facilitated the assessment of whether self-declared ecological sensitivity translates into differentiated visual exploration strategies when exposed to sustainability-related advertising cues.

3.2. Study Design

Three tourism offers were graphically and textually designed to resemble travel agency advertisements. The materials were prepared in Polish to ensure natural comprehension and varied systematically in the extent of sustainability-related content. All offers had comparable layout, typography, and price range (3500 PLN for two adults for seven nights with breakfast).

Offer A (Strong sustainability emphasis—“Eco-tour”): A stay at an eco-hotel certified with both the EU Ecolabel and Green Key. The advertisement highlighted renewable energy use, eco-friendly hotel standards, waste minimization, locally sourced organic food, and eco-educational programs, supported by slogans encouraging responsible travel.

Offer B (Moderate sustainability emphasis—“Lakeside Relaxation”): Accommodation in a comfortable hotel with eco-design elements and a Green Key certificate. Sustainability information was included but less prominent, embedded in background text. The main focus remained on standard features such as a balcony with lake view, restaurant services, and opportunities for motorized water sports.

Offer C (No sustainability emphasis—“Luxury Holiday”): A modern, elegant hotel offering superior rooms with lake view, buffet breakfasts with a wide choice of dishes, recreational options (jet-skis, motorboats), and evening entertainment. No ecological content or certifications were included; emphasis was on comfort and luxury.

Each participant completed the study individually. The procedure consisted of three stages: (1) general instructions and calibration, (2) exposure to the three offers in random order, each displayed for 55 s, and (3) a post-exposure questionnaire assessing attractiveness, recall, perception of ecological content, and self-reported ecological awareness.

3.3. Equipment

Eye movements were recorded using the Gazepoint GP3 HD eye-tracker (Gazepoint, Vancouver, BC, Canada), which operates at a sampling rate of 150 Hz and a spatial accuracy of 0.5°. These parameters ensured sufficient precision for analyzing visual attention in advertising perception studies. The device uses infrared sensors and allows for non-intrusive calibration, enabling participants to engage comfortably without disrupting natural behavior. The GP3 HD was selected because it provides a practical balance between

accuracy, usability, and accessibility, making it particularly suitable for exploratory pilot research. Individual calibration was conducted prior to each session using fixed screen points to ensure accurate mapping of gaze trajectories. Stimuli were presented on a 24-inch LCD monitor (1920 × 1080 resolution) with participants seated at an approximate viewing distance of 65 cm.

3.4. Data Analysis

Data were processed using iMotions 9.1 software. Heatmaps were generated to visualize the intensity of visual attention, with red zones indicating high fixation density and green or unmarked areas indicating lower or no attention. Predefined Areas of Interest (AOIs) included ecological certificates, price and meal information, transportation details, descriptive text, and main imagery (e.g., hotel or landscape photos). Metrics extracted included Time to First Fixation (TTFF), total fixation duration, number of fixations, and number of revisits.

The analysis was limited to descriptive statistics and qualitative comparisons between eye-tracking results and questionnaire responses. In addition to eye-tracking metrics, responses from the ecological attitudes questionnaire were analyzed using descriptive measures (mean, standard deviation, median, interquartile range, and range), which enabled the assessment of participants' pro-environmental orientation and its potential moderating role in visual attention and preference formation. This approach facilitated the identification of general attention patterns and discrepancies between self-reported perceptions and actual gaze behavior. No inferential statistical tests were conducted, as the study was designed as an exploratory experiment with a relatively small and homogeneous sample. An overview of the study design is presented in Figure 1.

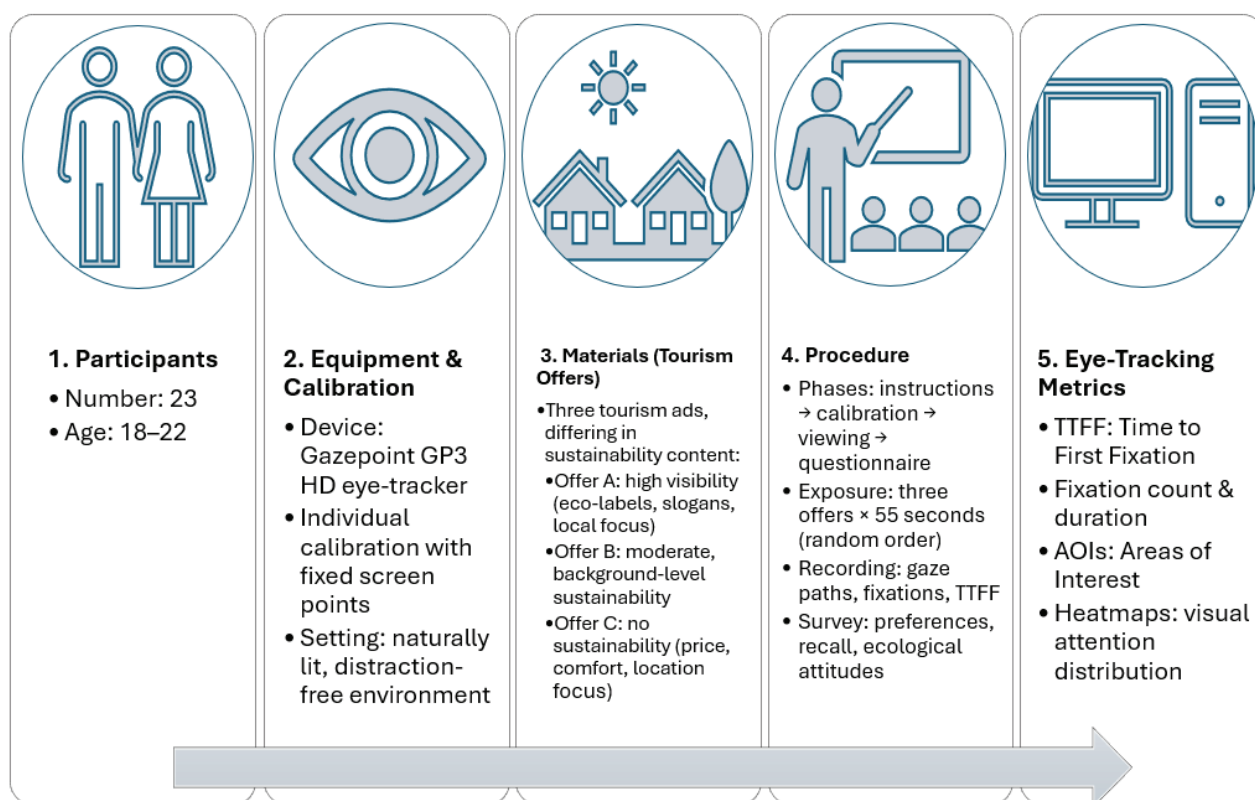


Figure 1. Overview of the study design: participants, equipment, materials, procedure, and eye-tracking metrics. Overview of the experimental design, including participant characteristics, equipment, materials, procedure, and eye-tracking metrics. The study involved 23 participants aged

18–22 years. Eye movements were recorded using a Gazepoint GP3 HD eye-tracker, with individual calibration performed for each participant using fixed screen points in a naturally lit, distraction-free environment. The materials consisted of three tourism advertisements resembling real travel agency offers, differing in sustainability content: Offer A featured highly visible pro-environmental elements (eco-labels, slogans, local experiences), Offer B presented moderate, background-level sustainability cues, and Offer C contained no sustainability references, focusing on price, comfort, and location. The procedure included instructions, calibration, viewing, and a post-exposure questionnaire; each participant viewed all three offers in random order for 55 s each, with continuous recording of gaze paths, fixation counts, and time to first fixation (TTFF). The questionnaire assessed offer preferences, recall of visual elements, and self-reported ecological attitudes. Eye-tracking analyses included TTFF, total fixation count, fixation duration for predefined Areas of Interest (AOIs), and heatmaps visualizing the distribution of visual attention across each offer.

4. Results

The heatmap analysis conducted during the study revealed distinct variations in the patterns of visual attention distribution, depending on the type of offer and the spatial arrangement of individual visual elements. The figures below present the heatmaps corresponding to offers A, B, and C (Figure 2).

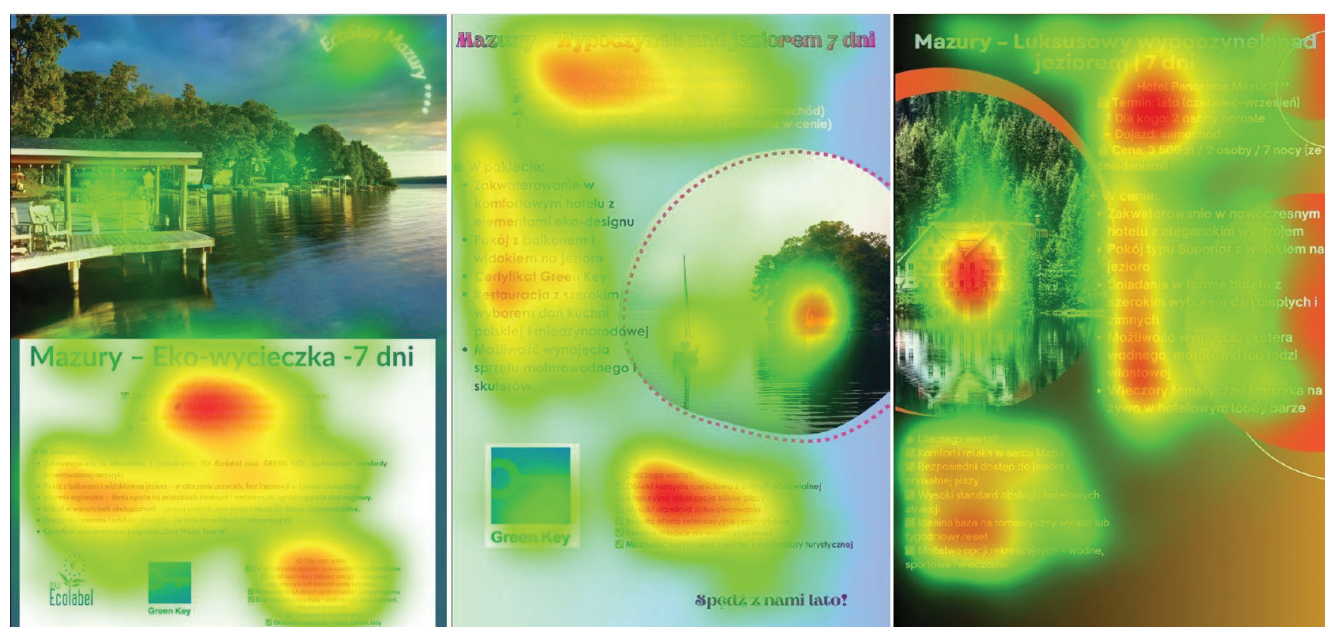


Figure 2. Heat maps Offers A, B and C.

Heatmap analysis for Offer A (“Mazury—Eco-Trip”) revealed that the highest fixation density was observed in the header area, the informational section containing transportation and pricing details, as well as the textual description of the offer. The landscape image (featuring a lake and pier) also attracted visual attention, although to a moderate degree. Regarding the ecological certifications (EU Ecolabel and Green Key), placed in the lower part of the offer, fixations were recorded (green areas on the heatmap), indicating that participants noticed these elements. However, they were not dominant in terms of visual attention intensity the absence of red or bright yellow zones suggests that the certifications were processed superficially or briefly.

In Offer B (“Mazury—Lakeside Leisure”), the pattern of visual attention was more dispersed. Stronger fixations were observed in the offer’s header, in the block containing information on dates and transportation, on the landscape image (a boat on the lake), and within the text describing available attractions. Fixations on the Green Key certification

were present (green area), yet similarly to Offer A these were neither strong nor sustained. This pattern suggests a more general, holistic scanning of the offer by participants, without distinct concentration on any single leading element.

In the case of Offer C (“Mazury—Luxury Lakeside Stay”), which did not include any ecological content, the heatmap displays a classic pattern of tourist material exploration. The strongest fixations were concentrated on the large image of the hotel and on the textual section outlining offer details and additional attractions. Information regarding transportation and pricing also attracted attention. There were no signs of attempts to search for ecological content, which is consistent with its absence in the material.

The heatmap analysis confirms that visually dominant elements such as images, headers, and key informational blocks (price and transport) consistently attracted the greatest share of visual attention across all three offers. Although ecological certifications were noticed (fixations were present), they did not emerge as perceptually dominant elements. This suggests that placing ecological content in less prominent or peripheral areas of the layout may limit its perceptual effectiveness, even among viewers who declare a high level of environmental awareness. These findings underscore the importance of effective visual design in sustainable tourism materials, ensuring that key pro-environmental components are not only noticed but also successfully retained in memory.

The results of the study indicate that the presentation format of tourism offers and the spatial arrangement of individual graphic elements significantly influenced their perception and evaluation by participants. Offer B was selected most frequently (by nine participants), followed closely by Offer A (eight selections), while Offer C was chosen by six participants. The distribution of preferences was relatively balanced, suggesting that no single offer was a clear leader in participant preference.

Average ratings of visual attractiveness among the three offers also showed no significant differences. Offer A received the highest average score (4.13 on a five-point scale), followed by Offer B (3.91), and then Offer C (3.65). However, these differences were not statistically pronounced, indicating no clear advantage for any of the offers in terms of visual appeal.

In the question concerning the remembered elements of the offer, participants most frequently indicated the hotel photograph (19 participants), transportation information (13), the ecological certificate (12), nature imagery (12), and the trip price (9). These self-reported responses were consistent with the visual attention patterns observed in the heatmaps. In all three offers, strong fixations occurred on large hotel and landscape photographs, as well as on text blocks containing information about transportation and pricing. Although fixation counts on ecological certifications were relatively low, recall data indicate that these elements were nonetheless registered by a substantial proportion of participants. This suggests that for environmentally concerned individuals, peripheral processing of sustainability cues may be sufficient to influence preference formation. In such cases, the presence of a certification seal serves primarily as a confirmatory signal rather than as a focal point of visual exploration.

With respect to the ecological certifications present in Offers A and B, fixations were noticeable but not particularly intense. Although the certificates were not the primary focal points of visual attention, their visibility on the page appeared sufficient for participants to register and later recall them. This suggests that even brief visual contact with a distinctive symbol—such as the EU Ecolabel or Green Key may be enough to facilitate recognition and memory encoding. In the case of Offer C, which did not include any ecological content, there was no evidence of attempts to search for such information, as confirmed by the absence of both fixations and corresponding memory declarations.

Catering options, although formally present in all offers, were indicated less frequently and did not attract visual attention to the same extent as more visually prominent content. The heatmaps show no strong fixation clusters in these areas, only brief glances. Similarly, promotional slogans encouraging responsible tourism were largely overlooked; they were not mentioned in memory-based responses, and the corresponding areas on the heatmaps did not feature any notable fixation activity.

Most participants rated their ecological awareness as high or very high. These individuals were also more likely to agree with statements regarding the influence of pro-environmental attitudes on consumer behavior, including the selection of tourism services. Nevertheless, ecological elements did not constitute the dominant areas of visual attention, which may suggest that their impact on perception is indirect or modulated by other factors such as their visual prominence or spatial location on the page.

The collected data suggest that the most frequently remembered and most intensely processed elements were graphic and informational components namely, images, price, transportation details, and key descriptive text. Although ecological content was noticed, its perceptual effectiveness was lower compared to more visually dominant components. This may indicate that the presence of sustainable development content in tourism materials should be not only conceptually justified but also carefully designed from a visual standpoint in order to effectively capture attention and support memory retention.

Table 1 presents the key eye-tracking metrics related to participants' visual attention during their examination of the three tourism offers. The data include the time to first fixation (TTFF), total fixation duration for each area of interest (AOI) and the number of fixations per AOI. These AOIs correspond to essential elements of each offer, such as the ecological certificate, transportation details, pricing and descriptive text, as well as landscape or hotel imagery (Figure 3).



Figure 3. Tourism offers with designated AOIs, from left to right: A, B, and C.

Table 1. Eye-tracking metrics for participants' visual attention across tourism offers A, B, and C.

Offer	Area of Interest (AOI)	Object	Time to First Fixation (ms)	Fixation Duration (ms)	Number of Fixations
A	AOI 1	Ecological certificate	25,846	186.99	5.8
	AOI 2	Transportation information	2263	122.89	43.87
	AOI 3	Price, meals, description	8388	171.84	58.61
	AOI 4	General information	26,452	153.63	22.27
	AOI 5	Hotel image	844	139.92	30.65
B	AOI 1	Ecological certificate	21,002	138.35	5.45
	AOI 2	Transportation information	15,006	189.63	31.91
	AOI 3	Description and price	1743	154.57	47.13
	AOI 4	General information	1555	125.75	54.43
	AOI 5	Hotel image	4623	132.19	22.74
C	AOI 1	General information	13,630	200.24	37.35
	AOI 2	Transportation information	6208	202.88	50.3
	AOI 3	Image, description and price	3958	129.34	28.7
	AOI 4	Price, meals, description	2070	97.88	47.3

The analysis of the data indicates that hotel images and key informational blocks—such as the offer description, pricing, and transportation details—were the most intensively visually explored elements of the stimuli. Both the number of fixations and the total fixation duration for these areas were the highest among all analyzed areas of interest. Particularly noteworthy are the time to first fixation values, which for hotel images and core content ranged from approximately 844 ms (AOI 5—hotel image, Offer A) to 8388 ms (AOI 3—price and description, Offer A), indicating that these elements were located relatively early after the beginning of exposure. In contrast, the TTF values for the ecological certificates in Offers A and B were 25,846 ms and 21,002 ms, respectively, suggesting that these elements were located significantly later.

Although ecological certificates were present in two out of the three offers and had designated AOIs, they did not generate high fixation counts compared to other areas. In Offer A, the number of fixations for AOI 1 (certificate) was 5.8, while in Offer B it was 5.45. Although these values are higher than previously expected, they remain lower than, for example, AOI 3 in Offer C (photo, description, and price), which reached as many as 28.7 fixations. This demonstrates that more attention was drawn to integrated and visually dominant content. The results suggest that even peripheral or brief fixations on ecological certifications may be cognitively meaningful. For environmentally concerned respondents, a short glance at the certificate might be sufficient to confirm the presence of sustainability attributes, which then contributes to their preference formation. This indicates that the role of sustainability cues may not depend exclusively on occupying central positions in visual focus, but also on their ability to serve as quick confirmatory signals for motivated consumers.

Conversely, the data clearly indicate that visually emphasized elements—such as hotel images, landscapes, and structurally distinct textual information attracted attention most strongly. These areas were located earlier, held participants' gaze for a longer time, and were revisited multiple times throughout the exposure.

The discrepancy between the actual distribution of visual attention and the presence of sustainability-related elements suggests that the mere inclusion of sustainable content is not sufficient for it to become anchored in the viewer's awareness. The perceptual effectiveness of such content largely depends on its visual prominence, placement within the structure of the offer, and alignment with users' typical scanning habits, which in the context of tourism offers are strongly shaped by expectations related to imagery, pricing, and logistical details.

As a result, the design of promotional materials that incorporate sustainability messaging requires not only the presence of such content but also its appropriate visual integration e.g., through larger size, contrast, central placement, or alignment with key attention anchors. Only under these conditions can ecological information be expected to be noticed, cognitively processed, and play a meaningful role in shaping tourism-related decisions.

A comparison between declared ecological awareness and tourism offer preferences provides important insight into the influence of pro-environmental attitudes on consumer decision-making. Respondents who rated their ecological awareness as very high consistently preferred Offer A as the most sustainability-focused offer. No respondents in this group chose Offer B or C. Similarly, those with high ecological awareness more frequently selected Offer A (5 participants), while only one selected Offer B and two selected Offer C.

A different distribution was observed among individuals with medium ecological awareness, where Offer B was the most frequently chosen (6 indications), and Offers A and C were each chosen once. Notably, in the group declaring very low ecological awareness, all participants selected Offer B, while those stating “I have no opinion” exclusively chose Offer C the only offer without any reference to sustainability.

These results suggest that individuals with higher ecological awareness are more responsive to pro-environmental content in tourism offers and are more likely to choose proposals that include explicit references to sustainable development. Importantly, this relationship is not merely declarative. As indicated by earlier eye-tracking results, individuals who selected sustainability-themed offers (A and B) also fixated on those components, even though they were visually less prominent than core elements such as images or transportation details. The ecological certificates—despite higher TTFF values and lower fixation counts—were remembered and reported in Question 7 of the questionnaire by these participants.

Taken together with visual perception analysis, these findings suggest that participants’ ecological attitudes may influence their visual exploration paths and the cognitive prioritization of content. One may thus infer that individuals with greater environmental awareness are not only more sensitive to sustainability content but also more inclined to actively seek out and cognitively engage with it, even when it is not prominently featured in the visual hierarchy of the material.

The analysis of participants’ attitudes toward paying extra for ecological solutions reveals meaningful associations between their declarations and both their choice of tourism offer and recall of environmentally themed content. The majority of respondents (17 out of 23) agreed with the statement “I am willing to pay more for ecological solutions,” indicating a clearly pro-environmental orientation within the study group. The remaining participants either disagreed or expressed no opinion.

A clear relationship emerged between ecological attitude and offer preference. Individuals who declared willingness to pay extra were more likely to choose Offers A and B, both of which included elements related to sustainable tourism. In contrast, ecologically disengaged or skeptical individuals most frequently chose Offer C, the only one devoid of any references to environmental sustainability. Moreover, the analysis showed that those with a positive ecological attitude were also more likely to recall the ecological certificate, despite its limited visual prominence in the materials.

These findings are consistent with the results obtained via eye-tracking. Although the ecological certifications in Offers A and B did not generate high fixation counts or intense visual engagement, environmentally aware participants were nevertheless able to identify and report them as remembered elements. This may suggest that individuals with higher environmental sensitivity actively seek out such information, even when it is not centrally positioned or visually dominant within the offer layout. The alignment

between declarative data and visual attention metrics supports the notion that cognitive motivation and personal values can significantly influence how individuals explore and prioritize visual content.

In addition to visual attention data, the questionnaire assessed participants' ecological attitudes. The results indicate generally positive orientations toward sustainability. The strongest agreement was reported for choosing environmentally friendly products and services ($M = 4.39$, $SD = 0.50$, Median = 4.00) and for awareness of tourism's environmental impact ($M = 4.00$, $SD = 0.85$, Median = 4.00). Willingness to pay more for ecological solutions also received relatively high ratings ($M = 3.83$, $SD = 1.07$, Median = 4.00). By contrast, interest in sustainable development was rated lower ($M = 3.22$, $SD = 1.00$, Median = 3.00), and the influence of ecology on purchasing decisions reached a moderate level ($M = 3.57$, $SD = 1.08$, Median = 4.00). The interquartile ranges (1.00–2.00) indicate moderate variability across responses. A detailed overview of these results is presented in Table 2.

Table 2. Descriptive statistics for ecological attitudes.

Item (1–5 Likert Scale)	M	SD	Median	IQR	Range
I try to choose environmentally friendly products/services	4.39	0.5	4.00	1.00	2–5
I am interested in sustainable development	3.22	1.00	3.00	1.00	1–5
I am aware of the environmental impact of tourism	4.00	0.85	4.00	1.00	2–5
I am willing to pay more for ecological solutions	3.83	1.07	4.00	2.00	1–5
Ecology influences my purchasing decisions	3.57	1.08	4.00	1.00	2–5
Mean of 5 items	3.80	0.90	3.80	-	2–5

Note: M = Mean; SD = Standard Deviation; IQR = Interquartile Range.

5. Discussion

This study set out to answer the research question of whether sustainability-related cues in tourism advertising attract visual attention and influence consumer preferences. The results indicate that while such cues were noticed, they rarely became focal points of visual processing and had limited impact on choice unless participants already displayed high ecological awareness.

By combining eye-tracking technology with self-reported survey data, the study provides a multidimensional perspective on the perception of sustainability messaging. Previous research, such as Lourenção et al. [62], showed that logos and slogans can increase fixation counts and durations without necessarily improving the overall evaluation of an advertisement. The present study extends this line of research by focusing specifically on ecological cues in tourism advertising. Results demonstrate that even when participants declared strong pro-environmental attitudes, sustainability-related components such as certificates or slogans were rarely prioritized visually if placed in peripheral or text-heavy areas of the layout. Stronger attention to ecological cues among participants with higher environmental awareness suggests that internal motivation moderates visual processing. This finding is consistent with studies showing that green advertising is more effective among consumers with pro-environmental values. These results highlight a theoretical contribution: the discrepancy between declared values and perceptual behavior is particularly pronounced in the context of sustainability communication.

The findings can also be interpreted in light of visual attention theories, which emphasize that attention is primarily allocated to elements with high salience, such as vivid imagery or pricing information. This explains why sustainability-related cues, although present, rarely emerged as focal points. According to the limited capacity model of mediated message processing, cognitive resources are allocated first to the most salient visual

stimuli, which reduces the processing of less prominent content. In this case, ecological certifications and pro-environmental slogans lacked the same visual intensity as price or imagery, resulting in lower attentional capture. Sustainability cues also typically lack the vividness of emotionally engaging symbols. Consumers tend to prioritize features that are easily processed, while peripheral or text-heavy ecological messages require greater cognitive effort and are therefore less likely to be noticed. In tourism advertising, where visual competition is particularly intense, sustainability information is often overshadowed by elements that communicate value and attractiveness more directly.

Recent research, including Sushchenko et al. [63] and Guido et al. [64], emphasizes that visual attention often gravitates toward anthropocentric and emotionally salient stimuli such as faces, movement, and cultural symbols. The present study adds new evidence by showing that pro-environmental content struggles to compete with such elements unless it is integrated into dominant visual pathways. This underscores the importance of perceptual accessibility and emotional resonance in effective sustainability communication. At the same time, the findings also raise the possibility that increasing the visual prominence of sustainability cues may not uniformly enhance advertising effectiveness. For environmentally disengaged or sceptical consumers, excessive emphasis on ecological certifications could trigger suspicions of greenwashing or associations with inflated costs, thereby reducing the persuasive impact of the message. This potential backfire effect highlights the need for nuanced design strategies, in which sustainability information is integrated credibly and proportionally within the overall advertising narrative, rather than being presented as a dominant or isolated feature.

The results also raise the possibility of differentiated processing routes depending on consumer orientation. For environmentally engaged participants, peripheral exposure to ecological certifications appears sufficient to activate pro-environmental preferences, consistent with theories of heuristic cue processing. In contrast, for disengaged or sceptical individuals, the strong visual emphasis on sustainability cues may backfire by triggering perceptions of greenwashing or concerns regarding inflated prices. These dual responses highlight the importance of tailoring communication strategies to heterogeneous audience segments rather than assuming a uniform effect of sustainability messaging.

The findings can also be compared with those of Pinhal et al. [65], who used eye-tracking to analyze tourists' visual responses to images promoting cities within the UNESCO Creative Cities Network. Although the geographic and cultural contexts differ, methodological similarities allow for meaningful comparisons. Pinhal et al. [65] found that colors, landscapes, architecture, and cultural symbols, even when not explicitly preferred by participants, elicited strong visual engagement. A similar pattern emerged in the current study, where sustainability-related elements such as certificates were less frequently noticed despite participants' positive statements about their importance. This again reveals a gap between conscious attitudes and subconscious visual behavior.

These results suggest that subconscious mechanisms may play a more significant role in the reception of promotional materials than stated preferences. In the context of sustainable tourism communication, this highlights the need for more sophisticated content design that aligns with cognitive expectations while also engaging viewers through visual aesthetics, color dynamics, and cultural anchoring. For instance, imagery that combines ecological messages with social or cultural narratives, such as people engaged in sustainable practices, local communities, or emotionally evocative landscapes, has the potential to resonate more strongly with viewers and sustain attention [66].

The contribution of this study lies in demonstrating that ecological cues, although positively valued at a declarative level, are often marginalized in perception unless integrated into central and emotionally compelling areas of the advertisement. By apply-

ing eye-tracking methods to the analysis of sustainable tourism advertising, the study provides empirical evidence of the gap between declared ecological values and actual visual behavior.

From a theoretical perspective, the study enriches research on sustainable tourism and green advertising by showing that ecological cues frequently fail to capture attention unless embedded in salient and emotionally engaging parts of an advertisement. From a practical standpoint, the findings underscore that sustainability messages should not be presented as peripheral or secondary features. Instead, they should be strategically integrated into the visual hierarchy and combined with appealing imagery, cultural symbols, or emotionally evocative content. Such design strategies can help sustainability information compete with dominant elements such as price and vivid imagery, thereby bridging the gap between consumer values and actual attention.

6. Conclusions

This study set out to answer the research question of whether sustainability-related cues in tourism advertising attract visual attention and shape consumer preferences. Although participants declared moderately high ecological awareness in the questionnaire ($M = 3.65$), eye-tracking results revealed that sustainability-related cues were rarely prioritized visually, underscoring the discrepancy between stated attitudes and actual perceptual behavior. The findings indicate that while ecological certifications and sustainability-themed slogans were noticed by participants, they rarely became focal points of visual processing or influenced preferences when presented in peripheral or text-heavy areas. Instead, destination imagery, pricing, and logistical details consistently dominated attention, suggesting that visual salience and structural positioning exert stronger influence than participants' declared environmental values.

The results also show that participants with stronger pro-environmental orientations were more likely to actively search for and cognitively engage with sustainability cues, even when these were less visually prominent. This highlights the moderating role of intrinsic motivation and ecological values in shaping attention patterns. The study therefore demonstrates that the effectiveness of sustainability messaging in tourism advertising depends not only on its conceptual inclusion but also on its visual and structural integration within the broader communicative design.

The contribution of this research lies in providing empirical evidence of the discrepancy between declared ecological attitudes and actual visual attention. By integrating eye-tracking with survey data, the study advances theoretical understanding of how attention mechanisms mediate the reception of green advertising in the context of tourism.

Several practical implications arise from these findings. Sustainability cues should be strategically positioned near high-salience content such as pricing or transportation details, designed with sufficient size, contrast, and clarity to facilitate perceptual accessibility. For highly engaged audiences, explicit sustainability information may be effective, while less engaged consumers may respond better to narrative or experiential visualizations that imply sustainability through context. The findings further suggest a dual-pathway mechanism: for pro-environmental audiences, even peripheral recognition of certification logos may suffice to validate preferences, whereas for disengaged or sceptical audiences, excessive emphasis on ecological attributes may risk backfiring by eliciting doubts about authenticity or concerns regarding cost. Future campaigns should therefore balance visibility and subtlety, ensuring that sustainability cues are integrated credibly within broader advertising narratives rather than being presented as isolated or overly accentuated features.

7. Limitations and Future Research

This study was based on a relatively small and homogeneous group of 23 young adults aged 18 to 22. While this demographic represents an influential segment of the tourism market, the limited sample size and age range restrict the generalizability of the findings. Perceptual patterns and attention strategies may differ in older groups, among individuals with varied educational or cultural backgrounds, or those less engaged with environmental issues. The exploratory nature of this study means that its results should be considered preliminary and interpreted with caution. They provide a useful starting point for designing more comprehensive future investigations in this area.

Future research should replicate this study with larger and more diverse samples, encompassing different ages, cultural contexts, and socioeconomic groups. Cross-cultural comparisons and behavioral segmentation would help to validate and extend these findings, providing a more comprehensive understanding of how sustainability-related content is perceived across heterogeneous consumer populations.

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References

- Geçikli, R.M.; Turan, O.; Lachytová, L.; Dağlı, E.; Kasalak, M.A.; Uğur, S.B.; Guven, Y. Cultural Heritage Tourism and Sustainability: A Bibliometric Analysis. *Sustainability* **2024**, *16*, 6424. [CrossRef]
- He, J.; Kawasaki, S.; Achal, V. The Utilization of Agricultural Waste as Agro-Cement in Concrete: A Review. *Sustainability* **2020**, *12*, 6971. [CrossRef]
- Zhu, H.; Zhang, J.; Yu, X.; Hu, S. Sustainable tourism development strategies and practices of world heritage sites in China: A case study of Mt. Huangshan. *Int. J. Sustain. Dev. Plan.* **2019**, *14*, 297–306. [CrossRef]
- Xing, W. Sustainable tourism: Pathways to environmental preservation, economic growth, and social equity. *Appl. Comput. Eng.* **2024**, *66*, 166–171. [CrossRef]
- Du, S.; Cheong, C.Y.M. Beyond the scenic view: A multimodal discourse analysis of sustainable tourism imaginaries on TikTok in Anhui, China. *Humanit. Soc. Sci. Commun.* **2025**, *12*, 690. [CrossRef]
- Wilson, R.T.; Casper, J. The Role of Location and Visual Saliency in Capturing Attention to Outdoor Advertising. *J. Advert. Res.* **2016**, *56*, 259–273. [CrossRef]
- Bruno, A.; Gugliuzza, F.; Pirrone, R.; Ardizzzone, E. A Multi-Scale Colour and Keypoint Density-Based Approach for Visual Saliency Detection. *IEEE Access* **2020**, *8*, 121330–121343. [CrossRef]
- Guo, Y.; Jiang, J.; Li, S. A Sustainable Tourism Policy Research Review. *Sustainability* **2019**, *11*, 3187. [CrossRef]
- Buckley, R. Sustainable tourism: Research and reality. *Ann. Tour. Res.* **2012**, *39*, 528–546. [CrossRef]
- Xu, N.; Li, H. Towards management of sustainable tourism development in coastal destinations of the Bohai Rim: Insights from a tourism carrying capacity analysis. *Discov. Sustain.* **2025**, *6*, 168. [CrossRef]
- Go, H.; Kang, M. Metaverse tourism for sustainable tourism development: Tourism Agenda 2030. *Tour. Rev.* **2023**, *78*, 381–394. [CrossRef]
- Gkarane, S.; Gianni, M.; Vassiliadis, C. Running toward Sustainability: Exploring Off-Peak Destination Resilience through a Mixed-Methods Approach—The Case of Sporting Events. *Sustainability* **2024**, *16*, 576. [CrossRef]
- Silanteva, O. Sustainable Tourism in the Pandemic Era: A Case Study of Japan. *Int. Conf. Tour. Res.* **2022**, *15*, 529–535. [CrossRef]
- Cárdenas, D.A.; Byrd, E.T.; Duffy, L.N. An exploratory study of community awareness of impacts and agreement to sustainable tourism development principles. *Tour. Hosp. Res.* **2015**, *15*, 254–266. [CrossRef]

15. Simpson, M.C. An integrated approach to assess the impacts of tourism on community development and sustainable livelihoods. *Community Dev. J.* **2007**, *44*, 186–208. [CrossRef]
16. Muresan, I.; Oroian, C.; Harun, R.; Arion, F.; Porutiu, A.; Chiciudean, G.; Todea, A.; Lile, R. Local Residents' Attitude toward Sustainable Rural Tourism Development. *Sustainability* **2016**, *8*, 100. [CrossRef]
17. Scott, D. Sustainable Tourism and the Grand Challenge of Climate Change. *Sustainability* **2021**, *13*, 1966. [CrossRef]
18. Peeters, P.; Papp, B. Pathway to zero emissions in global tourism: Opportunities, challenges, and implications. *J. Sustain. Tour.* **2024**, *32*, 1784–1810. [CrossRef]
19. Sadat, A. Optimizing Sustainable Tourism Governance and Its Impact on Employment Opportunities Through a Dynamic Governance Approach. *J. Inf. Syst. Eng. Manag.* **2025**, *10*, 965–979. [CrossRef]
20. Mirkova, I.; Padrón-Fumero, N. From vulnerability to resilience: Empowering stakeholder-driven just transitions in island tourism economies. *Energy Res. Soc. Sci.* **2025**, *121*, 103966. [CrossRef]
21. Andriollo, E.; Caimo, A.; Secco, L.; Pisani, E. Collaborations in Environmental Initiatives for an Effective “Adaptive Governance” of Social–Ecological Systems: What Existing Literature Suggests. *Sustainability* **2021**, *13*, 8276. [CrossRef]
22. Fernández Vallejo, A.M. Visual strategies of sustainability communication on corporate webpages. A critical multimodal discourse analysis in the hospitality sector. *Ibérica* **2023**, *45*, 109–137. [CrossRef]
23. Agapito, D.; Pinto, P.; Mendes, J. Tourists' memories, sensory impressions and loyalty: In loco and post-visit study in Southwest Portugal. *Tour. Manag.* **2017**, *58*, 108–118. [CrossRef]
24. Yang, F.; Huang, A.; Huang, J. Influence of sensory experiences on tourists' emotions, destination memories, and loyalty. *Soc. Behav. Personal. Int. J.* **2021**, *49*, 1–13. [CrossRef]
25. García-Rosell, J.-C.; Mäkinen, J. An integrative framework for sustainability evaluation in tourism: Applying the framework to tourism product development in Finnish Lapland. *J. Sustain. Tour.* **2013**, *21*, 396–416. [CrossRef]
26. Adamus-Matuszyńska, A.; Dzik, P.; Michnik, J.; Polok, G. Visual Component of Destination Brands as a Tool for Communicating Sustainable Tourism Offers. *Sustainability* **2021**, *13*, 731. [CrossRef]
27. Cristobal-Fransi, E.; Daries, N.; Ferrer-Rosell, B.; Marine-Roig, E.; Martin-Fuentes, E. Sustainable Tourism Marketing. *Sustainability* **2020**, *12*, 1865. [CrossRef]
28. Aman, E.E.; Papp-Váry, Á.F. Digital Marketing as a Driver for Sustainable Tourism Development. *Multidiscip. Kihívások Sokszínű Válaszok* **2022**, *2*, 3–33. [CrossRef]
29. Espinal, E.A.; Andrade, C.F.O.; Pastrana, C.A.A. Content Marketing and Digital Engagement in Amazonian Sustainable Tourism. *Rev. Adm. Contemp.* **2024**, *28*, e240178. [CrossRef]
30. Awad, A.; Alharthi, B. The role of digital marketing tools in promoting tourism: An applied study on online marketing strategies. *Innov. Mark.* **2025**, *21*, 14–26. [CrossRef]
31. Font, X.; McCabe, S. Sustainability and marketing in tourism: Its contexts, paradoxes, approaches, challenges and potential. *J. Sustain. Tour.* **2017**, *25*, 869–883. [CrossRef]
32. Alyahia, M.; Azazz, A.M.S.; Fayyad, S.; Elshaer, I.A.; Mohammad, A.A.A. Greenwashing Behavior in Hotels Industry: The Role of Green Transparency and Green Authenticity. *Sustainability* **2024**, *16*, 1050. [CrossRef]
33. Fang, Z. Greenwashing Versus Green Authenticity: How Green Social Media Influences Consumer Perceptions and Green Purchase Decisions. *Sustainability* **2024**, *16*, 10723. [CrossRef]
34. Lacmanovic, D.; Bulatovic, I. The role of local community in the marketing planning for sustainable tourism National Park Skadar Lake (Montenegro). *Turizam* **2014**, *18*, 113–129. [CrossRef]
35. Abreu, L.A.d.; Walkowski, M.d.C.; Perinotto, A.R.C.; Fonseca, J.F.d. Community-Based Tourism and Best Practices with the Sustainable Development Goals. *Adm. Sci.* **2024**, *14*, 36. [CrossRef]
36. Sharma, V.; Bhat, D.A.R. The role of community involvement in sustainable tourism strategies: A social and environmental innovation perspective. *Bus. Strateg. Dev.* **2023**, *6*, 119–127. [CrossRef]
37. Czesznek, C. Photovoice as a Tool for Increasing Awareness and Participation in Local-Based Environmental Education. *Ser. VII-Soc. Sci. Law* **2021**, *14*, 55–66. [CrossRef]
38. Savin, G.-D.; Fleşeriu, C.; Batrancea, L. Eye tracking and tourism research: A systematic literature review. *J. Vacat. Mark.* **2022**, *28*, 285–302. [CrossRef]
39. Hoffmann, A.; Stork, P.; Madysa, M.; Borgianni, Y. How attractive is sustainability in products: A Systematic Review about eye-tracking studies on sustainability labels. *J. Environ. Psychol.* **2025**, *101*, 102519. [CrossRef]
40. Cahyani, I.P.; Mardani, P.B.; Widianingsih, Y. Digital Storytelling in Cultural Tourism: A Sustainable Communication Approach at the Lasem Heritage Foundation. *Int. J. Manag. Entrep. Soc. Sci. Humanit.* **2023**, *6*, 45–69. [CrossRef]
41. Dang, N.H.; Maurer, O. Place-Related Concepts and Pro-Environmental Behavior in Tourism Research: A Conceptual Framework. *Sustainability* **2021**, *13*, 11861. [CrossRef]
42. Ondrijova, I.; Tomkova, A.; Pethö, T. Utilizing Eye-Tracking in Advertising: Preliminary Findings. *J. Mark. Res. Case Stud.* **2024**, *2024*, 404100. [CrossRef]

43. Wedel, M.; Pieters, R. Eye Tracking for Visual Marketing. *Found. Trends® Mark.* **2006**, *1*, 231–320. [CrossRef]
44. Segijn, C.M.; Voorveld, H.A.M.; Vakeel, K.A. The Role of Ad Sequence and Privacy Concerns in Personalized Advertising: An Eye-Tracking Study into Synced Advertising Effects. *J. Advert.* **2021**, *50*, 320–329. [CrossRef]
45. Cosic, D. Neuromarketing in Market Research. *Interdiscip. Descr. Complex Syst.* **2016**, *14*, 139–147. [CrossRef]
46. Hoseini, S.R.; Taghavi, H. Investigating the Effectiveness of Advertising on Customers' Minds Using Neuromarketing. *Int. J. Innov. Mark. Elem.* **2024**, *4*, 19–27. [CrossRef]
47. Chygryn, O.; Shevchenko, K.; Tuliakov, O. Neuromarketing as a Mechanism of Communication with the Consumer: The Case for Small Business. *Mark. Manag. Innov.* **2024**, *15*, 26–38. [CrossRef]
48. Guo, S.; Sun, W.; Chen, W.; Zhang, J.; Liu, P. Impact of Artificial Elements on Mountain Landscape Perception: An Eye-Tracking Study. *Land* **2021**, *10*, 1102. [CrossRef]
49. Chen, X.; Zhang, Q.; Liu, W.; Rahimi, R.; Qi, J. Exploring visual attention and perception in hospitality and tourism: A comprehensive review of eye-tracking research. *J. Hosp. Tour. Insights* **2025**. [CrossRef]
50. Wang, M.; Li, P.; Xiao, X.; Zhang, H.; Lu, J.; Xu, Y. Tourists' visual attention to cultural landscapes under crowding stimuli: An eye-tracking approach. *J. Vacat. Mark.* **2024**. [CrossRef]
51. Vera-Olmos, F.J.; Pardo, E.; Melero, H.; Malpica, N. DeepEye: Deep convolutional network for pupil detection in real environments. *Integr. Comput. Aided. Eng.* **2018**, *26*, 85–95. [CrossRef]
52. Rvacheva, I.M. Eyetracking as a Modern Neuromarketing Technology. *Ekon. I Upr. Probl. Resh.* **2023**, *5*, 80–84. [CrossRef]
53. Leveque, L.; Liu, H. An Eye-Tracking Database of Video Advertising. In Proceedings of the 2019 IEEE International Conference on Image Processing (ICIP), Taipei, Taiwan, 22–25 September 2019; pp. 425–429.
54. Scott, N.; Green, C.; Fairley, S. Investigation of the use of eye tracking to examine tourism advertising effectiveness. *Curr. Issues Tour.* **2016**, *19*, 634–642. [CrossRef]
55. Vinnik, A.E. Market analysis of neuromarketing technologies and assessment of their role in improving the effectiveness of content perception. *Vestn. Astrakhan State Tech. Univ. Ser. Econ.* **2024**, *2024*, 95–103. [CrossRef]
56. Wąsikowska, B. Zastosowanie technik neuronauki poznawczej do badania preferencji konsumentów. *Stud. Ekon. Ekon. W Katowicach* **2016**, *254*, 209–218.
57. Van Loon, G.; Hermesen, F.; Naber, M. Predicting Product Preferences on Retailers' Web Shops through Measurement of Gaze and Pupil Size Dynamics. *J. Cogn.* **2022**, *5*, 45. [CrossRef]
58. Segijn, C.M. Eye-Tracking Research in Advertising Scholarship: A Review and Practical Guide. *J. Advert.* **2025**, 1–18. [CrossRef]
59. Hudák, M.; Madleňák, R.; Brezániová, V. The Impact of Advertisement on Consumer's Perception. *CBU Int. Conf. Proc.* **2017**, *5*, 187–191. [CrossRef]
60. Peker, S.; Menekse Dalveren, G.G.; İnal, Y. The Effects of the Content Elements of Online Banner Ads on Visual Attention: Evidence from An-Eye-Tracking Study. *Futur. Internet* **2021**, *13*, 18. [CrossRef]
61. Kwon, J.; Kim, J.Y. Meaning of Gaze Behaviors in Individuals' Perception and Interpretation of Commercial Interior Environments: An Experimental Phenomenology Approach Involving Eye-Tracking. *Front. Psychol.* **2021**, *12*, 581918. [CrossRef] [PubMed]
62. Lourenção, M.; de Moura Engracia Giralaldi, J.; de Oliveira, J.H.C. Destination advertisement semiotic signs: Analysing tourists' visual attention and perceived ad effectiveness. *Ann. Tour. Res.* **2020**, *84*, 103001. [CrossRef]
63. Sushchenko, O.; Kasenkova, K.; Pohuda, N.; Petrova, M. Implementation of Eye-Tracking Technology in the Domestic Tourism Marketing Complex. *Tour. Hosp.* **2025**, *6*, 94. [CrossRef]
64. Guido, G.; Pichierri, M.; Pino, G.; Nataraajan, R. Effects of Face Images and Pareidolia on Consumers' Responses to Print Advertising. *J. Advert. Res.* **2019**, *59*, 219–231. [CrossRef]
65. Pinhal, R.; Estima, A.; Duarte, P. See, like, and book: Eye-tracking the power of visual attention in destination marketing. *J. Mark. Commun.* **2025**, 1–21. [CrossRef]
66. Balaskas, S.; Panagiotarou, A.; Rigou, M. Impact of Environmental Concern, Emotional Appeals, and Attitude toward the Advertisement on the Intention to Buy Green Products: The Case of Younger Consumer Audiences. *Sustainability* **2023**, *15*, 13204. [CrossRef]

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Article

Tourist Loyalty in Intangible Cultural Heritage Tourism: The Roles of Perceived Attributes, Involvement, and Cultural Identity

Wei Xiao ^{1,*}, Bowen Yu ² and Hanyue Zhang ¹

¹ College of Management Science, Chengdu University of Technology, No. 1 East 3 Road, Erxian Bridge, Chenghua District, Chengdu 610059, China; zhangsavannah41@gmail.com

² Department of Artificial Intelligent Research and Product Design, Chengdu Zero-One Era Technology Co., Ltd., No. 500 Middle Section of Tianfu Avenue, Dongfang Hope Tianxiang Plaza, Chengdu 610041, China; yu20901@hotmail.com

* Correspondence: emily_wx05@cdut.edu.cn

Abstract

Intangible cultural heritage (ICH) is an evolving repository of collective meaning; however, many ICH destinations face threats from over-commercialization and homogenization, which weaken authentic transmission and visitor engagement. Drawing on the Stimulus–Organism–Response (S–O–R) framework and a cultural identity perspective, this study examines how two stimulus sets—ICH attributes (perceived authenticity, vitality) and tourism involvement (cognitive, behavioral)—influence tourist loyalty, with experiential value as a mediator and cultural identity as a moderator. 385 valid online survey responses were analyzed using structural equation modeling and moderated mediation tests. Results show that perceived authenticity and vitality each exert significant positive effects on loyalty, and higher cognitive and behavioral involvement similarly strengthens loyalty. Experiential value partially mediates the effects of ICH attributes and involvement on loyalty. Cultural identity positively moderates several pathways; notably, when cultural identity is high, experiential value no longer mediates the link between tourism involvement and loyalty. These findings advance understanding of visitor-centered authenticity in living ICH contexts and offer guidance for destination managers seeking to build engaging, identity-sensitive heritage experiences.

Keywords: intangible cultural heritage; perceived authenticity; experiential value; tourism involvement; cultural identity; tourist loyalty; stimulus–organism–response

1. Introduction

Intangible cultural heritage (ICH) encompasses the living traditions, practices, and expressions that communities recognize as part of their cultural heritage. As an integral component of China’s cultural fabric, ICH manifests in diverse forms—from traditional crafts and performing arts to oral literature and social customs—and is a unique tourism attraction [1]. Integrating culture and tourism has elevated ICH from a passive cultural relic to an active driver of destination competitiveness and community revitalization [2]. Policy directives and consumer trends indicate that ICH tourism is poised for rapid expansion: the Chinese government’s emphasis on “cultural confidence” (Cultural confidence denotes belief in the value, vitality, and future of one’s cultural traditions—including pride, trust, and a willingness to preserve and transmit cultural practices. The phrase has been emphasized

in recent Chinese cultural policy statements (e.g., calls to “build cultural confidence”) and is discussed in the academic literature on cultural self-awareness and national culture [3]) has spurred local authorities to develop heritage-based experiences. Meanwhile, domestic tourists increasingly seek meaningful, authentic encounters with traditional culture [4].

The ICH tourism market has exposed several challenges despite these favorable conditions. First, although many visitors express interest in ICH-themed attractions and activities, their understanding of ICH concepts and significance remains limited [5]. Empirical evidence suggests that when tourists lack sufficient knowledge of heritage contexts, their appreciation of ICH offerings is superficial, leading to lower perceived value and diminished loyalty intentions [6]. Second, commercializing ICH experiences in specific destinations has led to a “theme-park” approach that prioritizes spectacle over substance, undermining the live transmission and preservation of traditional skills [7]. In particular, reliance on mass-produced souvenirs and repetitive performances reduces the distinctiveness of ICH sites and contributes to homogenization across destinations [8]. Third, many ICH attributes are not sufficiently highlighted in marketing and on-site interpretation, which weakens tourists’ value perception and engagement [9]. These factors constrain the effective utilization of ICH resources and impede the sustainable development of ICH tourism.

Traditionally, cultural tourism in China focused on preserving and displaying tangible heritage through site-centered, state-led development. Policy and market shifts recently encourage experience-oriented, participatory forms of cultural tourism that foreground visitor engagement with living traditions [4,10,11]. To enhance the competitiveness of ICH tourism destinations and encourage visitor engagement, adopting a tourist-centric perspective that addresses market demands and leverages ICH resource advantages is crucial. From the visitor’s perspective, the destination’s ability to deliver authentic, interactive experiences informs visitors’ experiential value appraisal and shapes their loyalty behaviors, such as repeat visits and word-of-mouth recommendations [12–14]. Moreover, the intertwined relationship between culture and tourism underscores the necessity of preserving ICH as a heritage imperative and a driver of economic development and cultural diplomacy [15]. Therefore, integrating ICH and tourism is a strategic priority for managers and an opportunity to revitalize endangered traditions [16]. However, studies examining how ICH attributes and visitor involvement jointly influence tourist loyalty remain scarce.

Furthermore, cultural identity—the psychological bond between tourists and the heritage context—is a critical lens through which visitors interpret and value ICH experiences [17]. Research indicates that individuals with stronger cultural identity derive greater emotional and symbolic value from heritage interactions, strengthening the link between perceived experience and loyalty [18]. However, few studies have integrated cultural identity as a moderating factor to explore ICH attributes, tourism involvement, experiential value, and loyalty.

To address these research gaps, this study employs the Stimulus–Organism–Response (S-O-R) framework [19] and a cultural identity perspective to investigate how two key stimuli, ICH attributes (authenticity and vitality) and tourism involvement (cognitive and behavioral), influence tourists’ experiential value and subsequent loyalty. Specifically, we examine (1) the direct effects of authenticity and vitality on experiential value and loyalty, (2) the role of cognitive and behavioral involvement on experiential engagement, and (3) the mediating function of experiential value in the stimuli-loyalty relationship. Critically, we introduce cultural identity as a moderator to assess how individuals’ heritage-related self-concept shapes these pathways.

By surveying 385 valid visitors at a representative ICH destination and analyzing data through structural equation modeling, this research aims to (a) clarify the dimensions of

ICH attributes and tourism involvement that most strongly predict loyalty, (b) uncover the mechanisms by which experiential value mediates these relationships, and (c) reveal how cultural identity amplifies or attenuates these effects. We contribute to the ICH tourism literature by offering an integrated model grounded in S-O-R and identity theory, and we provide practical implications for managers seeking to foster long-term visitor engagement while ensuring the live preservation of ICH. This work advances theory and practice at the intersection of heritage preservation and sustainable tourism development.

2. Literature Review

2.1. Perceived Attributes and Tourism Involvement in ICH Tourism

ICH comprises living traditions, practices, and expressions transmitted across generations [1]. Unlike static and material heritage, ICH relies on human agents for its continuity, manifesting as performance arts, craft techniques, and social customs [20,21]. China's 2011 ICH Law defines ICH as "traditional cultural expressions and related tangible carriers that various ethnic groups regard as part of their cultural inheritance," spanning oral literature, performing arts, crafts, rituals, and festivals [22]. Hence, ICH is a collective memory repository and a dynamic resource for tourism development.

Within ICH tourism, perceived attributes denote visitors' recognition of heritage qualities that inform their engagement [23]. Two core attributes emerge consistently: authenticity and vitality [24,25]. Since living traditions naturally evolve, we note that international heritage guidance (e.g., UNESCO) often frames "authenticity" concerning tangible, material heritage. Therefore, scholars adopt a visitor-centered notion—perceived or experiential authenticity—which captures whether tourists judge performances, practices, or craft demonstrations as genuine expressions of local culture. In ICH contexts, existential authenticity—where tourists feel they experience "true" cultural essence through interaction with practitioners or participation in traditional rituals—becomes paramount [26]. Studies demonstrate that perceived authenticity elevates satisfaction and related forms of emotional bond, thereby driving loyalty intentions [24,27,28]. However, over-commercialization risks producing pseudo-authentic experiences, undermining tourists' trust and long-term engagement [29].

Complementing authenticity, vitality captures ICH's "living" dimension [30]. Vital ICH is characterized by ongoing transmission, innovation, and intergenerational dialog. Destinations facilitating hands-on workshops (e.g., craft co-creation) or interactive performances exemplify ICH vitality [31]. Tourists exposed to living traditions report deeper emotional resonance and experiential immersion [32]. Conversely, vitality is lost when heritage is presented as a static artifact without participatory elements, diminishing overall appeal [33].

Beyond these attributes, tourism involvement reflects the degree of personal relevance and participation of tourists who invest in ICH settings [34]. Involvement theory posits that individuals allocate cognitive and emotional resources to essential matters [35]. Within tourism, involvement manifests as two dimensions: cognitive involvement and behavioral involvement [36,37]. Cognitive involvement encompasses mental effort to understand heritage, such as reading interpretive materials or absorbing historical context [28]. Behavioral involvement denotes observable actions and resource investments [38].

Empirical evidence indicates that higher cognitive involvement enhances knowledge acquisition and interpretive depth, strengthening experiential value [28]. For instance, visitors who engage with storytelling sessions report greater cultural resonance than passive observers. Similarly, behavioral involvement, such as direct participation in heritage activities, has fostered co-creation of experiences, increasing emotional engagement and experience value [31].

ICH attributes and involvement are interdependent. Tourists who perceive strong authenticity and vitality are more inclined to invest cognitively and behaviorally [23]. Conversely, high involvement amplifies attribute salience: participants in a traditional dance workshop may better appreciate the historical significance of costumes and choreography [39]. This synergy cultivates richer internal responses, laying the groundwork for loyalty [26].

ICH tourism research consistently identifies authenticity and vitality as essential perceived attributes that differentiate heritage offerings, while cognitive and behavioral involvement represent the visitor's engagement pathway. When destinations nurture genuine, vibrant ICH experiences, they invite deeper visitor involvement, strengthening experiential outcomes and fostering loyalty [23,32].

2.2. Cultural Identity in ICH Tourism

Cultural identity refers to individuals' psychological connection to shared cultural symbols, values, and practices [40]. Rooted in Social Identity Theory, cultural identity emerges when individuals categorize themselves as part of a cultural group and internalize its collective norms [41]. Cultural identity shapes how visitors perceive and value heritage stimuli, influencing cognitive appraisals and emotional attachments [42]. Although cultural identity, understood as an individual's sense of belonging to and pride in cultural traditions, does not apply equally to all tourists. While some visitors may not seek identity affirmation during their travels, others with stronger cultural identities are more likely to interpret ICH authenticity and involvement as meaningful, intensifying satisfaction and loyalty. This study conceptualizes cultural identity as a moderating factor that differentiates how strongly ICH attributes and involvement influence tourist loyalty.

Within ICH tourism, cultural identity often assumes a three-dimensional structure: cognitive (awareness and knowledge), affective (emotional attachment and pride), and behavioral (participation and advocacy). Cognitive identity involves recognizing cultural markers embedded in ICH performances or crafts [43]. Tourists with high cognitive identity may easily contextualize a folk art practice within broader ethnic histories. Affective identity reflects emotional bonds; when visitors feel pride or belonging toward a cultural tradition, they derive emotional satisfaction from ICH encounters [44]. Behavioral identity manifests through activities such as participating in heritage workshops, promoting ICH through social media, or supporting artisan communities [45].

Cultural identity influences both perceived attributes and involvement. Visitors who share ethnic backgrounds with the heritage community or have prior exposure to related traditions perceive authenticity more readily and interpret vitality as personally meaningful [43]. Conversely, low-identity tourists may require additional interpretive support to grasp symbolic nuance [46]. Some studies examined how identity and commodification shape ICH trajectories. In the Chinese context, recent work documents the tensions between official authenticity discourses, marketisation, and local practice. For example, studies show how authenticity is contested and reconfigured in living ICH settings and how commercialization reshapes craft economies and guardian communities [47].

Cultural identity can moderate the relationships among perceived attributes, involvement, experiential value, and loyalty. Domínguez-Quintero et al. [48] demonstrate that authenticity's positive influence on experiential value is stronger for tourists with high heritage identity. Wu and Li [49] find that identity magnifies the indirect influence of cognitive involvement on loyalty via experiential value. These findings suggest that identity is a psychological lens. High-identity tourists interpret the same ICH stimuli differently, experiencing emotional resonance and commitment.

Destination identity also matters. Genc and Gulertekin Genc [50] indicate that residents' strong identity with ICH fosters community participation and co-creation of authentic experiences, enriching tourist encounters. This reciprocal identity reinforcement generates a virtuous cycle. Tourists' identity affirmation strengthens loyalty, economic support sustains ICH vitality, and local identity is further bolstered by positive visitation outcomes [43].

Measurement of cultural identity in ICH contexts adapts established scales to capture its multifaceted nature [43]. For example, the "Heritage Tourist Identity Scale" measures cognitive, affective, and behavioral dimensions. This robust measurement can systematically test identity's moderating roles within structural models.

Cultural identity may moderate the experiential value-loyalty link. Tourists with strong heritage identity convert experiential gains into loyalty more effectively than low-identity visitors [48]. Rasoolimanesh et al. [51] also note that identity amplifies involvement's influence on loyalty via experiential value. Hence, identity is a boundary condition. When identity is high, experiential value's incremental effect on loyalty may be less pronounced, as high-identity tourists already possess strong predispositions [52].

Therefore, cultural identity is a precondition and a boundary condition in ICH tourism. It shapes how tourists perceive authenticity and vitality, steers their involvement strategies, and intensifies the translation of experiential value into loyalty intentions [43,53]. Accounting for identity refines our understanding of visitor behavior in ICH contexts. It effectively informs destination strategies to engage diverse tourist segments.

2.3. Experiential Value and Tourist Loyalty in ICH Contexts

Experiential value arises from tourists' subjective appraisal of benefits (e.g., enjoyment and social connection) versus sacrifices (e.g., time and cost) during heritage encounters [54,55]. This appraisal hinges on how authenticity, vitality, and involvement converge in ICH tourism to produce functional, emotional, social, and epistemic gains [49,56]. For instance, tourists participating in traditional craft workshops may derive functional, emotional, social, and epistemic values [55,57].

Tourist loyalty in ICH contexts predominantly manifests as attitudinal loyalty (i.e., revisit intention and positive word-of-mouth) rather than actual repeat visits, given tourism's novelty-seeking nature [58]. Attitudinal loyalty encompasses psychological commitment to a destination, manifesting in willingness to recommend and preference for similar heritage experiences [59]. In ICH tourism, substantial experiential value often translates into emotional attachment, forging sustained loyalty [58].

The S-O-R framework articulates how ICH stimuli (i.e., authenticity, vitality, and involvement) evoke experiential value and drive loyalty responses [19]. For example, Chen [28] finds that authenticity enhances experiential quality, which mediates its effect on satisfaction and loyalty. Lenzerini [31] shows that behavioral involvement elevates existential value, leading to stronger loyalty intentions. Yan et al. [60] confirm that perceived ICH vitality increases experiential value, which fully mediates its effect on festival attendance intentions.

Moreover, experiential value often operates as a partial mediator, reflecting direct effects from stimuli to loyalty. Park et al. [61] observe that while experiential value mediates most of the authenticity-loyalty relationship, authenticity also exhibits a residual direct effect on loyalty. Similar findings indicate that high-identity tourists may translate authenticity directly into loyalty, bypassing intermediary experiential evaluations [52].

Tourism involvement also exerts both direct and indirect influences on loyalty. Scholars argue that cognitive involvement enhances emotional engagement and increases experiential value and loyalty. Behavioral involvement signals deeper commitment, directly

boosting loyalty and indirectly through experiential value [31]. For example, participants reported elevated experiential value and advocacy intentions, illustrating the dual pathways [49].

Therefore, experiential value is the central mechanism linking ICH stimuli to tourist loyalty, predominantly attitudinal, with cultural identity that can amplify or attenuate its role [48,51]. Integrating these insights, this study adopts an S-O-R-Identity model to elucidate how ICH attributes and involvement drive experiential value and loyalty, moderated by cultural identity, offering a framework for theory and practice in ICH destination marketing.

2.4. Theoretical Foundation

This study uses three interrelated theoretical perspectives to explain how ICH attributes and tourism involvement influence experiential value and tourist loyalty.

Firstly, the S-O-R framework [19] is the core theoretical foundation of this study. It posits that external environmental stimuli (S) influence internal organismic states (O), which in turn lead to behavioral responses (R). In heritage tourism, destination attributes are stimuli, affecting tourists' cognitive and emotional evaluations. This subsequently drives loyalty-related behaviors such as revisitation and recommendation. The S-O-R model is widely used to explain how experiential and psychological processes mediate the relationship between destination features and visitor responses [62,63].

Secondly, tourism involvement theory emphasizes the degree of relevance and interest a tourist places in a destination or activity. It typically encompasses cognitive and behavioral components [34]. High involvement implies that tourists are more engaged in their decision-making and participation in destination activities, which leads to stronger emotional bonds and loyalty intentions [64]. In this study, involvement is an antecedent variable influencing both experiential value and loyalty, serving as a key explanatory factor in how tourists connect with ICH destinations.

Thirdly, cultural identity theory explores how individuals perceive, internalize, and express affiliation with particular cultural groups [65]. It is critical in shaping tourists' attitudes, values, and behaviors. When tourists identify strongly with the culture presented by a destination, they are more likely to develop a sense of belonging, satisfaction, and loyalty [66]. In this study, cultural identity is a moderating variable that strengthens the effects of destination attributes and involvement on tourist loyalty, particularly through its interaction with experiential value.

3. Theoretical Foundations and Hypotheses

3.1. Conceptual Framework

Guided by the S-O-R paradigm and a cultural identity lens, this study examines how ICH attributes and tourism involvement shape tourists' loyalty via experiential value. There are two categories of stimuli:

ICH attributes are delineated into authenticity and vitality. Authenticity refers to visitors' perception that heritage presentations are genuine, historically grounded, and minimally commercialized [23,24]. Vitality denotes the degree to which heritage practices remain "living"—actively transmitted, innovated, and experienced as dynamic traditions [31].

Tourism involvement is subdivided into: Cognitive involvement, which involves the mental effort required to understand ICH content through reading, interpretation, and reflection; and Behavioral involvement, which encompasses the extent of hands-on participation, such as attending workshops or purchasing artisan goods [31].

These four stimulus dimensions provoke tourists' internal evaluative process (i.e., experiential value), integrating functional, emotional, social, and epistemic gains relative to perceived costs [54,55]. Experiential value drives tourists' attitudinal loyalty [59].

Moreover, since individual differences in cultural orientation can alter these pathways [40], cultural identity is introduced as a moderator of ICH attribute → experiential value relationships. This model isolates cultural identity as the sole individual-level moderator by holding constant other potential influences on experiential value. Figure 1 depicts the basic conceptual model: ICH attributes and tourism involvement (Stimuli) → experiential value (Organism) → tourist loyalty (Response), with cultural identity moderating the stimulus-organism links.

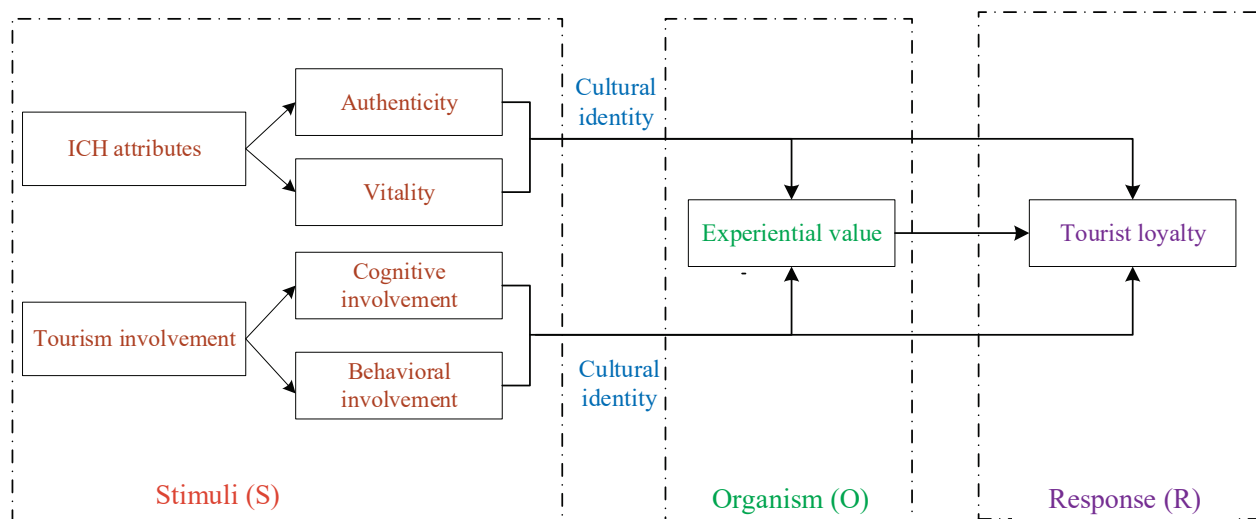


Figure 1. Conceptual Model.

3.2. Hypothesis Development

3.2.1. ICH Attributes and Tourist Loyalty

Research in ICH tourism highlights how heritage authenticity and vitality attract, engage, and retain visitors [31,43]. When tourists perceive heritage offerings as authentic, their trust and emotional connection to the destination strengthen, fostering intentions to revisit and recommend [58]. Through interactive workshops, live performances, and ongoing innovation, ICH vitality anchors tourists' perceived uniqueness and emotional resonance, making the destination memorable [23]. Therefore, we hypothesize:

H1. Destination ICH attributes have a positive effect on tourist loyalty.

H1a. Perceived authenticity positively influences tourist loyalty.

H1b. Perceived vitality positively influences tourist loyalty.

3.2.2. Tourism Involvement and Tourist Loyalty

Tourism involvement is the degree to which tourists mentally and behaviorally invest in heritage activities [34]. When visitors perceive that a destination's values align with theirs, they form deeper emotional bonds that encourage repeat visitation and word-of-mouth advocacy [67]. Similarly, behavioral involvement signals commitment and heightens perceived experiential value, translating into stronger loyalty. Higher-involvement tourists report greater satisfaction and demonstrate stronger revisit intentions [68]. Therefore, we hypothesize:

H2. Tourism involvement has a positive effect on tourist loyalty.

H2a. Cognitive involvement positively influences tourist loyalty.

H2b. Behavioral involvement positively influences tourist loyalty.

3.2.3. ICH Attributes and Experiential Value

ICH attributes also enrich the visitor experience, forming the basis for perceived experiential value. Authenticity fosters trust in heritage narratives and elevates perceived quality, directly strengthening experiential value's functional and emotional dimensions [44]. By inviting tourists into living traditions and encouraging active participation, vitality deepens emotional engagement and epistemic stimulation, thereby intensifying the experiential value derived [69]. As Lenzerini [31] observes, interactive exchanges between heritage bearers and visitors solidify cultural meaning and value. Therefore, we hypothesize:

H3. *ICH attributes have a positive effect on experiential value.*

H3a. *Perceived authenticity positively influences experiential value.*

H3b. *Perceived vitality positively influences experiential value.*

3.2.4. Tourism Involvement and Experiential Value

Tourism involvement shapes how visitors process heritage stimuli and therefore influences experiential outcome. High cognitive involvement drives tourists into the ICH context, resulting in richer knowledge acquisition and emotional resonance [49]. High behavioral involvement creates co-creative experiences that amplify emotional enjoyment and social connection. Empirical findings show that involved tourists perceive higher experiential quality and satisfaction [68]. Therefore, we hypothesize:

H4. *Tourism involvement has a positive effect on experiential value.*

H4a. *Cognitive involvement positively influences experiential value.*

H4b. *Behavioral involvement positively influences experiential value.*

3.2.5. Experiential Value and Tourist Loyalty

Experiential value reflects tourists' holistic assessment of ICH engagements [54,55]. In heritage tourism, high experiential value generates positive affective responses strongly linked to attitudinal loyalty because memorable, meaningful experiences breed affective attachment and future behavioral commitments [31]. Therefore, we hypothesize:

H5. *Experiential value has a positive effect on tourist loyalty.*

3.2.6. Mediating Role of Experiential Value

Previous studies showed that experiential value mediates the relationship between destination attributes and loyalty [70]. In ICH contexts, authenticity and vitality instill experiential value, fostering loyalty. Tourism involvement enhances experiential value, leading to loyalty intentions [68]. Therefore, we hypothesize:

H6. *Experiential value mediates the relationship between ICH attributes and tourist loyalty.*

H6a. *Experiential value mediates the effect of authenticity on tourist loyalty.*

H6b. *Experiential value mediates the effect of vitality on tourist loyalty.*

H7. *Experiential value mediates the relationship between tourism involvement and tourist loyalty.*

H7a. *Experiential value mediates the effect of cognitive involvement on tourist loyalty.*

H7b. *Experiential value mediates the effect of behavioral involvement on tourist loyalty.*

3.2.7. Mediating Role of Cultural Identity

Previous studies indicate a clear relationship between cultural identity and tourists' perceived experiential value. Scholars argue that the higher the experiential quality, the stronger the local cultural identity; cultural identity influences tourists' perceived value,

and the two are positively correlated [28]. Huang and Lu [71] confirm that awareness of ICH leads tourists to a deeper appreciation of the forms and cultural connotations of ICH products. This recognition is a prerequisite for cultural identification with ICH products and positively affects purchase intention. Therefore, we hypothesize:

H8. *Cultural identity positively moderates the relationship between destination ICH attributes and tourist loyalty.*

H8a. *Cultural identity positively moderates the relationship between the authenticity dimension of ICH attributes and tourist loyalty.*

H8b. *Cultural identity positively moderates the relationship between the vitality dimension of ICH attributes and tourist loyalty.*

H9. *Cultural identity positively moderates the relationship between tourism involvement and tourist loyalty.*

H9a. *Cultural identity positively moderates the relationship between tourists' cognitive involvement and tourist loyalty.*

H9b. *Cultural identity positively moderates the relationship between tourists' behavioral involvement and tourist loyalty.*

3.2.8. Moderated Mediation by Cultural Identity

Tourist cultural identity conditions how ICH stimuli translate into experiential value and loyalty [43]. Tourists who feel a strong cultural affinity for ICH interpret authenticity and vitality as more personally meaningful, generating higher experiential value. Low-identity tourists may require additional interpretive support to achieve comparable experiential gains. Cultural identity amplifies the positive effect of authenticity on experiential value [51] and may strengthen the vitality-experiential value relationship. Under high cultural identity, experiential value is more closely linked to loyalty intentions, as identity-congruent visitors more readily convert positive experiences into repeat visitation and advocacy [44]. Therefore:

H10. *Cultural identity moderates the mediated relationship between ICH attributes and tourist loyalty.*

H10a. *Under high cultural identity, the mediated pathway from authenticity to loyalty via experiential value is strengthened.*

H10b. *Under high cultural identity, the mediated pathway from vitality to loyalty via experiential value is strengthened.*

H11. *Cultural identity moderates the mediated relationship between tourism involvement and tourist loyalty.*

H11a. *Under high cultural identity, the mediated pathway from cognitive involvement to loyalty via experiential value is strengthened.*

H11b. *Under high cultural identity, the mediated pathway from behavioral involvement to loyalty via experiential value is strengthened.*

4. Empirical Analysis

4.1. Data Collection

This study targeted individuals who had visited an ICH destination within the past five years. A structured questionnaire was developed and administered online via the “Wenjuanxing” platform. We disseminated the survey link and QR code through social media channels, including WeChat groups and Moments, immediately following China's National Day holiday to reach a broad audience. By concentrating data collection in the first two weeks after the October Golden Week (a peak travel period), we maximized the

likelihood of capturing respondents' most recent ICH tourism experiences while ensuring an adequate sample size.

The questionnaire consisted of two sections. The first section contained 31 measurement items, each rated on a seven-point Likert scale (1 = "Strongly Disagree" to 7 = "Strongly Agree"). The second section gathered demographic and background information, such as gender, age, and primary motivation for visiting ICH destinations. These demographic items facilitated the sample representativeness.

4.1.1. Measurement Dimensions and Scale Design

Drawing on established scales, the measurement dimensions cover four categories: (1) independent variables (ICH attributes and tourism involvement), (2) the mediating variable (experiential value), (3) the moderating variable (cultural identity), and (4) the dependent variable (tourist loyalty). Item wording was adapted from previous studies to reflect the characteristics of ICH destinations in China; expert feedback and pre-testing ensured clarity and relevance. Details are as follows:

A. Independent Variables: ICH Attributes and Tourism Involvement

ICH attributes were conceptualized as comprising: authenticity and vitality. Tourism involvement captures the degree to which visitors mentally and behaviorally engage with the ICH destination. Table 1 lists the measurement items for each independent variable.

B. Mediating Variable: Experiential Value

Experiential value represents tourists' holistic appraisal of their ICH experience [54,55]. Since ICH tourism relies on immersive, interactive encounters, the items were designed to capture the extent to which respondents found the destination's heritage scene visually appealing, emotionally engaging, distinct from other tourism products, and intellectually enriching [72,73]. Table 2 presents five experiential value items.

Table 1. Measurement Items for Independent Variables.

Variable	Item Code	Item Statement	Source
Authenticity	A1	I can feel the genuine essence of the ICH culture here.	[28]
	A2	I perceive that the ICH culture here has a long, continuous history.	
	A3	I perceive an intense traditional atmosphere surrounding the ICH culture here.	
	A4	I perceive that the ICH crafts or cultural elements here are well preserved.	
Vitality	V1	I can observe traditional ICH activities or performances at this destination.	[74]
	V2	I sense a unique ICH ecosystem thriving here.	
	V3	I experience how ICH has integrated with local production and daily life.	
	V4	I have opportunities to interact directly with ICH bearers here.	
Cognitive Involvement	C1	Visiting an ICH destination is very important to me.	[12,75,76]
	C2	I am very interested in this ICH destination.	
	C3	During my visit, I can identify myself with this ICH site.	
	C4	I find traveling in this ICH environment to be highly enjoyable.	

Table 1. *Cont.*

Variable	Item Code	Item Statement	Source
Behavioral Involvement	BI1	I actively participate in ICH activities here.	[75]
	BI2	I pause to watch folk performances and ICH demonstrations.	
	BI3	I sample local ICH-related foods here.	
	BI4	I use on-site digital tools (e.g., apps or kiosks) to learn about ICH culture.	

Note: English item stems are translations of the Chinese questionnaire used in data collection and analysis (Supplementary Material). Reliability and validity statistics reported in the text are based on the Chinese instrument.

Table 2. Measurement Items for Experiential Value (Mediator).

Variable	Item Code	Item Statement	Source
Experiential Value	EV1	I find that the ICH scenes here are visually distinctive and well themed.	[72,73]
	EV2	The ICH activities here are so engaging that they put me in a good mood.	
	EV3	I feel that this ICH destination clearly stands out from other tourism products.	
	EV4	I learn a lot about ICH culture, skills, and knowledge here.	
	EV5	I believe the ICH experience here can inspire younger generations to protect and carry forward our cultural heritage.	

C. Moderating Variable: Cultural Identity

Cultural identity was conceptualized as tourists' cognitive recognition, emotional attachment, and behavioral inclination toward ICH [40]. Specifically, the five items capture (a) recognition of ICH as an essential cultural and historical asset, (b) belief that ICH represents a core form of traditional cultural expression, (c) the sense of national or ethnic pride derived from ICH, (d) appreciation for creative integration of ICH with contemporary contexts, and (e) willingness to participate in heritage preservation efforts [77–79]. Table 3 lists these items.

Table 3. Measurement Items for Cultural Identity (Moderator).

Variable	Item Code	Item Statement	Source
Cultural Identity	CI1	I believe ICH has significant historical and cultural value.	[77–79]
	CI2	I think ICH represents an important form of traditional cultural expression.	
	CI3	I feel a strong sense of national pride and cultural confidence when I think about ICH.	
	CI4	I appreciate how ICH can be innovatively integrated into both traditional and contemporary contexts.	
	CI5	I am willing to actively participate in efforts to preserve and promote the ICH culture.	

D. Dependent Variable: Tourist Loyalty

Tourist loyalty in ICH tourism was operationalized predominantly as attitudinal loyalty. Although some scholars measure loyalty by repeat visitation, travel researchers argue

that attitudinal indicators better capture loyalty where novelty-seeking is common [80]. The five loyalty items measure (a) prioritizing ICH destinations when traveling under similar cost constraints, (b) desire to participate in additional ICH-related activities, (c) willingness to recommend one's preferred ICH site to friends, (d) intent to share one's ICH travel experience publicly, and (e) willingness to provide positive word-of-mouth [81–83]. Table 4 displays these items.

Table 4. Measurement Items for Tourist Loyalty (Dependent Variable).

Variable	Item Code	Item Statement	Source
Tourist Loyalty	TL1	If the costs are similar, I would choose an ICH destination first.	[81–83]
	TL2	I hope to participate in more ICH-related activities or tours.	
	TL3	I would introduce or recommend my favorite ICH destination to friends.	
	TL4	I am willing to share my ICH travel experience with others.	
	TL5	I will offer positive word-of-mouth and evaluations about this trip.	

By grounding each measurement dimension in previous empirical research and conducting rigorous validity checks, this study ensures that all constructs reliably capture the nuances of ICH tourism experiences, involvement, identity, and loyalty.

4.1.2. Questionnaire Adjustment and Data Collection

We conducted a small-scale pre-survey to ensure the questionnaire's quality, accuracy, and scientific rigor. 109 questionnaires were distributed to individuals who reported having visited an ICH destination within the past five years. We excluded responses from anyone who had not traveled to an ICH destination in the previous five years, and questionnaires were completed in under 60 s, intending to remove inattentive or ineligible respondents. Then, 83 valid pre-survey questionnaires remained, yielding an effective response rate of 76.14%.

Using SPSS 25.0, we evaluated internal consistency reliability for each construct. The Cronbach's alpha values for these constructs range from 0.908 to 0.952, demonstrating excellent reliability (all exceeding 0.90). In addition, "Cronbach's alpha if item deleted" values for every item were lower than the overall alpha of their corresponding construct, indicating that no individual item diminished reliability. Corrected item-total correlations exceeded 0.40, signifying that each item correlated sufficiently with its build and did not require removal.

We then assessed construct validity through exploratory factor analysis. The Kaiser-Meyer-Olkin (KMO) measure exceeded 0.90, and Bartlett's test of sphericity was highly significant, confirming that the data were suitable for factor extraction. These results provided confidence that the revised questionnaire would capture the intended constructs effectively.

We launched the final data collection after this pre-survey and subsequent item refinement. The questionnaire was disseminated online utilizing a non-probability convenience sampling method. During the main data collection period, 487 responses were received. After data cleaning, 385 valid questionnaires were retained for analysis. Thus, the valid response rate was 79.06% (385/487).

To quickly see nationwide coverage and regional concentration, Figure 2 shows geographic provenance of collected and valid questionnaires (IP-based attribution), where the most significant proportions of respondents come from Sichuan, Jiangsu, Shanghai, and

Shandong provinces. In addition, Figure 3 shows the above cities/regions to orient those unfamiliar with Chinese geography. Exact sensitive site names are withheld for ethical reasons; the map uses regional/locality labels only.

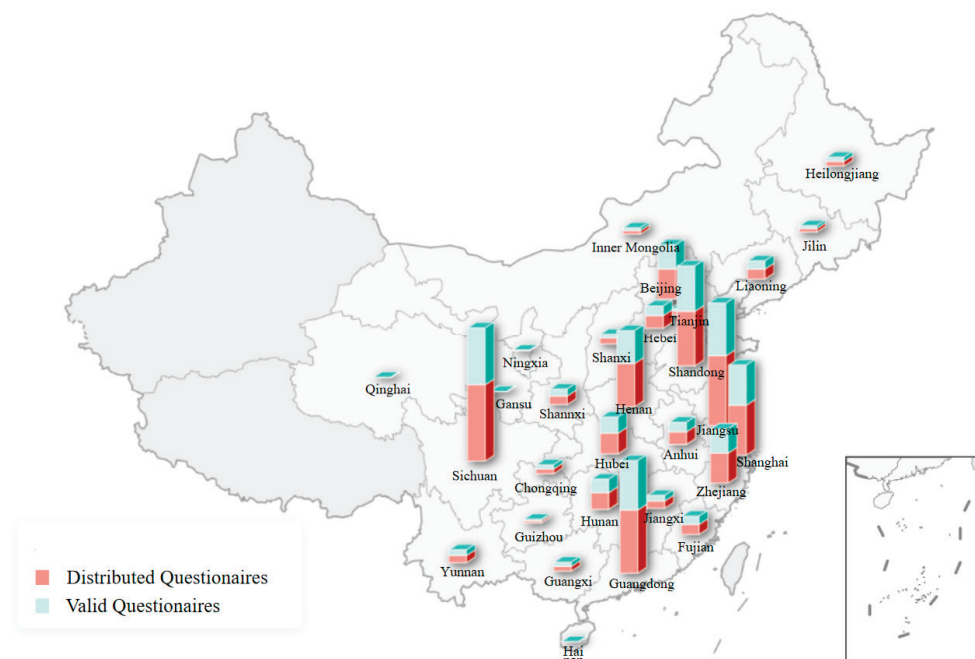


Figure 2. Provincial distribution of questionnaire responses.

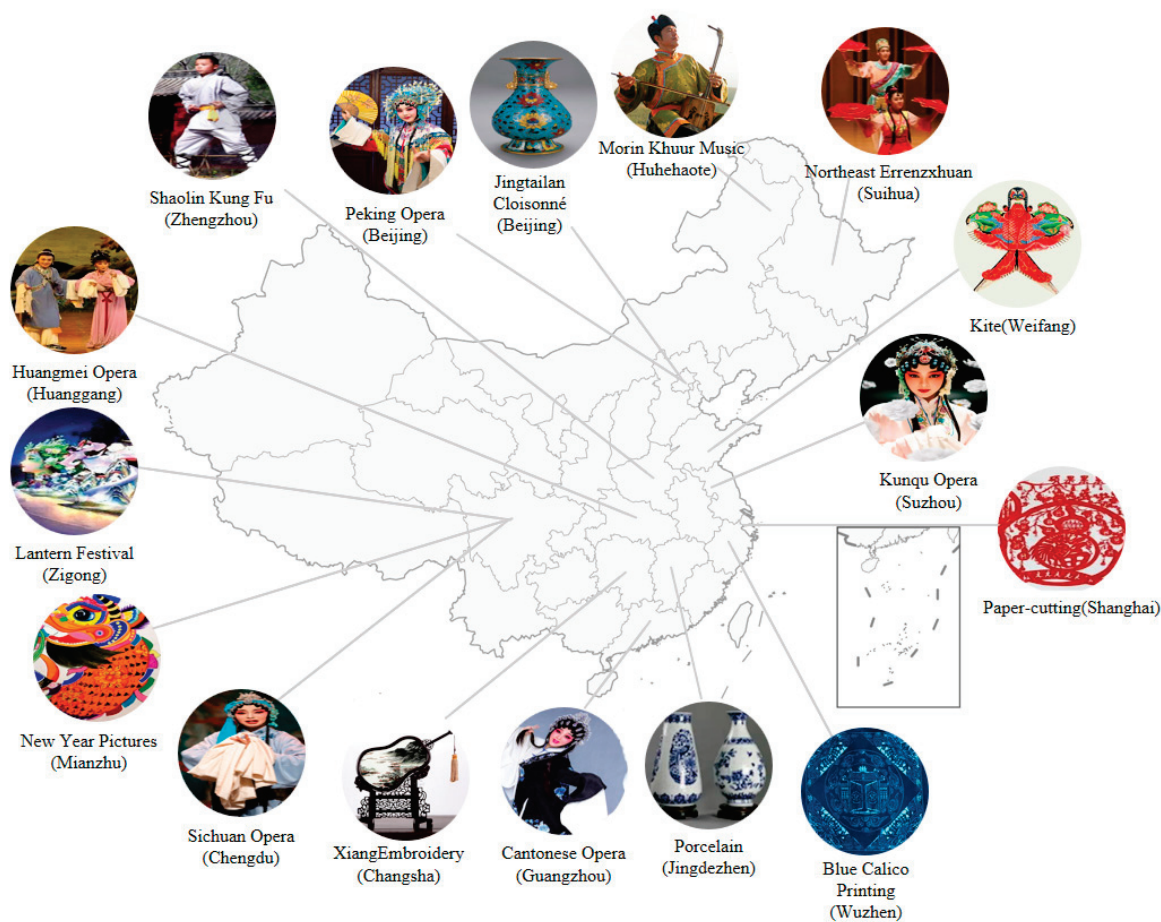


Figure 3. Representative ICH destination regions, cities, and products.

4.2. Descriptive Statistical Analysis

The 385 valid questionnaires were subjected to statistical analyses to assess measurement properties and test the research hypotheses. First, we performed a confirmatory factor analysis (CFA) using AMOS 25 to verify the constructs' factor structure and assess overall model fit. SPSS 25.0 was used to compute reliability measures and examine convergent and discriminant validity (via standard factor loadings, average variance extracted (AVE), and inter-construct correlations). Once the measurement model exhibited satisfactory fit (e.g., CFI > 0.90, RMSEA < 0.08, SRMR < 0.08), we proceeded to test the structural relationships.

Next, the hypothesized structural paths were evaluated using SPSS 25.0 and PROCESS v4.2. Specifically, we estimated regression equations to examine the direct effects of ICH attributes and tourism involvement on experiential value and, in turn, on tourist loyalty. Mediation effects of experiential value were tested using the bootstrap-based approach implemented in PROCESS. Finally, moderated mediation analyses were conducted to determine whether cultural identity significantly moderated the indirect effects of ICH attributes and involvement on loyalty via experiential value. All regression coefficients are reported alongside bootstrapped confidence intervals; significance was assessed at 0.05.

Table 5 summarizes the demographic and travel-related characteristics. The sample is balanced by gender (45.20% male, 54.80% female) and skewed toward higher education (71.43% hold a bachelor's degree or above); nearly three-quarters (68.05%) are aged 21–40 (mean age = 32.80). Occupations concentrate among enterprise employees (36.62%) and students (35.58%), reflecting the survey's reach into university networks and working professionals. Monthly income is concentrated in the 4001–6000 RMB band (34.29%), with a substantial student/no-fixed-income subgroup (31.17%). Regarding ICH travel behavior, 42.60% reported 1–2 visits to ICH destinations in the past five years, while only 14.29% visited five times or more; 26.03% were first-time visitors. Most respondents (73.01%) cited “to experience the cultural spirit of intangible heritage” as their primary motivation, whereas 12.99% described their visit as an incidental stop.

Table 5. Sample Demographics and Travel Characteristics (N = 385).

Characteristic	Category	Count (n)	Percentage (%)
Gender	Male	174	45.20
	Female	211	54.80
Age (years)	≤20	35	9.09
	21–40	262	68.05
	41–60	66	17.14
	≥61	22	5.72
Education Level	High school or below	35	9.09
	Vocational/ Associate	75	19.48
	Bachelor's degree	181	47.01
	Master's degree or above	94	24.42
Occupation	Enterprise employee	141	36.62
	Student	137	35.58
	Government/Institution	38	9.87
	Self-employed/Business owner	31	8.05
	Other	38	9.88
Monthly Income (RMB)	No fixed income	120	31.17
	<2000	35	9.09
	2001–4000	90	23.38
	4001–6000	132	34.29
	>6000	8	2.08

Table 5. *Cont.*

Characteristic	Category	Count (n)	Percentage (%)
ICH Visits (past 5 yrs)	1–2 visits	164	42.60
	3–4 visits	66	17.14
	≥5 visits	55	14.29
	First-time visit	100	26.03
Primary Motivation	“Experience ICH cultural spirit”	281	73.01
	“Incidental stop, limited ICH interest”	50	12.99
	“Academic/professional purposes”	54	14.03

These patterns indicate that younger, educated, and digitally active visitors are more likely to seek experiential consumption, engage with interpretive media, and participate in hands-on activities. Moreover, the high proportion motivated by “experiencing cultural spirit” suggests a sample predisposed to register stronger, more substantial experiential value and identity-congruent responses. Hence, the estimated effects of perceived authenticity, vitality, involvement, and cultural-identity moderation on loyalty may be more pronounced in this sample than in a population less intrinsically interested in ICH. The relatively low share of frequent repeat visitors (≥ 5 visits = 14.3%) indicates that domestic ICH tourism is still maturing for many respondents.

4.3. Data Reliability and Validity Testing

4.3.1. Reliability Analysis

Cronbach’s alpha was computed for each construct to assess internal consistency reliability. Table 6 summarizes the results. The overall questionnaire achieved an alpha of 0.963, indicating excellent reliability. Each construct’s Cronbach’s alpha also exceeded 0.80, which confirms that all scales exhibit high internal consistency.

Table 6. Reliability Data for All Constructs.

Construct	Number of Items	Cronbach’s Alpha
Authenticity	4	0.885
Vitality	4	0.935
Cognitive Involvement	4	0.902
Behavioral Involvement	4	0.904
Cultural Identity	5	0.911
Experiential Value	5	0.848
Tourist Loyalty	5	0.853
Overall Instrument	31	0.963

4.3.2. Validity Analysis

Validity was assessed in two parts: Convergent validity via composite reliability (CR) and AVE; and Discriminant validity.

Convergent validity requires that each construct explains a substantial portion of the variance in its indicators. AVE should exceed 0.50 and CR should exceed 0.60 [84]. Table 7 displays the convergent validity results. All standardized factor loadings are above 0.68 and significant at $p < 0.001$. CR values range from 0.888 to 0.917, all above 0.80, and AVE values range from 0.529 to 0.734, all above 0.50, indicating satisfactory convergent validity.

Table 7. Convergent Validity.

Construct	Item Code	Factor Loading	CR	AVE
Authenticity	A1	0.863	0.895	0.690
	A2	0.824		
	A3	0.828		
	A4	0.779		
Vitality	V1	0.833	0.917	0.734
	V2	0.860		
	V3	0.826		
	V4	0.828		
Cognitive Involvement	C1	0.849	0.888	0.678
	C2	0.821		
	C3	0.757		
	C4	0.746		
Behavioral Involvement	BI 1	0.862	0.905	0.706
	BI 2	0.858		
	BI 3	0.807		
	BI 4	0.901		
Cultural Identity	CI 1	0.821	0.921	0.699
	CI 2	0.855		
	CI 3	0.840		
	CI 4	0.826		
	CI 5	0.838		
Experiential Value	EV 1	0.737	0.854	0.539
	EV 2	0.780		
	EV 3	0.755		
	EV 4	0.691		
	EV 5	0.706		
Tourist Loyalty	TL 1	0.683	0.849	0.529
	TL 2	0.710		
	TL 3	0.744		
	TL 4	0.733		
	TL 5	0.763		

Discriminant validity was assessed using the Fornell-Larcker criterion, which requires that the square root of each construct's AVE exceed its correlations with other constructs. Table 8 reports the discriminant validity results. All diagonal entries are larger than the corresponding off-diagonal correlations, confirming discriminant validity.

Table 8. Discriminant Validity.

Construct	AVE	1	2	3	4	5	6	7
1. Authenticity	0.690	0.831						
2. Vitality	0.734	0.743 ***	0.857					
3. Cognitive Involvement	0.678	0.605 ***	0.601 ***	0.828				
4. Behavioral Involvement	0.706	0.550 ***	0.550 ***	0.582 ***	0.840			
5. Cultural Identity	0.699	0.378 ***	0.378 ***	0.357 ***	0.354 ***	0.836		
6. Experiential Value	0.539	0.757 ***	0.763 ***	0.690 ***	0.645 ***	0.780 ***	0.734	
7. Tourist Loyalty	0.529	0.683 ***	0.654 ***	0.674 ***	0.710 ***	0.536 ***	0.774 ***	0.728

Note. Diagonal entries (in bold) are the square roots of AVE; off-diagonal entries are Pearson's correlation coefficients. *** $p < 0.001$.

4.3.3. Confirmatory Factor Analysis

A CFA was conducted to evaluate the measurement model's fit. Table 9 presents the CFA results. The model achieved $\chi^2/df = 1.624$. CFI = 0.971, TLI = 0.962, and RMSEA = 0.046, all meeting recommended criteria, indicating that the overall measurement model fits the data well.

Table 9. Overall Measurement Model Fit Statistics.

Fit Index	Recommended Threshold	Model Value	Meets Criterion?
χ^2	—	677.453	—
df	—	412	—
χ^2/df	<3.00	1.624	Yes
CFI	>0.90	0.971	Yes
TLI	>0.90	0.962	Yes
RMSEA	<0.08	0.046	Yes

4.4. Hypothesis Testing

4.4.1. Correlation Analysis

Pearson correlation coefficients (r) were computed to examine the relationships among the key variables. Table 10 presents the results. All correlations are significant at $p < 0.01$, and coefficients range from 0.33 to 0.69, indicating moderate positive associations. Variance inflation factors (VIFs) ranged from 1.61 to 2.29 (all < 5), confirming that multicollinearity is not a concern.

Table 10. Means, Standard Deviations, and Correlations (N = 385).

Variable	M	SD	1	2	3	4	5	6	7
1. Authenticity	5.28	1.18	1						
2. Vitality	5.01	1.05	0.69 **	1					
3. Cognitive Involvement	4.95	1.12	0.55 **	0.56 **	1				
4. Behavioral Involvement	5.40	1.04	0.51 **	0.50 **	0.54 **	1			
5. Cultural Identity	5.49	1.10	0.35 **	0.36 **	0.33 **	0.33 **	1		
6. Tourist Satisfaction	5.14	0.98	0.67 **	0.69 **	0.61 **	0.58 **	0.69 **	1	
7. Tourist Loyalty	5.19	0.93	0.60 **	0.58 **	0.59 **	0.63 **	0.48 **	0.66 **	1

Note. M = mean; SD = standard deviation. Off-diagonal entries are Pearson's r. ** represents for $p < 0.01$ (two-tailed).

4.4.2. Main Effects Testing

We conducted hierarchical regression analyses to test H1–H5. Gender, age, education, occupation, and monthly income were entered as control variables in Step 1; independent variables (ICH attributes and tourism involvement) and the mediator (tourist satisfaction) were entered in subsequent steps. Table 11 presents the results.

Table 11. Hierarchical Regression Results (N = 385).

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
	Satisfaction (1)	Satisfaction (2)	Satisfaction (3)	Loyalty (4)	Loyalty (5)	Loyalty (6)	Loyalty (7)	Loyalty (8)	Loyalty (9)
Constant	5.103 *** (0.752)	1.422 *** (0.375)	1.318 *** (0.402)	6.012 *** (0.518)	3.085 *** (0.281)	2.342 ** (0.304)	2.893 *** (0.296)	2.513 *** (0.322)	1.934 *** (0.428)
Control Variables									
Gender	−0.052 (0.038)	−0.018 (0.037)	−0.005 (0.036)	0.002 (0.041)	0.032 (0.025)	0.054 (0.028)	0.041 (0.027)	0.038 (0.029)	0.053 (0.032)

Table 11. Cont.

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
	Satisfaction (1)	Satisfaction (2)	Satisfaction (3)	Loyalty (4)	Loyalty (5)	Loyalty (6)	Loyalty (7)	Loyalty (8)	Loyalty (9)
Age	−0.008 (0.014)	0.006 (0.012)	0.004 (0.013)	−0.022 ** (0.016)	−0.013 ** (0.008)	−0.011 ** (0.009)	−0.012 ** (0.009)	−0.014 ** (0.010)	−0.012 ** (0.011)
Education	0.061 (0.029)	0.047 (0.028)	0.044 (0.027)	−0.022 (0.031)	−0.037 (0.019)	−0.039 (0.021)	−0.059 (0.020)	−0.053 (0.022)	−0.054 (0.023)
Occupation	0.071 (0.035)	0.029 (0.032)	0.051 (0.031)	0.011 (0.034)	−0.028 (0.020)	−0.012 (0.023)	−0.036 (0.022)	−0.037 (0.024)	−0.028 (0.025)
Income	−0.019 (0.022)	−0.025 (0.020)	−0.021 (0.018)	−0.038 (0.023)	−0.041 (0.014)	−0.039 (0.015)	−0.027 (0.016)	−0.033 (0.017)	−0.031 (0.018)
Independent/Mediator									
Intangible Attributes	—	0.594 *** (0.039)	0.352 *** (0.056)	—	0.348 *** (0.045)	0.281 ** (0.048)	—	0.221 *** (0.047)	0.199 *** (0.049)
Tourism Involvement	—	0.582 *** (0.042)	0.273 *** (0.059)	—	0.289 *** (0.050)	0.248 ** (0.053)	—	0.193 *** (0.052)	0.184 *** (0.054)
Tourist Satisfaction	—	—	—	—	—	—	0.422 *** (0.044)	0.410 *** (0.046)	0.376 *** (0.048)
Model Fit Statistics									
R ²	0.035	0.527	0.452	0.081	0.472	0.519	0.485	0.537	0.589
ΔR ²	0.035	0.492	0.417	0.081	0.391	0.438	0.404	0.052	0.052
F-statistic	2.145 *	55.783 ***	43.210 ***	5.211 ***	49.587 ***	46.011 ***	48.402 ***	55.673 ***	62.130 ***

Note. Unstandardized coefficients (B) are reported with standard errors (SE) in parentheses. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$. The same as below.

4.4.3. Path Coefficients

Table 12 examines paths from each dimension of intangible attributes (authenticity vs. vitality) and involvement (cognitive vs. behavioral) to tourist satisfaction and loyalty via satisfaction. Results are confirming H1a–H4b.

Table 12. Path Coefficient Estimates (N = 385).

Dependent Variable	Predictor	Hypothesis	B	SE	β	p	Support
Loyalty	Authenticity	H1a	0.226	0.045	0.21	***	Yes
	Vitality	H1b	0.169	0.049	0.16	**	Yes
	Cognitive Involvement	H2a	0.217	0.043	0.20	***	Yes
	Behavioral Involvement	H2b	0.342	0.044	0.33	***	Yes
Satisfaction	Authenticity	H3a	0.275	0.042	0.25	***	Yes
	Vitality	H3b	0.318	0.048	0.30	***	Yes
	Cognitive Involvement	H4a	0.198	0.041	0.18	***	Yes
	Behavioral Involvement	H4b	0.203	0.041	0.19	***	Yes

Note.; ** $p < 0.01$; *** $p < 0.001$.

4.4.4. Mediation Analysis

To test H6 and H7, we examined whether satisfaction mediates the effects of intangible attributes and involvement on loyalty. We estimated total, direct, and indirect effects using the bootstrap method (5000 resamples, bias-corrected 95% CIs) (Table 13). For intangible attributes, the total effect on loyalty was $B = 0.457$, $SE = 0.037$, $p < 0.001$; the direct effect remained significant ($p < 0.001$), and the indirect effect (via satisfaction) was $B = 0.239$, $SE = 0.035$, 95% CI [0.172, 0.307], supporting partial mediation (H6a and H6b). Involvement had a total effect on loyalty of $B = 0.481$, $SE = 0.039$, $p < 0.001$; direct effect remained significant ($p < 0.001$); and indirect effect was $B = 0.157$, $SE = 0.031$, 95% CI [0.102, 0.222], indicating partial mediation, confirming H7a and H7b.

Table 13. Mediation Effect Decomposition (N = 385).

Path	Effect Type	B	SE	95% CI Lower	95% CI Upper	p
Authenticity → Satisfaction → Loyalty	Total Effect	0.457	0.037	0.385	0.529	***
	Direct Effect	0.218	0.041	0.137	0.299	***
	Indirect Effect	0.239	0.035	0.172	0.307	***
Vitality → Satisfaction → Loyalty	Total Effect	0.489	0.040	0.410	0.568	***
	Direct Effect	0.226	0.047	0.134	0.318	***
	Indirect Effect	0.263	0.038	0.197	0.332	***
Cognitive → Satisfaction → Loyalty	Total Effect	0.478	0.038	0.403	0.553	***
	Direct Effect	0.254	0.040	0.176	0.332	***
	Indirect Effect	0.224	0.033	0.162	0.289	***
Behavioral → Satisfaction → Loyalty	Total Effect	0.564	0.042	0.481	0.647	***
	Direct Effect	0.331	0.044	0.243	0.419	***
	Indirect Effect	0.233	0.032	0.169	0.302	***

Note. Bootstrap 95% CIs are reported for indirect effects. *** $p < 0.001$.

4.4.5. Moderation Analysis

Hypotheses H8a–H9b posited that cultural identity moderates the effects of intangible attributes and involvement on loyalty. We tested these interactions in hierarchical regression (Table 14). Intangible attributes, cultural identity, and their interaction term were entered after the control variables. The interaction between attributes and cultural identity was significant ($p < 0.01$), indicating that the positive effect of attributes on loyalty is stronger when cultural identity is higher (H8a). The interaction between involvement and cultural identity was significant ($p < 0.05$), supporting H9a.

Table 14. Moderation Effects (Hierarchical Regression, N = 385).

	Model 10	Model 11	Model 12	Model 13	Model 14	Model 15
	Satisfaction (10)	Satisfaction (11)	Loyalty (12)	Loyalty (13)	Loyalty (14)	Loyalty (15)
Constant	0.583 *** (0.184)	0.420 ** (0.182)	2.532 *** (0.238)	2.012 *** (0.258)	2.393 *** (0.265)	1.922 *** (0.277)
Control Variables						
Gender	−0.007 (0.032)	0.005 (0.030)	0.043 (0.027)	0.052 (0.029)	0.041 (0.029)	0.049 (0.031)
Age	0.005 (0.011)	0.001 (0.010)	−0.018 ** (0.012)	−0.011 ** (0.013)	−0.012 * (0.013)	−0.010 (0.014)
Education	0.009 (0.023)	0.006 (0.021)	−0.049 (0.019)	−0.059 (0.020)	−0.053 (0.020)	−0.056 (0.022)
Occupation	−0.011 (0.027)	0.010 (0.025)	−0.046 (0.023)	−0.029 (0.024)	−0.044 (0.024)	−0.031 (0.026)
Income	−0.022 (0.019)	−0.026 (0.017)	−0.038 (0.016)	−0.040 (0.017)	−0.035 (0.017)	−0.034 (0.018)
Independent/Moderator						
Intangible Attributes	0.456 *** (0.036)	—	0.436 *** (0.042)	—	0.317 *** (0.040)	—
Tourism Involvement	—	0.526 *** (0.039)	—	0.518 *** (0.041)	—	0.426 *** (0.042)
Satisfaction	—	—	—	—	0.397 *** (0.043)	0.402 *** (0.045)
Cultural Identity	0.231 ** (0.072)	0.215 ** (0.069)	0.399 ** (0.071)	0.426 *** (0.074)	0.133 ** (0.061)	0.120 ** (0.062)
Interaction (Attributes × Identity)	—	—	−0.079 ** (0.025)	—	−0.036 (0.021)	—
Interaction (Involvement × Identity)	—	—	—	−0.063 * (0.028)	—	−0.042 (0.023)
Model Fit						
R ²	0.756	0.687	0.524	0.582	0.537	0.587
ΔR ²	0.756	0.687	0.524	0.582	0.015	0.015
F-statistic	121.624 ***	87.312 ***	41.309 ***	23.045 ***	39.482 ***	48.189 ***

Note. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

4.4.6. Moderated Mediation Analysis

To evaluate H10 and H11, we used PROCESS v4.2 (Model 7) with 5000 bootstrap samples and 95% CIs. Cultural identity was tested as a moderator of the mediation by tourist satisfaction. Table 15 displays the results.

Table 15. Moderated Mediation Results (N = 385).

Path	Condition	Indirect Effect	SE	95% CI Lower	95% CI Upper	Index	95% CI Lower	95% CI Upper	Support
Attributes → Satisfaction → Loyalty	Low Cultural Identity	0.206	0.028	0.147	0.272	−0.069	−0.118	−0.022	Yes
	High Cultural Identity	0.137	0.024	0.085	0.192				
Involvement → Satisfaction → Loyalty	Low Cultural Identity	0.174	0.025	0.121	0.236	−0.043	−0.100	0.000	No
	High Cultural Identity	0.131	0.022	0.079	0.186				

Note. Unstandardized conditional indirect effects with bootstrapped standard errors (SE) and CIs. Index = difference between high and low identity effects.

For Attributes → Satisfaction → Loyalty, the index of moderated mediation (−0.069, 95% CI [−0.118, −0.022]) indicates that cultural identity significantly moderates the indirect effect. Satisfaction mediates the attributes-loyalty link more strongly when cultural identity is lower. H10a and H10b are supported.

For Involvement → Satisfaction → Loyalty, the index (−0.043, 95% CI [−0.100, 0.000]) indicates no significant moderation by cultural identity of the involvement-satisfaction-loyalty mediation. H11, H11a, and H11b are rejected.

4.4.7. Dimension-Specific Moderated Mediation

We examined whether satisfaction mediates the effects of each dimension of intangible attributes (authenticity vs. vitality) on loyalty, conditional on cultural identity (H10a, H10b). Table 16 shows that both indices' CIs exclude zero. Thus, cultural identity moderates these indirect effects, supporting H10a and H10b. The direct impact remains significant, indicating partial moderated mediation.

Table 16. Dimension-Specific Moderated Mediation (Valid Questionnaires N = 385).

Path	Index	SE	95% CI Lower	95% CI Upper	Support
Authenticity → Satisfaction → Loyalty	−0.046	0.011	−0.068	−0.022	Yes
Vitality → Satisfaction → Loyalty	−0.041	0.012	−0.063	−0.016	Yes

5. Discussion

5.1. Heritage Attributes as Drivers of Tourist Loyalty

Our findings confirm that both authenticity and vitality dimensions of ICH significantly and positively influence tourist loyalty. This aligns with current research illustrating the centrality of perceived authenticity in heritage tourism [24,31]. Tourists seek “genuine” cultural experiences, which motivates return visits and positive word-of-mouth [12,13,85]. Meanwhile, the vitality dimension, which reflects ICH's evolving nature, reinforces loyalty by connecting tourists to dynamic cultural practices. Therefore, when visitors perceive that artisans and bearers actively transmit and adapt traditions to contemporary contexts, they report stronger affective responses and higher experiential value, which supports revisit intentions and positive endorsements. The results align with Lee et al. [86], who found

that distinctive heritage features help form deeper destination-tourist relationships, stimulating revisit intentions and positive endorsements. Thus, destination managers should preserve original cultural expressions while supporting living traditions to maximize ICH's loyalty-building potential.

Moreover, the findings confirm that ICH's perceived authenticity and vitality significantly and positively influence tourist loyalty. We frame authenticity as a visitor-centered, experiential judgment—whether performances, craft demonstrations, or rituals are seen as genuine expressions of local culture—which aligns with empirical work linking perceived authenticity to stronger experiential outcomes [24,31]. Authenticity and vitality capture distinct but complementary cues: authenticity directs visitors' attention to provenance and embodied skill, whereas vitality signals that the tradition is living and socially meaningful. These cues promote more profound meaning-making and emotional resonance, which raises satisfaction and motivates revisit intentions and positive word-of-mouth [12,13]. Previous studies also show that distinctive heritage features strengthen destination–tourist bonds [86]. Therefore, managers should protect original expressions while supporting living transmission (e.g., master-led demonstrations and documented craft narratives) so that authenticity and vitality jointly generate the affective and cognitive responses that sustain loyalty.

5.2. Tourism Involvement and Its Role in Shaping Loyalty

Consistent with prior studies [34], cognitive and behavioral involvement strengthen loyalty. The pathway operates via intensified information processing and embodied learning: cognitive involvement promotes interpretive engagement, while behavioral involvement facilitates embodied experience and longer memory traces. These processes heighten experiential value, supporting satisfaction and loyalty, which align with Kempiaik and Hollywood's findings [87]. Importantly, design can scaffold involvement: targeted interpretive materials, short guided demonstrations, or low-cost participatory stations can convert casual interest into deeper involvement. A two-track approach is effective for destination marketers, providing rich interpretive content for curious visitors and practical, low-barrier participation for those willing to invest time.

5.3. Experiential Value (Satisfaction) as a Partial Mediator

Our mediation analysis shows that experiential value partially transmits the effects of ICH attributes and involvement to loyalty. This occurs because perceived authenticity and vitality direct visitors' attention toward culturally salient cues, which enhances meaning-making and emotional arousal. Cognitive involvement amplifies interpretive processing, while behavioral involvement increases embodied learning; both increase the intensity and durability of the experience. The heightened experiential value raises satisfaction and normative endorsements that motivate revisit intentions and word-of-mouth. The chain, attention→meaning-making/embodiment→affective response→loyalty, aligns with S-O-R logic and is consistent with prior work linking perceived authenticity to stronger experiential outcomes in heritage settings [88,89]. Managers should design interpretive cues and hands-on touchpoints (e.g., live demonstrations with concise narration, tactile workshops) that scaffold visitors' attention and meaning-making to convert fleeting interest into sustained loyalty.

5.4. Cultural Identity's Moderating Role

Interestingly, cultural identity amplifies how ICH attributes and involvement translate into loyalty for identity-aligned visitors. The moderating logic is twofold. First, cultural identity furnishes an interpretive frame that increases relevance and personal meaning, so authenticity and vitality more readily convert into loyalty among those with strong

identity ties [57]. Second, identity can produce a boundary effect. When cultural identity is high, visitors may rely directly on identity-based devotion as identity already predisposes favorable commitments [90]. However, experiential value remains crucial for visitors with low cultural identity as the pathway through which stimuli and involvement generate loyalty. We also find that involvement's indirect path via experiential value is comparatively consistent across identity levels, suggesting that active engagement builds experiential resonance broadly. This implies a segmentation strategy: identity-targeted programming (e.g., symbolic festivals) can effectively convert identity-aligned visitors, while broadly accessible engagement tools are needed to build experiential value among less identity-engaged audiences.

5.5. Cross-Cultural Considerations

Cultural frameworks help explain how national or group-level differences might shape the processes we model. According to Hofstede [91] and Hall [92], we expect systematic variation in how ICH attributes, involvement, and experiential value translate into loyalty. High-context, collectivist visitors may privilege relational and symbolic cues. Hence, authenticity and vitality may more readily produce experiential value and loyalty for these visitors [93]. In contrast, low-context or individualist visitors may depend more on explicit information and structured interpretation, which makes cognitive involvement especially important for generating experiential value. Moreover, behavioral involvement may yield broad gains in experiential value across cultures, but the pathways' strengths (direct vs. mediated through experiential value) are likely conditioned by cultural communication norms [94]. Therefore, destinations serving multi-national markets should combine practitioner-centered, visually contextualized presentations with clear, step-by-step interpretive content and multilingual guides to engage both high- and low-context visitors.

6. Conclusions and Implications

This study employed an S-O-R framework integrated with a cultural identity perspective to investigate the mechanisms driving tourist loyalty in ICH tourism. The findings confirm that perceived ICH attributes and tourism involvement are pivotal stimuli that directly foster loyalty, indirectly through experiential value mediation. Furthermore, cultural identity is a significant moderator, particularly strengthening the direct effects of ICH attributes on loyalty and influencing the mediated pathways.

6.1. Managerial Implications

Our findings offer crucial actionable levers for destination managers to strengthen experiential value and tourist loyalty.

Firstly, protect and activate authentic ICH assets. Base product development on a documented inventory of local ICH practices and collaborate with heritage bearers to preserve original techniques, rituals, and narratives. Avoid superficial "theme-park" staging and build coherent cultural narratives or "ICH cultural IP" that foreground authenticity and living tradition.

Secondly, design participatory, hands-on experiences. Prioritize workshops, master-led demonstrations, and performance-based participation that let visitors learn by doing. These activities raise cognitive and behavioral involvement, converting transient interest into stronger, more substantial experiential value and repeat visitation.

Third, technology can be used to deepen live engagement. Deploy AR/VR, mobile guides, multimedia kiosks, or interactive apps to contextualize ICH, extend interpretation,

and scaffold learning; ensure these tools complement face-to-face interaction with artisans rather than substituting for it.

Fourth, ensure experience quality and culturally informed hospitality. Invest in visitor-center infrastructure, clear interpretive signage, accessibility, and staff training so front-line personnel can narrate cultural meanings accurately and empathetically. High service quality protects visitor satisfaction and prevents commodification of heritage content.

Finally, communication plays a crucial role in building cultural identity links. Use storytelling, festival programming, school partnerships, and targeted social-media campaigns to foreground symbolic meanings and identity signals. Identity-focused promotion amplifies the effect of ICH attributes and involvement on loyalty and can strengthen mediated pathways through experiential value.

Additionally, implementation should be community-sensitive. To avoid over-commercialization, local stakeholders should be involved in co-design, intellectual and cultural property should be respected, and impacts on resident attitudes should be monitored.

6.2. Limitations and Future Research

Although this study provides robust quantitative evidence, several limitations should be addressed in future research. First, our online, cross-sectional design may underrepresent groups with limited internet access and cannot establish causal ordering. Hence, future research should employ multi-site field sampling and longitudinal designs to test causal dynamics and enhance generalizability. Second, we operationalized affective response primarily through experiential value. Related constructs (i.e., place attachment or community identification) may capture different facets of emotional bonding and should be directly compared in future research. Third, the predominantly quantitative approach cannot fully reveal the micro-processes by which ICH experiences produce meaning. Hence, qualitative methods, such as semi-structured interviews and in-depth case studies, can be adopted to enrich the understanding of mechanisms, staging practices, and community perspectives. Fourth, since cultural identity operates as a conditional and context-dependent process, future studies should examine how identity evolves through repeated interactions or participatory programs. Finally, since cultural frameworks imply systematic cross-national variation, future studies should incorporate multi-country or multicultural samples to test whether the model's pathways differ by cultural profile.

Supplementary Materials: The following supporting information can be downloaded at: <https://www.mdpi.com/article/10.3390/su17178056/s1>, Questionnaire S1: Questionnaire for Tourist Loyalty in Intangible Cultural Heritage Tourism: The Roles of Perceived Attributes, Involvement, and Cultural Identity.

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Institutional Review Board Statement: The study was approved by the Research Ethics Committee of Chengdu University of Technology, Sichuan, China, on 15 October 2024, under the financial project numbers 24XQZD02 and 24XQYB05. It adheres strictly to ethical standards aimed at safeguarding the rights of human participants, including privacy, confidentiality, informed consent, dignity, protection,

and voluntary participation. All processes and procedures followed in this research align with the ethical principles outlined in the Declaration of Helsinki. This approval covers every aspect of the study, such as participant recruitment, data collection and analysis, informed consent procedures, and measures to ensure confidentiality, as specified in the approved protocol.

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study. No personally identifiable information is disclosed in this manuscript.

Data Availability Statement: The data presented in this study are available on request from the corresponding author. The data are not publicly available due to privacy and ethical restrictions.

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References

1. UNESCO. *Convention for the Safeguarding of the Intangible Cultural Heritage*; UNESCO: Paris, France, 2003.
2. Silverman, H.; Blumenfield, T. Cultural heritage politics in China: An introduction. In *Cultural Heritage Politics in China*; Springer: Berlin/Heidelberg, Germany, 2013; pp. 3–22.
3. People's Daily Online. Xi Calls for Building Cultural Confidence, Strength. Available online: <http://en.people.cn/n3/2022/1016/c90000-10159262.html?> (accessed on 2 September 2025).
4. Kuah, K.E.; Liu, Z. *Intangible Cultural Heritage in Contemporary China*; Routledge Ltd.: Florence, Italy, 2016.
5. Qiu, Q.; Zuo, Y.; Zhang, M. Intangible Cultural Heritage in Tourism: Research Review and Investigation of Future Agenda. *Land* **2022**, *11*, 139. [CrossRef]
6. Zhou, Q.; Pu, Y. Impact of cultural heritage rejuvenation experience quality on perceived value, destination affective attachment, and revisiting intention: Evidence from China. *Asia Pac. J. Tour. Res.* **2022**, *27*, 192–205. [CrossRef]
7. Massing, K. Safeguarding intangible cultural heritage in an ethnic theme park setting—the case of Binglanggu in Hainan Province, China. *Int. J. Herit. Stud.* **2018**, *24*, 66–82. [CrossRef]
8. Dong, B.; Bai, K.; Sun, X.; Wang, M.; Liu, Y. Spatial distribution and tourism competition of intangible cultural heritage: Take Guizhou, China as an example. *Herit. Sci.* **2023**, *11*, 64. [CrossRef]
9. Chen, Y.; Tao, L.; Zheng, S.; Yang, S.; Li, F. What drives viewers' engagement in travel live streaming: A mixed-methods study from perceived value perspective. *Int. J. Contemp. Hosp. Manag.* **2025**, *37*, 418–443. [CrossRef]
10. Mo, Y. *Touring China: A History of Travel Culture, 1912–1949*; Cornell University Press: Ithaca, NY, USA, 2021.
11. Yan, H. *Heritage Tourism in China: Modernity, Identity and Sustainability*; Channel View Publications: Bristol, UK, 2016.
12. Abou-Shouk, M.; Zouair, N.; Abdelhakim, A.; Roshdy, H.; Abdel-Jalil, M. The effect of immersive technologies on tourist satisfaction and loyalty: The mediating role of customer engagement and customer perceived value. *Int. J. Contemp. Hosp. Manag.* **2024**, *36*, 3587–3606. [CrossRef]
13. Liu, D.; Wu, M.; Zhu, T.; Fang, H.; Hu, D. Self-congruity and functional congruity drive positive word-of-mouth in food tourism through moderating effects of emotional experiences. *Sci. Rep.* **2025**, *15*, 10560. [CrossRef]
14. Zhou, M.; Yu, H. Exploring how tourist engagement affects destination loyalty: The intermediary role of value and satisfaction. *Sustainability* **2022**, *14*, 1621. [CrossRef]
15. Ma, Z.; Guo, Y. Leveraging intangible cultural heritage resources for advancing China's knowledge-based economy. *J. Knowl. Econ.* **2024**, *15*, 12946–12978. [CrossRef]
16. Wasela, K. The role of intangible cultural heritage in the development of cultural tourism. *Int. J. Eco-Cult. Tour. Hosp. Plan. Dev.* **2023**, *6*, 15–28. [CrossRef]
17. Colomer, L. ICH and identity: The use of ICH among global multicultural citizens. In *Research Handbook on Contemporary Intangible Cultural Heritage*; Edward Elgar Publishing: Cheltenham, UK; Northampton, MA, USA, 2018; pp. 194–215.
18. McIntyre-Tamwoy, S.; O'Rourke, K. Under the Bauhinia tree: Lessons from South East Asia on ICH and the intersection between people, place and practice. *Hist. Environ.* **2017**, *29*, 12–30.
19. Mehrabian, A.; Russell, J.A. *An Approach to Environmental Psychology*; MIT Press: Cambridge, MA, USA, 1974.
20. Fu, Y.; Luo, J.M. An empirical study on cultural identity measurement and its influence mechanism among heritage tourists. *Front. Psychol.* **2023**, *13*, 1032672. [CrossRef]
21. Gaonkar, S.; Sukthankar, S.V. Measuring and evaluating the influence of cultural sustainability indicators on sustainable cultural tourism development: Scale development and validation. *Heliyon* **2025**, *11*, e42514. [CrossRef] [PubMed]
22. NPC. *The Intangible Cultural Heritage Law of the People's Republic of China*; Beijing: China Legal Publishing House: Beijing, China, 2011.

23. Sharma, P.; Nayak, J. Examining experience quality as the determinant of tourist behavior in niche tourism: An analytical approach. *J. Herit. Tour.* **2019**, *15*, 76–92. [CrossRef]
24. Cohen, E. Authenticity and commoditization in tourism. *Ann. Tour. Res.* **1988**, *15*, 371–386. [CrossRef]
25. Tian, D.; Wang, Q.; Law, R.; Zhang, M. Influence of Cultural Identity on Tourists' Authenticity Perception, Tourist Satisfaction, and Traveler Loyalty. *Sustainability* **2020**, *12*, 6344. [CrossRef]
26. Zhang, Y.; Zheng, Q.; Huang, L.; Lee, T.; Hyun, S. Alienation and authenticity in intangible cultural heritage tourism. *J. Sustain. Tour.* **2023**, *32*, 2459–2478. [CrossRef]
27. Castéran, H.; Roederer, C. Does authenticity really affect behavior? The case of the Strasbourg Christmas Market. *Tour. Manag.* **2013**, *36*, 153–163. [CrossRef]
28. Chen, C.-F.; Chen, F.-S. Experience quality, perceived value, satisfaction and behavioral intentions for heritage tourists. *Tour. Manag.* **2010**, *31*, 29–35. [CrossRef]
29. Su, J. *Intangible Cultural Heritage and Tourism in China: A Critical Approach*; Channel View Publications: Bristol, UK, 2023; Volume 63.
30. Wulf, C. Performativity and dynamics of intangible cultural heritage. In *Ritual, Heritage and Identity*; Routledge: New Delhi, India, 2020; pp. 76–94.
31. Lenzerini, F. Intangible cultural heritage: The living culture of peoples. *Eur. J. Int. Law* **2011**, *22*, 101–120. [CrossRef]
32. Qiu, Q. Identifying the role of intangible cultural heritage in distinguishing cities: A social media study of heritage, place, and sense in Guangzhou, China. *J. Destin. Mark. Manag.* **2023**, *27*, 100764. [CrossRef]
33. Wang, C.; Wang, Y.; Edelman, J.R.; Zhou, J. Tourism commercialisation and the frontstage-backstage metaphor in intangible cultural heritage tourism. *Tour. Stud.* **2024**, *24*, 246–265. [CrossRef]
34. Zaichkowsky, J.L. Measuring the involvement construct. *J. Consum. Res.* **1985**, *12*, 341–352. [CrossRef]
35. Sherif, M. *An Outline of Social Psychology*; Harper & Bros: New York, NY, USA, 1948.
36. Gross, M.J.; Brown, G. Tourism experiences in a lifestyle destination setting: The roles of involvement and place attachment. *J. Bus. Res.* **2006**, *59*, 696–700. [CrossRef]
37. Havitz, M.E.; Howard, D.R. How enduring is enduring involvement? A seasonal examination of three recreational activities. *J. Consum. Psychol.* **1995**, *4*, 255–276. [CrossRef]
38. Akhoondnejad, A. Tourist loyalty to a local cultural event: The case of Turkmen handicrafts festival. *Tour. Manag.* **2016**, *52*, 468–477. [CrossRef]
39. Rong, H. Protection of 'Intangible Cultural Heritage' and the Everyday Characteristics of Handicraft Folk Customs—A Case Study of the Transmission of Black Pottery-Making Techniques in Northwestern Shandong. *Minsu Yanjiu Folk. Stud.* **2017**, *4*, 63–70.
40. Turner, J.C. Henri Tajfel: An introduction. In *Social Groups and Identities: Developing the Legacy of Henri Tajfel*; Butterworth-Heinemann: Oxford, UK, 1996; Volume 1, p. 23.
41. Kapuściński, G.; Richards, B. Destination risk news framing effects—The power of audiences. *Serv. Ind. J.* **2022**, *42*, 107–130. [CrossRef]
42. Shen, S.; Guo, J.; Wu, Y. Investigating the structural relationships among authenticity, loyalty, involvement, and attitude toward world cultural heritage sites: An empirical study of Nanjing Xiaoling Tomb, China. *Asia Pac. J. Tour. Res.* **2014**, *19*, 103–121. [CrossRef]
43. Yang, Y.; Wang, Z.; Shen, H.; Jiang, N. The impact of emotional experience on tourists' cultural identity and behavior in the cultural heritage tourism context: An empirical study on Dunhuang Mogao Grottoes. *Sustainability* **2023**, *15*, 8823. [CrossRef]
44. Lam, L.W.; Liu, Y. The identity-based explanation of affective commitment. *J. Manag. Psychol.* **2014**, *29*, 321–340. [CrossRef]
45. Tsaur, S.-H.; Yen, C.-H.; Yan, Y.-T. Destination brand identity: Scale development and validation. *Asia Pac. J. Tour. Res.* **2016**, *21*, 1310–1323. [CrossRef]
46. Trinh, T.T.; Ryan, C. Visitors to heritage sites: Motives and involvement—A model and textual analysis. *J. Travel Res.* **2017**, *56*, 67–80. [CrossRef]
47. Su, J. A difficult integration of authenticity and intangible cultural heritage? The case of Yunnan, China. *China Perspect.* **2021**, 29–39. [CrossRef]
48. Domínguez-Quintero, A.M.; González-Rodríguez, M.R.; Paddison, B. The mediating role of experience quality on authenticity and satisfaction in the context of cultural-heritage tourism. *Curr. Issues Tour.* **2020**, *23*, 248–260. [CrossRef]
49. Wu, H.-C.; Li, T. A study of experiential quality, perceived value, heritage image, experiential satisfaction, and behavioral intentions for heritage tourists. *J. Hosp. Tour. Res.* **2017**, *41*, 904–944. [CrossRef]
50. Genc, V.; Gulertekin Genc, S. The effect of perceived authenticity in cultural heritage sites on tourist satisfaction: The moderating role of aesthetic experience. *J. Hosp. Tour. Insights* **2023**, *6*, 530–548. [CrossRef]
51. Rasoolimanesh, S.M.; Seyfi, S.; Rather, R.A.; Hall, C.M. Investigating the mediating role of visitor satisfaction in the relationship between memorable tourism experiences and behavioral intentions in heritage tourism context. *Tour. Rev.* **2022**, *77*, 687–709. [CrossRef]

52. Japutra, A. Building enduring culture involvement, destination identification and destination loyalty through need fulfilment. *Tour. Recreat. Res.* **2022**, *47*, 177–189. [CrossRef]
53. da Costa Mendes, J.; Oom do Valle, P.; Guerreiro, M.M.; Silva, J.A. The tourist experience: Exploring the relationship between tourist satisfaction and destination loyalty. *Tour. Int. Interdiscip. J.* **2010**, *58*, 111–126.
54. Holbrook, M.B. *Consumer Value: A Framework for Analysis and Research*; Routledge: London, UK, 1999.
55. Mathwick, C.; Malhotra, N.; Rigdon, E. Experiential value: Conceptualization, measurement and application in the catalog and Internet shopping environment. *J. Retail.* **2001**, *77*, 39–56. [CrossRef]
56. Sheth, J.N.; Newman, B.I.; Gross, B.L. Why we buy what we buy: A theory of consumption values. *J. Bus. Res.* **1991**, *22*, 159–170. [CrossRef]
57. Fu, X. Existential authenticity and destination loyalty: Evidence from heritage tourists. *J. Destin. Mark. Manag.* **2019**, *12*, 84–94. [CrossRef]
58. Oppermann, M. Tourism destination loyalty. *J. Travel Res.* **2000**, *39*, 78–84. [CrossRef]
59. Jing, W.; Loang, O.K. China's Cultural Tourism: Strategies for Authentic Experiences and Enhanced Visitor Satisfaction. *Int. J. Bus. Technol. Manag.* **2024**, *6*, 566–575.
60. Yan, Q.; James, H.S.; Xin, W.; Ben, H.Y. Examining the ritualized experiences of intangible cultural heritage tourism. *J. Destin. Mark. Manag.* **2024**, *31*, 100843. [CrossRef]
61. Park, E.; Choi, B.-K.; Lee, T.J. The role and dimensions of authenticity in heritage tourism. *Tour. Manag.* **2019**, *74*, 99–109. [CrossRef]
62. Kumar, V.; Kaushik, A.K. Destination brand experience and visitor behavior: The mediating role of destination brand identification. *J. Travel Tour. Mark.* **2018**, *35*, 649–663. [CrossRef]
63. Ryan, C.; Huimin, G. *Tourism in China: Destination, Cultures and Communities*; Routledge: London, UK, 2009.
64. Gursoy, D.; Gavcar, E. International leisure tourists' involvement profile. *Ann. Tour. Res.* **2003**, *30*, 906–926. [CrossRef]
65. Stella, T.-T.; William, G. Identity Negotiation Theory: Crossing Cultural Boundaries. In *Theorizing About Intercultural Communication*; Sage Publications Ltd.: Thousand Oaks, CA, USA, 2005; pp. 211–233.
66. Maleki, F.; Gholamian, A. Antecedents and consequences of ethnic tourist satisfaction: The moderating role of ethnic identity. *J. Herit. Tour.* **2020**, *15*, 597–611. [CrossRef]
67. Ng, S.L.; Feng, X. Residents' sense of place, involvement, attitude, and support for tourism: A case study of Daming Palace, a Cultural World Heritage Site. *Asian Geogr.* **2020**, *37*, 189–207. [CrossRef]
68. Zhao, Y.; Zhan, Q.; Du, G.; Wei, Y. The effects of involvement, authenticity, and destination image on tourist satisfaction in the context of Chinese ancient village tourism. *J. Hosp. Tour. Manag.* **2024**, *60*, 51–62. [CrossRef]
69. Wanju, T.; Zijuan, W.; Yijie, T. ICH and E-Commerce: Bridging Tradition and Modernity in Cultural and Creative Products. *J. Econ. Manag. Trade* **2025**, *31*, 1–8. [CrossRef]
70. Basaran, U.; Aksoy, R. The effect of perceived value on behavioural intentions. *J. Manag. Mark. Logist.* **2017**, *4*, 1–16. [CrossRef]
71. Huang, Y.; Lu, Q. The Measurement of Cultural Identity with Intangible Cultural Heritage Products and Its Influence on Purchase Intention. *J. Dalian Marit. Univ. Soc. Sci. Ed.* **2019**, *18*, 60–69.
72. Maulani, T.S.; Presetyo, M.H. Experiential marketing, experiential value and their effect on loyalty of culture tourism. *J. Econ. Manag. Perspect.* **2018**, *12*, 299–306.
73. Zhan, F.; Wang, C.; Luo, W.; Luo, J. Event tourist experience value: Multi-item scale development and validation. *Int. J. Contemp. Hosp. Manag.* **2023**, *35*, 2246–2266. [CrossRef]
74. Dulce, C.; Muntele, I.; Istrate, M. How Do Cultural Vitality and Socio-economic Factors Influence Urban Tourism? Evidence from Romanian Cities. In *Cultural Sustainable Tourism*; Springer: Berlin/Heidelberg, Germany, 2022; pp. 205–218.
75. Stone, R.N. The marketing characteristics of involvement. *Adv. Consum. Res.* **1984**, *11*, 210–215.
76. Tao, H.; Peiying, S.; Huihui, W.; Jiamin, F. How do affective and cognitive involvement affect tourism intentions: A perspective on blogger impact. *Curr. Issues Tour.* **2024**, *4*, 1–20. [CrossRef]
77. Farivar, S.; Wang, F. Effective influencer marketing: A social identity perspective. *J. Retail. Consum. Serv.* **2022**, *67*, 103026. [CrossRef]
78. Lam, S.K.; Ahearne, M.; Hu, Y.; Schillewaert, N. Resistance to brand switching when a radically new brand is introduced: A social identity theory perspective. *J. Mark.* **2010**, *74*, 128–146. [CrossRef]
79. Rather, R.A. Customer experience and engagement in tourism destinations: The experiential marketing perspective. *J. Travel Tour. Mark.* **2020**, *37*, 15–32. [CrossRef]
80. Oppermann, M. Predicting destination choice—A discussion of destination loyalty. *J. Vacat. Mark.* **1999**, *5*, 51–65. [CrossRef]
81. Buhalis, D.; López, E.P.; Martínez-Gonzalez, J.A. Influence of young consumers' external and internal variables on their e-loyalty to tourism sites. *J. Destin. Mark. Manag.* **2020**, *15*, 100409. [CrossRef]
82. Cohen, S.A.; Prayag, G.; Moital, M. Consumer behaviour in tourism: Concepts, influences and opportunities. *Curr. Issues Tour.* **2014**, *17*, 872–909. [CrossRef]

83. McKercher, B.; Denizci-Guillet, B.; Ng, E. Rethinking loyalty. *Ann. Tour. Res.* **2012**, *39*, 708–734. [CrossRef]
84. Fornell, C.; Larcker, D.F. Evaluating structural equation models with unobservable variables and measurement error. *J. Mark. Res.* **1981**, *18*, 39–50. [CrossRef]
85. Rössler, M. World Heritage cultural landscapes: A UNESCO flagship programme 1992–2006. *Landsc. Res.* **2006**, *31*, 333–353. [CrossRef]
86. Lee, S.; Kim, T.; Kim, Y.H. Heritage tourism and allegiance development: A study of the Korean demilitarized zone. *J. Vacat. Mark.* **2024**, *31*, 1000–1021. [CrossRef]
87. Kempia, J.; Hollywood, L.; Bolan, P.; McMahon-Beattie, U. The heritage tourist: An understanding of the visitor experience at heritage attractions. *Int. J. Herit. Stud.* **2017**, *23*, 375–392. [CrossRef]
88. Bagheri, F.; Guerreiro, M.; Pinto, P.; Ghaderi, Z. From Tourist Experience to Satisfaction and Loyalty: Exploring the Role of a Sense of Well-Being. *J. Travel Res.* **2023**, *63*, 1989–2004. [CrossRef]
89. Omo-Obas, P.; Anning-Dorson, T. Cognitive-affective-motivation factors influencing international visitors' destination satisfaction and loyalty. *J. Hosp. Tour. Insights* **2023**, *6*, 2222–2240. [CrossRef]
90. Wang, T.; Zhong, X.; Wang, Y.; Guo, Y. A broader social identity comes with stronger face consciousness: The effect of identity breadth on deviant tourist behavior among Chinese outbound tourists. *Tour. Manag.* **2023**, *94*, 104629. [CrossRef]
91. Hofstede, G.; Hofstede, G.J.; Minkov, M. *Cultures and Organizations: Software of the Mind*; McGraw Hill: New York, NY, USA, 2010.
92. Hall, E.T. *Beyond Culture*; Anchor Books: New York, NY, USA, 1990.
93. Ji, G.M.; Cheah, J.-H.; Sigala, M.; Ng, S.I.; Choo, W.C. Tell me about your culture, to predict your tourism activity preferences and evaluations: Cross-country evidence based on user-generated content. *Asia Pac. J. Tour. Res.* **2023**, *28*, 1052–1070. [CrossRef]
94. Cheng, X.; Chi, X.; Han, H. Perceived authenticity and the heritage tourism experience: The case of Emperor Qinshihuang's Mausoleum Site Museum. *Asia Pac. J. Tour. Res.* **2023**, *28*, 503–520. [CrossRef]

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Article

Factors Influencing Nighttime Tourists' Satisfaction of Urban Lakes: A Case Study of the Daming Lake Scenic Area, China

Huying Zhu ^{1,2,*} and Mengru Li ¹¹ Business School, Hunan University of Science and Technology, Xiangtan 411201, China; 13262289301@163.com² Research Center for Regional High-Quality Development, Hunan University of Science and Technology, Xiangtan 411201, China

* Correspondence: zhy@hnust.edu.cn

Abstract

Tourist satisfaction of nighttime urban lakes as scenic areas, such as the Daming Lake, is influenced by multiple factors, which are crucial for tourists' experiences and the sustainable development of these areas. This paper explores the factors impacting nighttime visitor satisfaction at the Daming Lake Scenic Area. Basing our studies on analysis of the literature and questionnaire surveys, the study constructs a visitor satisfaction evaluation index system based on the Expectancy-Disconfirmation Theory. Utilizing the revised importance-performance analysis method, the study identifies several significant influencing factors including the distinctive features of nighttime shopping products, the rich variety of nighttime tourscape and entertainment products, the aesthetically pleasing design of nighttime lighting products, the affordable price of nighttime dining products, and the diverse methods, reasonable pricing, and multimodal transit options of nighttime transportation. Furthermore, it finds the main factors that reduce tourists' satisfaction in nighttime urban lakes include: premium pricing of nighttime shopping and dining products, transport infrastructure deficiencies, the cultural connotation of tourism products, and the safety of nighttime tourscape and entertainment products. This research provides insights to enhance satisfaction in urban lake scenic areas and expands the application of the tourist satisfaction theory.

Keywords: nighttime tourism activities; tourism satisfaction; expectancy-disconfirmation theory; importance-performance analysis; Urban Lake

1. Introduction

Urban lakes, essential to urban ecosystems and cultural landscapes, resemble city parks and play a pivotal role in regulating urban climates and enhancing environmental quality. Additionally, they serve as central attractions for city tourism due to their unique cultural and historical significance and are key drivers in the development of urban nighttime tourism [1]. Recent studies have highlighted that urban lakes boost urban livability by improving air quality and mitigating the urban heat island effect [2]. Moreover, the integration of cultural landscapes with natural environments significantly fosters the development of nighttime tourism and leisure activities [1]. The 2022 State Council guidelines, titled "Strengthening Urban Ecological Protection and Restoration", underscore that lakes and wetlands are vital components of urban ecosystems, playing an essential role in enhancing residents' quality of life and bolstering urban attractiveness. The importance of nighttime tourism has grown apparent in recent years, particularly within urban scenic and cultural

areas, as it not only extends tourist stays but also stimulates the growth of the nighttime economy [3]. The development of nighttime tourism has received prioritization from the Chinese government, particularly through the Ministry of Culture and Tourism's introduction of the "National Nighttime Cultural and Tourism Consumption Cluster" initiative [4], which encourages regions to develop nighttime tourism projects with local characteristics.

The analysis of tourist behavior has an important reference value for the development of night tourism in urban lake scenic areas. Tourist satisfaction is an important variable in the study of tourist behavior [5]. The influencing factors of tourist satisfaction determine the improvement of the tourist experience in scenic areas. At present, scholars often use three models such as the Expectancy-Disconfirmation Theory (EDT), SERVQUAL, and Kano mode to analyze tourist satisfaction [6]. Grounded in the EDT, this study posits that satisfaction is determined by the discrepancy between pre-visit expectations (e.g., regarding nightscape aesthetics, activity diversity) and actual perceived experiences (e.g., of lighting design, service convenience). This EDT foundation facilitates the identification of requirements standards and motivation gaps. Specifically tailored to an urban lake's nighttime tourism context, we construct an EDT-based multidimensional satisfaction evaluation index system, covering critical domains like shopping, dining, transportation, sightseeing, and illumination. This system diverges from SERVQUAL's exclusive focus on service quality dimensions (tangibles, reliability, etc.) by holistically incorporating context-specific elements, such as the cultural and environmental dimensions associated with nighttime lighting. Furthermore, unlike the Kano model's attribute classification approach (basic, performance, and excitement), this study prioritizes developing a comprehensive evaluation framework uniquely suited to urban lake nighttime tourism. Methodologically, the research employs EDT alongside a revised Importance-Performance Analysis (IPA). To overcome traditional IPA's reliance on subjective importance ratings, derived importance is calculated using partial correlation coefficients between individual satisfaction items and overall satisfaction. This refined IPA enables objective, data-driven identification of critical satisfaction factors. Applied within the context of Daming Lake—where media reports indicate a quadrupling of visitors following its free admission policy—despite the lack of official nighttime statistics, this approach yields actionable insights for enhancing the nighttime tourism experience.

The research question is divided into three levels of progressive questions. The first question is the basic question: "What are the components of satisfaction with night tourism in urban lakes?" The second question is an analytical question: "What is the relative importance of each element to overall satisfaction?" The third question is an applied question: "How to develop a prioritized improvement strategy with IPA analysis?"

This study aims to integrate a global theoretical framework with local empirical data to investigate nighttime tourism satisfaction and its influencing factors in urban lake scenic areas. Specifically, the research will: (1) Develop an evaluation index system for assessing tourist satisfaction with urban lake nighttime tourism; (2) apply the EDT to research nighttime tourism satisfaction of urban lakes; and (3) analyze the factors influencing nighttime tourism satisfaction with the IPA method to derive actionable recommendations for promoting the sustainable development of urban lake nighttime tourism.

The primary contributions of this paper are as follows: First, it examines tourist satisfaction in the context of nighttime tourism in urban lake scenic areas, thereby expanding the scope of research on tourist satisfaction; second, it attempts to establish an evaluation index system for assessing the satisfaction of nighttime tourism in urban lake scenic areas; and third, it innovatively integrates EDT with IPA to analyze tourist satisfaction in this specific context.

The structure of the subsequent sections of this paper is arranged as follows: The Section 1 introduces the background and significance of the thesis, research questions, research content and methods, research objectives and research contributions; Section 2 reviews the existing literature; the Section 3 outlines the research methodology, including details of the data collection procedures and sources utilized; the Section 4 presents the research findings; the Section 5 provides a comprehensive analysis and discussion of the results; and the Section 6 concludes with a summary of the paper and its corresponding conclusions.

2. Literature Review

2.1. Night Tourism

Nighttime tourism fundamentally comprises leisure-oriented engagements that occur after dusk, including but not limited to sightseeing, retail experiences, performance attendance, event participation, and social gatherings [7]. Temporally, these activities span from evening twilight until morning daylight [8], often operationally defined as occurring between 18:00 and 06:00 [9]. At its core, nighttime tourism embodies the dynamic interplay between visitors and destination cultures across multiple dimensions [10], with particular emphasis on nocturnal leisure experiences during travel [11]. Such research advances both sector-specific knowledge and broader urban development strategies through innovative analytical frameworks. As early as the 1990s, scholarly investigations into nighttime tourism had primarily examined its interconnection with the nighttime economy. International researchers progressively emphasized the nighttime economy's growth, with European scholars identifying it as a viable approach to enhance social interaction and stimulate urban economic renewal [12]. The development of 24 h cities and vibrant entertainment districts demonstrated how temporally distributed tourism activities could mitigate overtourism by diverting visitor flows into evening hours, consequently alleviating daytime congestion at attractions [13]. Nighttime tourism embodies a complex sustainability paradox, balancing economic benefits against environmental degradation and socio-cultural disruption. Environmentally, while celestial ecotourism protects dark skies [14] and light festivals utilize energy-efficient technologies [15], excessive illumination exacerbates light pollution and energy waste [16], necessitating strategies to reconcile infrastructure optimization with ecological stewardship [17]. From a socio-cultural perspective, tourism–nightlife interactions reconfigure urban dynamics, generating polarized outcomes: community displacement in European cities [17] versus improved perceived safety through optimized lighting in Malaysian parks [18]. Spatially, empirical analyses indicate that China's nighttime tourism clusters enhance resource efficiency [19], whereas Europe's nighttime economy accounts for over 15% of urban tourism revenue [20], though unmanaged growth may transform economic gains into net social losses [21]. Sensory design, as exemplified by Xi'an's landscapes [22], enriches visitor experiences but risks eroding authenticity through over-commercialization [2]. These contradictions underscore the imperative for context-sensitive frameworks to harmonize economic, environmental, and socio-cultural sustainability in nighttime tourism development.

2.2. Tourism Satisfaction

Current research on visitor satisfaction predominantly employs evaluation models tailored to diverse geographical contexts and tourism sectors. A prominent methodological approach is the Importance-Performance Analysis (IPA), applied to assess gaps between visitor expectations and actual experiences in cultural and creative parks, particularly regarding service quality and product innovation [23,24]. Parallel studies in cultural tourism leverage the perceived value theory to analyze developmental challenges, offering insights into operational management inefficiencies [25]. Spatial and demographic

factors further shape satisfaction dynamics. For instance, rural tourism studies reveal that visitor origin significantly influences satisfaction levels, with local residents reporting a higher satisfaction than non-locals, whereas demographic variables (e.g., gender, age) exhibit negligible effects [26]. Similarly, research on Guangzhou's forest parks identifies thirteen determinants—spanning service quality, accessibility, and environmental conditions—though their relative impacts vary considerably [27]. Qualitative investigations in ancient villages further establish positive correlations among situational involvement, authenticity, destination image, and satisfaction through mixed methods approaches [28]. Notably, contemporary satisfaction studies uncover sustainability paradoxes. The COVID-19 pandemic exposed the fragility of nighttime tourism economies, as seen in declining satisfaction among cultural tourists [29], contrasting with Malaysia's community-centric lighting strategies that enhance sustainability through place-making [18]. However, as Christou et al. [30] demonstrate in Cyprus, the predominance of socializing motives in nightlife experiences frequently marginalizes environmental sustainability concerns among tourists. This dissonance underscores a critical misalignment between sustainable tourism frameworks and actual nocturnal consumer behavior.

2.3. Nighttime Tourism in Urban Lake Scenic Areas

In contrast, research on urban lake nighttime tourism remains fragmented. As integral components of urban landscapes, urban lakes have only been peripherally examined in urban nighttime tourism studies. Current research exhibits significant deficiencies in understanding the developmental evolution, socio-ecological impacts, and service management aspects of nighttime tourism, with most findings scattered within the broad scope of urban tourism research [31]. This dispersion has resulted in the insufficient systematic investigation of urban lake nighttime tourism. Existing urban tourism scholarship predominantly focuses on daytime activities, while paying relatively limited attention to nighttime tourism. Academic research on nighttime tourism has primarily concentrated on its relationship with the nighttime economy, with specialized areas such as urban lake nighttime tourism receiving notably less attention. Although the growing prominence of urban lakes in tourism and the expansion of nighttime markets have gradually increased research interest, studies remain largely exploratory. Most investigations continue to emphasize daytime tourism, resulting in limited cumulative research. Previous studies have examined urban lakes' ecological functions in daytime microclimate regulation [32]; however, research on nocturnal ecological changes, the impacts of nighttime visitor activities on lake ecosystems, and the balance between tourism development and ecological protection remains scarce. Urban lake nighttime tourism involves complex, interrelated factors including natural environments, cultural contexts, and activity organization, leading to fragmented studies across cultural, ecological, and economic domains [33]. The development of such tourism requires the careful coordination of natural and cultural resources alongside lighting design and event planning challenges that complicate systematic research. Furthermore, most urban lakes maintain open-access policies, making official nighttime visitor statistics difficult to obtain [34], presenting a significant research obstacle.

3. Methods

3.1. Case Selection

The Daming Lake Scenic Area in Figure 1 is a natural lake located in Jinan. According to Jinan City, it is a national 5A-level tourist attraction and a representative urban lake tourism destination that had 11.505 million tourists in 2018 (accounting for 14.37% of the total number of tourists in Jinan). It is renowned for its abundant springs, expansive water surface, and picturesque landscape. In addition to its natural resources, the area is replete

with cultural landmarks, including Lixia Pavilion, Arctic Pavilion, and Nanfeng Shrine, which collectively reflect its rich historical and cultural heritage. The scenic area provides convenient transportation options for tourists, and the buildings and bridges surrounding the lake are illuminated to create an immersive visual experience. Visitors can enjoy boat rides to appreciate the nighttime views of Daming Lake. Furthermore, lakeside food stalls and restaurants serve authentic Jinan cuisine. The integration of modern technology into lighting effects creates a stunning nighttime atmosphere, providing tourists with unforgettable visual experiences at Daming Lake.



Figure 1. Daming Lake Scenic Area map.

The Daming Lake Scenic Area in Jinan not only possesses abundant tourism resources, but it also provides a strong foundation for night tourism products. Zhao Yijing classified night tourism products into six primary categories based on the locations and formats of night tourism activities: night landscape sightseeing, night festival tourism, night cultural and artistic leisure tourism, night performance experience tourism, block night tourism, and night scenic area tourism [10]. Zhou and Yao conducted comprehensive research on night tourism, building on previous studies, and classified it into three types: performance, landscape, and participatory. They further refined this classification in subsequent research, adding a comprehensive category and resulting in four types of night tourism [35]. A questionnaire was utilized to measure product satisfaction, considering three distinct nighttime product classification methods. Based on the characteristics of night tourism and the six elements of “food, accommodation, transportation, tourscape, shopping, and entertainment” in tourism activities, existing night tourism products at Daming Lake in Jinan were collected, organized, and summarized. Finally, these products were categorized into five groups: night shopping, night dining, night transportation, night tourscape [1] and entertainment, and night lighting. The specific products are detailed in Table 1.

Table 1. Main nighttime tourism products of Daming Lake Scenic Area.

Typology	Main Nighttime Tourism Products
Nighttime shopping products	In addition to Daming Lake-themed cultural T-shirts, postcards, cultural and creative products, and crafts such as paper-cutting and clay sculptures, Jinan Longshan black pottery, hand-held pork, Zhoucun baked cakes, and lotus root noodles from Minghu Lake are also included.
Nighttime dining products	Furong Street Snack Street features a variety of food options, including Hong Kong Jia Wonton Noodles, DouDou Fried Yogurt, Afu Lucky Food, Furong Quan Roasted Chicken Feet, Yang's Sesame Candy, and Pancake Rolled with Scallions. Kuanhouli Snack Street also offers Grandma's Cuisine, Tri-State Roasted Pig's Feet, Pin Fry, National Foot Stinky Bean Curd, Hand-Punched Shrimp Sliders, and Longji Shancheng Soup Dumplings. Additionally, the Ziyi Minghu Hotel, situated in the center of the Daming Lake Scenic Area, houses the "Night Banquet Minghu" restaurant, while Xiaobai Izakaya offers an atmosphere reminiscent of a late-night diner.
Nighttime transportation products	As of 1 June 2023, Jinan's public transportation has been systematically enhanced, and the number of bus routes that are available after 22:00 is now 114. Cabs and online taxis in Jinan are also accessible at night through mobile software, providing convenience for citizens and tourists. Shared bike services are available near scenic spots that can be utilized at night, and bikes are rentable through mobile apps, thus facilitating short trips.
Nighttime tourscape and entertainment products	The Daming Lake Scenic Area is characterized by scenic tourism resources, including Wuyue Temple, Chaoran Building, and Thousand Buddha Reflection; culturally significant resources, such as Qu Shui Ting Street, Pearl Spring, and Jiefang Pavilion; notable attractions, including the Chaoran Building and the night tour around the lake; and well-known commercial resources, such as Kuanhouli and Shimao Plaza.
Nighttime lighting products	The night light show of the Chaoran Building, the night tour around Daming Lake, a special light show themed on the Chaoran Building and Daming Lake, and a night tour of cultural attractions are offered.

3.2. Research Method

This study applies the EDT as its core theoretical framework in Figure 2, integrated with a revised IPA approach, to systematically examine factors influencing tourist satisfaction in the nighttime tourism sector of the Daming Lake Scenic Area. Proposed by Oliver, EDT posits that tourist satisfaction is determined by the discrepancy between pre-visit expectations and perceived post-visit performance [36]. Positive disconfirmation (when performance exceeds expectations) enhances satisfaction, whereas negative disconfirmation diminishes it. This model effectively identifies gaps between tourists' expectations and actual perceptions of critical attributes. Guided by this theory, our research design—from variable selection to data analysis—focuses on quantifying “expectation–perception” disparities.

While the Importance-Performance Analysis (IPA) framework is widely applied, it exhibits inherent limitations. Critically, IPA's operationalization of “importance” remains ambiguous, potentially leading respondents to conflate importance with expectations or absolute importance with relative importance. This conceptual vagueness can diminish the model's predictive validity. Furthermore, the IPA's prescriptive utility is constrained: attributes with fundamentally divergent characteristics may reside within the same quadrant, yielding identical improvement strategies, whereas attributes sharing core similarities may fall into different quadrants, generating conflicting recommendations. This undermines the credibility of IPA-derived conclusions. To mitigate these biases and better capture authentic perceptions, our study adopts a revised IPA approach. Building upon Jin and Park's methodology [37]—which integrates IPA, conjoint analysis, and an importance grid analysis to enhance sensitivity to attribute performance in rural tourism contexts—we

operationalize derived importance. This is calculated via partial correlation coefficients between satisfaction with individual attributes and overall satisfaction, following Deng's refinement [38]. The procedure involves: (1) computing natural logarithms of attribute-level satisfaction scores, and (2) conducting linear regression with these log-transformed values as independent variables against overall satisfaction. The resulting partial correlation coefficients serve as objective, data-driven importance metrics, enabling more precise identification of improvement priorities.

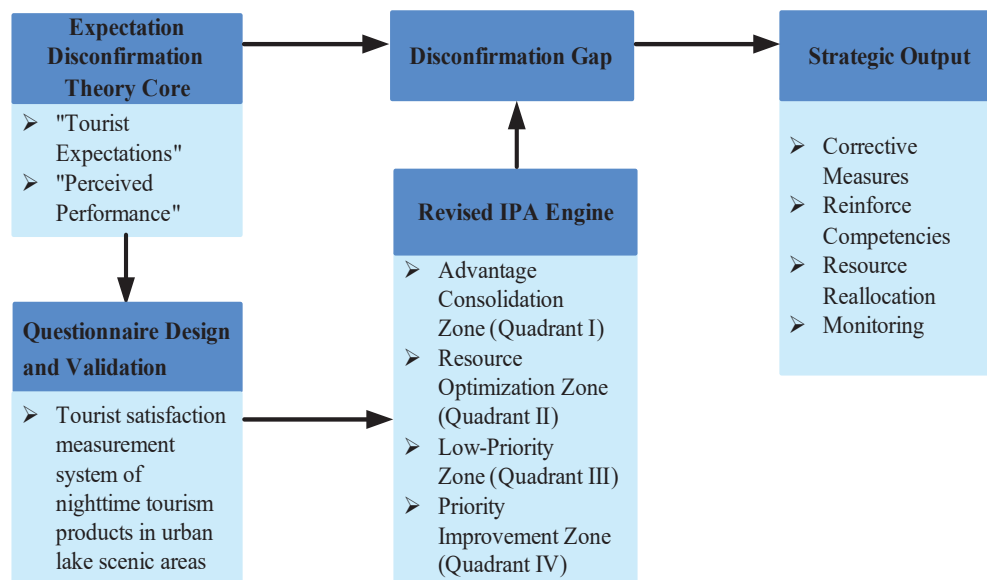


Figure 2. The EDT-integrated revised IPA framework for nighttime tourism satisfaction in urban lake scenic areas.

The derived importance and satisfaction scores construct a two-dimensional matrix, categorizing indicators into four strategic quadrants: (1) Priority Improvement Zone (high derived importance, low satisfaction): Address negative disconfirmation through corrective measures. (2) Resource Optimization Zone (low derived importance, high satisfaction): Reduce redundant investments. (3) Advantage Consolidation Zone (high derived importance, high satisfaction): Reinforce core competencies. (4) Low-Priority Zone (low derived importance, low satisfaction): Defer interventions. The IPA quadrant classification references the Kano model's demand categorization, with Quadrant II corresponding to "must-be requirements".

Visual tools like scatter plots enhance the revised IPA's interpretability, enabling the efficient identification of service gaps. This dynamic analytical framework not only improves data interpretation efficiency but also strengthens conclusion reliability through statistical optimization. The quadrant-based strategy offers managers a tiered optimization pathway: prioritizing high-gap areas, consolidating strengths, reallocating resources, and avoiding over-investment in low-impact attributes.

The methodology advances the theoretical understanding of nighttime tourism satisfaction while providing a rigorous, actionable solution for urban lake scenic areas—balancing academic rigor with practical implementation. This study identifies the key factors to improve the satisfaction of tourists in urban lake scenic areas and provides theoretical guidance for the development of night tourism in other urban lake scenic areas. In balancing economic, environmental, and socio-cultural sustainability, the findings help scenic planners develop science-based strategies. Compared with the SERVQUAL model, which mainly focuses on the improvement of service quality, and the Kano model, which focuses on product attribute optimization, this research paper provides an empirical basis and

practical direction for the theory of sustainable development of night tourism from a macro perspective and expands the theoretical boundaries of night tourism research.

3.3. Research Steps

3.3.1. Questionnaire Design and Validation

The questionnaire was structured into two components: (1) The demographic profiling of respondents, capturing preferences across gender, age, occupation, and income levels related to visits to the Daming Lake Scenic Area; (2) a multi-dimensional satisfaction assessment of nighttime tourism products (five offerings), grounded in a theoretical framework that evaluated demand (safety needs, cultural experiences), motivation (social interaction, exploration), perception (price fairness, service efficiency), and subjective factors (commercialization tolerance, ecological concerns).

To measure the factors influencing nighttime tourists' satisfaction, this study draws on the indicator system developed by scholars. Dong and Yang assess tourists' experiences in attractions [39]. On the basis of the influencing factors of night tourism satisfaction adopted by systematic review scholars, Zhu used the improved Kano model to study the influencing factors of night tourism satisfaction [40]. Based on the research results of these scholars' influencing factors, combined with the characteristics of night tourism in urban lake scenic areas, a three-tier evaluation indicator system for the experience of nighttime tourism products is constructed, with the evaluation of product satisfaction as the primary indicator. The secondary indicators include five variables: night shopping, night catering, night lighting, night tourscape and entertainment, and nighttime shopping products. Additionally, the 20 tertiary indicators are categorized into specific tertiary indicators based on the characteristics of night tourism products, as shown in Table 2.

Table 2. Tourist satisfaction measurement system of nighttime tourism products in urban lake scenic areas.

Primary Indicators	Secondary Indicators	Tertiary Indicators
Satisfaction evaluation of night tourism products	Nighttime shopping products	The affordable price of nighttime shopping products The distinctive features of nighttime shopping products The quality of nighttime shopping products The rich variety of nighttime shopping products
	Nighttime dining products	The affordable price of nighttime dining products The rich variety of nighttime dining products The quality status of nighttime dining products The distinctive features of nighttime dining products
	Nighttime transportation products	The high safety of nighttime transportation The diverse methods of nighttime transportation The convenience and accessibility of nighttime transportation The affordable price of nighttime transportation
	Nighttime tourscape and entertainment products	The affordable price of nighttime tourscape and entertainment products The rich variety of nighttime tourscape and entertainment products The cultural connotations of nighttime tourscape and entertainment products The high safety of nighttime tourscape and entertainment products
	Nighttime lighting products	The rich variety of nighttime lighting products The cultural connotations of nighttime lighting products The coordination with the surrounding environment of nighttime lighting products The design of aesthetically pleasing of nighttime lighting products

Due to the large area of water surface in the urban lake scenic area, the visibility at night is lower than during the day, so the safety consideration is strengthened when setting the three-level indicators. At the same time, through the conclusions of previous studies [41,42], it is found that tourists have great expectations for exploring the cultural

connotation of lake landscapes. Therefore, the cultural connotations of nighttime tourscape and entertainment products have been added to the indicator system.

The nighttime tourists' satisfaction in urban lake scenic areas is measured using a 5-point Likert scale, with responses ranging from 1 = "Very dissatisfied" to 5 = "Very satisfied" (where 2 = "Slightly dissatisfied", 3 = "Neutral", and 4 = "Moderately satisfied").

3.3.2. Questionnaire Collection

According to the tabular data in Table 3, which compares the alpha and KMO values between 312 and 212 questionnaires, both Cronbach's alpha coefficients exceed 0.9. This indicates that the scales used in the questionnaire exhibit high reliability, justifying further analysis. Additionally, the KMO values in Table 3 are all above 0.9, further confirming the robustness of the questionnaire's reliability.

Table 3. Reliability analysis table.

Project	Alpha	KMO	Number	Number of Valid Cases
Satisfaction	0.921	0.944	20	312
Satisfaction	0.920	0.938	20	212

3.3.3. Survey Implementation and Data Collection

In this study, 350 questionnaires were distributed through the QuestionStar platform in March 2024 and May 2025. A total of 320 questionnaires were successfully returned, of which 312 were deemed valid. The collected data were subsequently analyzed. The respondents represented a diverse range of genders, ages, occupations, and income levels, ensuring a comprehensive sample that ultimately yielded more precise findings.

3.3.4. Sampling Representativeness Considerations

While the free admission policy at Daming Lake precludes access to official nighttime visitor demographics, the study implemented three key measures to ensure sample validity: first, temporal stratification was achieved by distributing surveys across all operating hours (18:00–22:00) on both weekdays and weekends. Second, spatial coverage was ensured through randomized sampling at four major access points (north/south/east/southwest gates). Third, demographic balance was verified through a post-collection analysis showing representative distributions: gender (47.76% male, 52.24% female) and age groups (21–30 years: 46.47%; 31–45: 19.87%; and 46–60: 21.15%).

4. Results and Analysis

4.1. Demographics

Table 4 reveals the following characteristics. The gender distribution indicates that males constitute 47.76% of the sample, while females account for 52.24%. Females are outnumbered by males in this study. Regarding age distribution, tourists aged 21–30 accounted for the largest share at 46.47%, closely followed by those aged 31–45 and 46–60, with proportions of 19.87% and 21.15%, respectively. In contrast, the number of tourists under 20 and those over 61 is relatively small, accounting for 9.94% and 2.56%, respectively. Tourists aged 21–30 are primarily students or young professionals who have recently entered the workforce and exhibit good physical fitness and energy. Conversely, tourists aged 31–45 may experience shifts in family roles accompanied by significant responsibilities, while those aged 46–60 may encounter physical fatigue associated with aging. Consequently, the participation rate in nighttime tourism activities among these groups tends to be lower. Meanwhile, individuals under 20 typically face academic pressures, while those aged 61

and above often experience limitations in physical health. As a result, tourists in these two age groups are less likely to engage in nighttime tourism activities.

Table 4. Characterization of visitor demographics.

Effective Projects	Descriptive	Number	Percentage
Gender	Man	149	47.76%
	Woman	163	52.24%
Age	Below 20 years old	31	9.94%
	21–30 years old	145	46.47%
	31–45 years old	62	19.87%
	46–60 years old	66	21.15%
	Over 61 years old	8	2.56%
Career	Flexible workers	45	14.42%
	Students	132	42.31%
	Corporate employees	19	6.09%
	Self-employed	42	13.46%
	Civil servants/institutional employees	66	21.15%
	Retirees	8	2.56%
Income (CNY/month)	Below 1000	23	7.37%
	1001–3000	38	12.18%
	3001–6000	158	50.64%
	6001–10,000	61	19.55%
	Over 10,001	32	10.26%

Regarding occupation, students and civil servants/institutional employees account, respectively, for 42.31% and 21.15% of the sample, followed by self-employed (13.46%) and flexible workers (14.42%). Corporate employees and retirees represent, respectively, the smallest proportions of 6.09% and 2.56%. Since students, civil servants, and public organization employees generally experience lower life and work pressures, they tend to have more leisure time and energy compared to other groups. In contrast, corporate employees often work overtime due to job requirements, limiting their ability to participate in nighttime tourism activities. Meanwhile, retirees commonly face mobility challenges that hinder their engagement in such activities. The income distribution shows that 50.64% of tourists report monthly earnings between CNY 3001 and 6000, while 19.55% earn CNY 6001–10,000, and 12.18% earn CNY 1001–3000. Smaller proportions fall into higher and lower brackets: 10.26% earn above CNY 10,000 and 7.37% earn below CNY 1000. Therefore, when optimizing nighttime tourism offerings at Jinan’s Daming Lake, developers need to consider both the current tourism product landscape and tourists’ income levels to ensure appropriate pricing strategies.

4.2. Tourist Consumption Behavior Analysis

4.2.1. Tourist Preference Analysis

The data presented in Table 5 indicate that the night tourscape of the Jinan Daming Lake Scenic Area is preferred by the majority of respondents, serving as the primary motivation for nighttime visits. This preference is followed by food and beverage offerings and amusement rides, while shopping ranked as the least preferred activity. The night view accounts for the highest percentage of tourist preference, indicating that visitors are predominantly attracted to the night tourscape of the Daming Lake Scenic Area. Furthermore, the “Chaoran Building” has emerged as a focal point of interest for nighttime visitors. Tourists exhibited the lowest preference for shopping, as the Daming Lake Scenic Area primarily emphasizes natural and cultural landscapes. Consequently, these scenic spots may prioritize providing tourism-related services, leading to reduced shopping needs among visitors.

Table 5. Tourist preference analysis table.

Project	Number	Percentage
Night tourscape	162	51.92%
Food and beverage offerings	85	27.24%
Shopping	28	8.97%
Amusement rides	37	11.86%

4.2.2. Transportation Mode Analysis

The data presented in Table 6 indicate that the majority of tourists preferred walking as their primary mode of transportation. The proportions of visitors choosing other transportation methods—including self-driving, taking a taxi or bus, cycling, and alternative options—remained relatively consistent. This preference for pedestrian mobility may be attributed to several factors: The narrow road infrastructure surrounding Daming Lake Scenic Area, which limits vehicular access and frequently causes congestion; the inherent convenience of walking compared to self-driving; and the particularly suitable nighttime ambiance for pedestrian activity. These findings collectively demonstrate a clear preference for walking among tourists visiting the area.

Table 6. Analysis of transportation modes.

Project	Number	Percentage
Walking	100	32.05%
Cycling	41	13.14%
Self-driving	62	19.87%
Taking a taxi	38	12.18%
Taking a bus	46	14.74%
Others	25	8.01%

4.2.3. Overall Product Satisfaction Analysis

The survey results reveal distinct patterns in tourist satisfaction and recommendation intentions at the Jinan Daming Lake Scenic Area. Regarding satisfaction levels, 47.12% of respondents report relative satisfaction, while 29.81% express high satisfaction, and 10.58% indicate average satisfaction. Conversely, 6.73% report relative dissatisfaction, and 5.77% express strong dissatisfaction. These findings suggest that there is room for improvement in the visitor experience.

Concerning recommendation likelihood, 54.81% of tourists indicate a willingness to recommend the site, comprising 28.21% who would strongly recommend it, and 26.60% who would recommend it with suggestions for improvement. However, 20.19% remain uncertain about recommending it, while 25.00% would not recommend it. This distribution demonstrates a generally positive visitor perception of the scenic area.

The intention to revisit data show that only 37.18% of tourists would return, compared to 62.82% who would not. This reluctance stems primarily from two factors: (1) The limited number of nighttime attractions compared to daytime offerings, which restricts visitors' experiences; and (2) the lack of novel experiences after the initial visit, reducing the site's appeal for repeat visits.

Furthermore, through the analysis of the satisfaction evaluation results of tourists of different age groups (shown in Table 7), it is found that there are significant differences in the satisfaction of different age groups ($F = 3.773$, $p = 0.01 < 0.05$). As shown in Table 7, tourists aged 21–30 exhibit the highest mean satisfaction score ($\bar{x} \pm s = 4.04 \pm 0.964$) among all age groups, with this value being significantly greater than that of other cohorts. In contrast,

the 46–60 age group displayed the lowest mean satisfaction score ($\bar{x} \pm s = 3.33 \pm 1.351$), reflecting comparatively poorer evaluation outcomes among all demographic segments.

Table 7. Comparison of tourist satisfaction by age group.

Age	N	$\bar{x} \pm s$	F	p
Below 20 years old	31	4.03 ± 1.063	3.773	0.01
21–30 years old	145	4.04 ± 0.964		
31–45 years old	62	4.02 ± 0.896		
45–60 years old	66	3.33 ± 1.351		
Over 61 years old	8	3.88 ± 0.996		

4.3. Multivariate Analysis of Tertiary Indicators

Table 8 shows that the variance (R-squared) explained by all predictor variables is 72.4%, and the adjusted R-squared (a more reliable explanatory power indicator considering the number of independent variables) is 70.5%. This indicates that the selected combination of independent variables has a strong explanatory power for overall satisfaction, and the model fitting effect is good.

Table 8. Goodness of fit test ^b table.

Model	R	R ²	Adjusted R ²	Error in Standard Estimation
1	0.851 ^a	0.724	0.705	0.624

Note: ^a. Predictive variable: the 20 tertiary indicators in Table 2. ^b. Dependent variable: overall satisfaction.

In Table 9, the F-statistic of the regression model is 38.165, corresponding to a significance level of $p = 0.000$, $p < 0.001$, indicating that the regression model is statistically significant. Overall, this set of independent variables has statistical significance in predicting the dependent variable.

Table 9. Significance test results of regression equation (F-test).

ANOVA ^a					
Model	Sum of Squares	Freedom	Mean Square	F	Significance
1					
return	266.316	20	13.316	38.165	0.000 ^b
residual	101.530	291	0.349		
total	367.846	311			

Note: ^a. Predictive variable: the 20 tertiary indicators in Table 2. ^b. Dependent variable: overall satisfaction.

The data presented in Table 10 indicate that the regression analysis revealed several significant predictors of overall satisfaction. Among these, the distinctive features of nighttime shopping products exhibit the strongest positive impact, with a beta coefficient of 0.149 ($p < 0.001$), indicating its pivotal role in enhancing satisfaction levels.

The rich variety of nighttime toursapes and entertainment products also demonstrates a statistically significant influence ($\beta = 0.138$, $p = 0.001$), ranking prominently among contributing factors and exerting substantial positive effects on nighttime tourism satisfaction.

The aesthetically pleasing design of nighttime lighting products emerges as another significant contributor ($\beta = 0.109$, $p = 0.007$), warranting attention for its measurable positive effects. Similarly, the rich variety of nighttime dining products shows a meaningful predictive value ($\beta = 0.091$, $p = 0.019$), suggesting that culinary diversification effectively elevates satisfaction.

Table 10. Regression coefficient significance test results (T-test).

Model		Coefficient ^a					Collinearity Statistics	
		Non-Standardized Coefficient		Standardization Coefficient	t	Significance		
		B	Standard Error	Beta			Tolerance	VIF
1	(Constant)	0.307	0.14		2.183	0.03		
	The affordable price of nighttime shopping products	0.013	0.032	0.016	0.398	0.691	0.586	1.707
	The distinctive features of nighttime shopping products	0.134	0.037	0.149	3.592	0	0.548	1.823
	The quality of nighttime shopping products	0.015	0.032	0.018	0.462	0.645	0.644	1.554
	The rich variety of nighttime shopping products	0.039	0.034	0.045	1.123	0.262	0.583	1.714
	The affordable price of nighttime dining products	0.065	0.031	0.087	2.123	0.035	0.567	1.763
	The rich variety of nighttime dining products	0.079	0.033	0.091	2.356	0.019	0.635	1.576
	The quality status of nighttime dining products	0.034	0.033	0.041	1.033	0.302	0.615	1.627
	The distinctive features of nighttime dining products	0.051	0.033	0.061	1.55	0.122	0.606	1.65
	The affordable price of nighttime tourscape and entertainment products	0.043	0.035	0.049	1.234	0.218	0.607	1.648
	The cultural connotations of nighttime tourscape and entertainment products	0.054	0.031	0.068	1.733	0.084	0.609	1.643
	The rich variety of nighttime tourscapes and entertainment products	0.105	0.031	0.138	3.379	0.001	0.565	1.77
	The high safety of nighttime tourscape and entertainment products	0.056	0.032	0.071	1.747	0.082	0.568	1.76
	The rich variety of nighttime lighting products	0.016	0.033	0.019	0.482	0.63	0.581	1.721
	The coordination with the surrounding environment of nighttime lighting products	0.051	0.035	0.058	1.448	0.149	0.583	1.716
	The cultural connotations of nighttime lighting products	0.031	0.033	0.038	0.935	0.351	0.56	1.787
	The aesthetically pleasing design of nighttime lighting products	0.094	0.034	0.109	2.73	0.007	0.599	1.67
	The diverse methods of nighttime transportation	0.085	0.035	0.101	2.463	0.014	0.568	1.762
	The convenient and unobstructed nighttime transportation	0.035	0.033	0.043	1.06	0.29	0.581	1.722
	The high safety of nighttime transportation	0.031	0.037	0.034	0.845	0.399	0.57	1.756
	The affordable price of nighttime transportation	0.057	0.028	0.08	2.04	0.042	0.616	1.623

Note: ^a Dependent variable: overall satisfaction.

The affordable price of nighttime dining products ($\beta = 0.087$, $p = 0.035$) and the diverse methods of nighttime transportation ($\beta = 0.101$, $p = 0.014$) both achieve statistical significance, confirming that reasonable pricing and multimodal transit options positively influence outcomes. Finally, the affordable price of nighttime transportation ($\beta = 0.08$, $p = 0.042$) likewise demonstrates significant effects, underscoring the importance of equitable pricing structures in transportation services.

4.4. Revised IPA

Utilizing Deng's revised IPA [35] conducted with SPSS 27 software, the natural logarithm of tourists' satisfaction for each evaluation index is initially computed. Subsequently, the natural logarithm of each evaluation index and overall satisfaction is analyzed using a partial correlation, yielding partial correlation coefficients that represent implied im-

portance, as presented in Table 11 and Figure 3. The mean value of importance for each evaluation index is 0.49, while the mean value of tourist satisfaction across these indices is 3.28. Utilizing the importance and tourist satisfaction for each evaluation index, a two-dimensional coordinate system for the revised IPA is constructed. The importance serves as the horizontal axis, while tourist satisfaction is represented on the vertical axis. The mean values (0.49, 3.28) define the origin, and the four quadrants are plotted to illustrate the positions of each evaluation index.

Table 11. The importance and tourist satisfaction of each evaluation indicator.

Serial Number	Evaluation Indicator	Satisfaction	Derived Importance
1	The affordable price of nighttime shopping products	3.12	0.508
2	The distinctive features of nighttime shopping products	3.34	0.436
3	The quality of nighttime shopping products	3.3	0.485
4	The rich variety of nighttime shopping products	3.21	0.503
5	The affordable price of nighttime dining products	3.12	0.57
6	The rich variety of nighttime dining products	3.31	0.459
7	The quality status of nighttime dining products	3.34	0.482
8	The distinctive features of nighttime dining products	3.17	0.485
9	The affordable price of nighttime tourscape and entertainment products	3.38	0.454
10	The cultural connotations of nighttime tourscape and entertainment products	3.25	0.529
11	The rich variety of nighttime tourscapes and entertainment products	3.34	0.535
12	The high safety of nighttime tourscape and entertainment products	3.28	0.5
13	The rich variety of nighttime lighting products	3.3	0.476
14	The coordination with the surrounding environment of nighttime lighting products	3.49	0.441
15	The cultural connotations of nighttime lighting products	3.22	0.495
16	The aesthetically pleasing design of nighttime lighting products	3.37	0.46
17	The diverse methods of nighttime transportation	3.22	0.495
18	The convenience and accessibility of nighttime transportation	3.25	0.509
19	The high safety of nighttime transportation	3.38	0.426
20	The affordable price of nighttime transportation	3.25	0.592

Average extended importance of each evaluation indicator: 0.49. Average tourist satisfaction of each evaluation indicator: 3.28.

Figure 3 depicts the IPA results, where the horizontal axis represents the perceived importance of tourists and the vertical axis represents satisfaction. Quadrant explanation is as follows: Quadrant I (high importance/high satisfaction) represents the zone where the destination is manifested well and efforts should be maintained; Quadrant II (low importance/high satisfaction) indicates resource optimization zone; Quadrant III (low importance/low satisfaction) represents low-priority zone; Quadrant IV (high importance/low satisfaction) emphasizes key zones that require priority improvement.

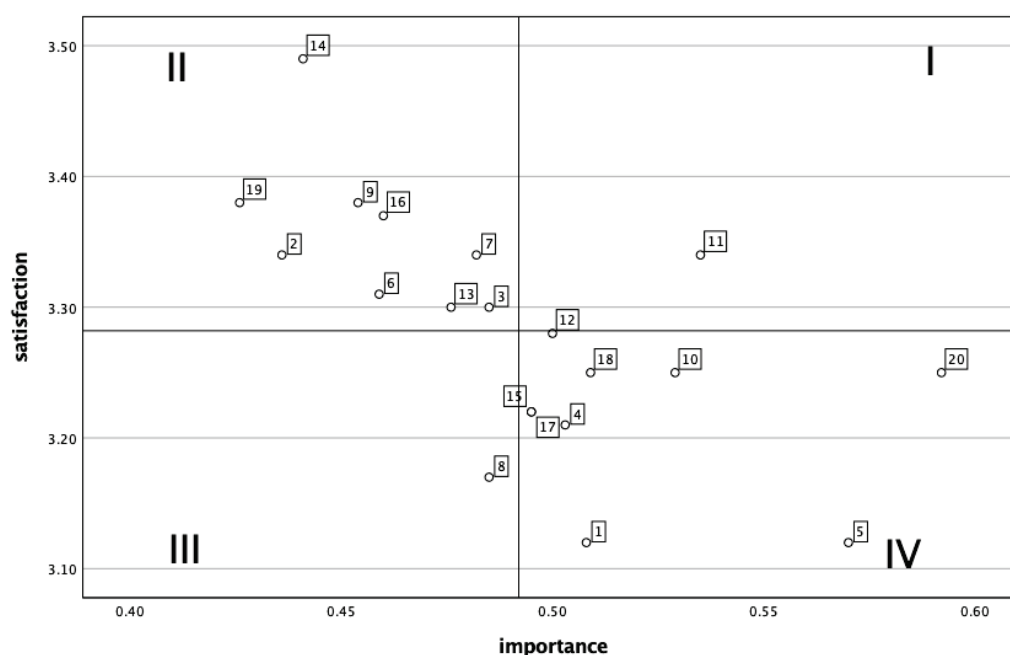


Figure 3. Revised IPA.

4.4.1. Advantage Consolidation Zone (Quadrant I)

Quadrant I represents evaluation indicators with both high satisfaction and high importance, which is highly consistent with the core connotation of the EDT. In this theory, when the perceived performance of a tourism product or service exceeds the initial expectations of tourists, a positive disconfirmation occurs, thereby significantly enhancing tourist satisfaction. The only indicator in this quadrant—"the rich variety of nighttime tourscape and entertainment products"—has a performance score far exceeding the mean, which precisely reflects such a positive disconfirmation effect.

From the perspective of EDT, tourists have clear and high expectations for the variety of nighttime tourscapes and entertainment products in urban lake nighttime tourism, which is their core expectation. Daming Lake's nighttime landscape and entertainment offerings, represented by the light show using dynamic projection technology to present historical scenes like the "Buddha Mountain Reflection", have a perceived performance that surpasses these high expectations. This not only meets tourists' aesthetic needs but also conveys cultural stories to create additional value, resulting in a strong positive disconfirmation. According to EDT, this positive disconfirmation directly leads to high satisfaction, which is consistent with the high satisfaction shown by this indicator. It also confirms that high quality tourism products that exceed expectations can effectively improve satisfaction, which is an important embodiment of the application of EDT in the tourism experience research.

4.4.2. Resource Optimization Zone (Quadrant II)

In the EDT framework, this quadrant, where satisfaction is high but importance is low, can be interpreted as follows: although tourists' initial expectations (expectancy) for these attributes are low, their perceived performance (performance) is high, thus generating a positive disconfirmation. These factors—including distinctive features and the quality of nighttime shopping products, the rich variety and quality status of nighttime dining products, the affordable price of the nighttime tourscape and entertainment products, the coordination with the surrounding environment and aesthetically pleasing design of nighttime lighting products, and the high safety of nighttime transportation—all show that their actual performance exceeds the low expectations of tourists.

According to EDT, these attributes are not the core factors that tourists focus on, so their initial expectations are not high. However, the good performance of these attributes has brought unexpected surprises to tourists, resulting in high satisfaction. But from the perspective of resource allocation, since the importance of these attributes is low, even if the performance is improved further, the positive disconfirmation generated will not have a significant impact on overall satisfaction, because the degree of influence of disconfirmation on satisfaction is also related to the importance of the attribute in EDT. Therefore, according to EDT, managers should maintain the current service level, avoid excessive investment in these attributes to prevent the marginal benefit from diminishing, and transfer resources to attributes with higher importance (Quadrants I and IV), so as to optimize the overall tourism experience effect based on the EDT.

4.4.3. Low-Priority Zone (Quadrant III)

Attributes in this quadrant have both low importance and low satisfaction, which is in line with the prediction of the EDT for low-importance and low-performance attributes. In EDT, when tourists' expectations for an attribute are low (due to low importance) and the perceived performance is also low, the disconfirmation generated is either negative but with low intensity or even close to zero. Because the low importance means tourists will not pay much attention to these attributes, even if the performance is not good, it will not have a significant impact on their overall satisfaction.

Take the distinctive features of nighttime dining products as an example. Tourists do not have high expectations for the distinctiveness of nighttime dining products in Daming Lake's nighttime tourism (low importance). At the same time, the actual performance of this attribute is also not good (low satisfaction). According to EDT, the disconfirmation here is weak, so it has little impact on overall tourist satisfaction. Therefore, managers do not need to rush to invest resources to improve these attributes. Instead, they should follow the guidance of EDT, focus on attributes with higher importance, and allocate resources to areas where they can generate significant positive disconfirmation so as to improve the overall tourism satisfaction more effectively.

4.4.4. Priority Improvement Zone (Quadrant IV)

Quadrant IV represents the critical priority improvement zone in the IPA framework, comprising attributes that exhibit significant negative disconfirmation between high importance expectations and low satisfaction performance. These foundational elements—including the affordable price and rich variety of nighttime shopping products, the affordable price of nighttime dining products, the cultural connotations and high safety of the nighttime tourscape and entertainment products, the cultural connotations of nighttime lighting products, the diverse methods, the convenience, accessibility, and affordable price of nighttime transportation—constitute basic “must-be” requirements under the Kano model, where their absence or poor performance severely diminishes tourist satisfaction while their presence only maintains baseline satisfaction levels. The case study of Daming Lake reveals concrete manifestations of these gaps, particularly in premature bus service termination and inadequate wayfinding systems, which directly violate tourists' fundamental expectations of accessibility and safety. According to EDT, these attributes demonstrate the most severe expectation–performance discrepancies, demanding immediate managerial attention. Three strategic interventions are warranted: (1) targeted infrastructure upgrades to meet minimum service standards, (2) resource reallocation from over-performing Quadrant II attributes, and (3) policy innovations such as extended transit hours and enhanced signage systems. This tripartite approach ensures optimal resource allocation to bridge the most critical expectation–performance gaps. The management strategy particularly emphasizes

cost-effective solutions for these basic requirements, allowing strategic resources to be preserved for high-impact factors in Quadrant I.

Guided by EDT, this revised IPA framework enables a tiered resource-allocation strategy: Advantage Consolidation Zone (Quadrant I), Resource Optimization Zone (Quadrant II), Low Priority Zone (Quadrant III) and Priority Improvement Zone (Quadrant IV). Such an approach ensures efficient resource utilization while maximizing experiential value for nighttime tourism in urban lake scenic areas.

5. Discussion

5.1. Key Findings

5.1.1. Premium Pricing of Nighttime Shopping and Dining Products Undermines Tourist Satisfaction in Urban Lake Scenic Areas

The findings reveal that attributes such as affordable pricing of shopping and dining products fall within the priority improvement zone (high importance, low satisfaction). Specifically, the premium pricing of nighttime tours and entertainment products at Daming Lake significantly exceeds market averages, leading to reduced tourist satisfaction. This aligns with Oliver's EDT paradigm [36], wherein prices surpassing the threshold of tourists' "perceived economic rationality" result in the perceived value falling short of expectations, thereby diminishing satisfaction. Dong and Yang [39] further note that while leisure tourists exhibit relative price elasticity for functional consumption, excessive premiums erode trust in the overall experience. Conversely, Zhou and Yao [35] demonstrate that tourists show a higher willingness to pay for cultural value-added products (e.g., Daming Lake's "Ten Scenic Views"), yet current market homogenization exacerbates the imbalance between pricing and value propositions.

5.1.2. Transport Infrastructure Deficiencies Undermine Tourist Satisfaction in Nighttime Tourism

The findings reveal that nighttime transportation issues—including early bus suspensions, taxi surcharges, and inadequate signage—significantly diminish tourist satisfaction. This reflects a clear case of negative disconfirmation, where visitors' basic expectations for transportation services (e.g., convenience, affordability, and accessibility) remain unmet. For instance, poorly designed signage directly contradicts tourists' anticipation of "hassle-free navigation", aligning with Tribe and Snaith's assertion that "service accessibility forms the foundation of satisfaction [43]." Furthermore, traffic congestion and price surges disrupt the desired "escapist experience" central to nighttime tourism [44]. A comparative analysis with Xi'an's successful "Great Tang All-Day Mall" [22]—which implements dedicated nighttime shuttle services and dynamic crowd management strategies—reveals transferable best practices for enhancing visitor experiences at Daming Lake. Beyond functional optimizations, integrating experiential elements into transportation services (e.g., introducing "ancient-style night tour buses" to enhance immersion) could bridge the current gap between infrastructure and visitor expectations.

5.1.3. The Cultural Connotation of Tourism Products Significantly Influences Tourist Satisfaction in Urban Lake Scenic Areas' Nighttime Tourism

The failure of Daming Lake's nighttime products and lighting design to effectively convey cultural narratives is the main driver of low satisfaction. On the one hand, the lighting design of historical landmarks is not embedded with local cultural symbols such as "Foshan Reflection" and "Spring Water Legend", and the lack of symbolic representation leads to inconsistent experiences, which confirms the view of Liu et al. that visual displays without a narrative cannot evoke emotional resonance [11]. On the other hand, the lack of interactivity in cultural performances and the lack of integration of technologies such as AR

interaction to promote visitor participation contrasts with the successful case of enhancing cultural immersion through role-playing and scene reconstruction in Xi'an's "Chang'an Twelve Hours" themed area [22], highlighting the critical role of interactivity in bridging the expectation–perception gap.

5.1.4. Nighttime Tourscape and Entertainment Products Fail to Provide Adequate Security in the Urban Lake Scenic Area

There are insufficient safety details for the night view of Daming Lake, such as the lack of safety tips in the landscape area, where the simple sign "Be careful of falling into the water" is only set up on the lakeside plank road, and key information such as water depth and emergency phone numbers are not marked. Insufficient surveillance coverage at night (e.g., no cameras at some corners of Qushuiting Street) and slow emergency response (tourists reported waiting for security personnel for more than 15 min) led to the insufficient perception of "safety and security capabilities" among tourists. In addition, safety explanations for recreational activities are not in place, such as cruise ship drivers not detailing how to use life jackets, which weakens the sense of trust in safety. Traditional safety studies in scenic spots mostly focus on daytime activities (e.g., mountaineering safety), but this study is consistent with the conclusion of Ngesan et al. [18] that "insufficient lighting" and "sparse crowding" in nighttime scenes will magnify safety hazards. For example, urban parks in Malaysia have increased night patrols to improve their sense of safety, while Daming Lake lacks similar measures, resulting in an insufficient psychological safety perception, which confirms the difference in scenarios where "night safety needs require special responses" [16]. The essence of the security gap in Daming Lake is the imbalance between "two-dimensional demand" and "insufficient supply"—physical security only meets some basic standards, but the supply of psychological safety is significantly missing, resulting in the superposition of negative inconsistency effects in EDT.

5.1.5. Weakened Demand for Distinctive Dining Products in Nighttime Compared to Daytime in Urban Lake Scenic Areas

The attributes of nighttime dining products, particularly their distinctive features, demonstrate both below-average importance and satisfaction scores. This finding supplements the existing view that distinctive dining requirements differ significantly between daytime and nighttime scenarios. Previous studies have primarily focused on the importance of distinctive dining characteristics in daytime tourism contexts, identifying "local uniqueness" as a core variable enhancing visitor satisfaction [1,41]. However, our study reveals that tourists' demand for distinctive dining features is markedly diminished in nighttime settings, with basic functional factors (e.g., convenience, price) becoming prioritized instead. For instance, the prevalence of fast-food options in the Guangzhou Chimelong Tourist Resort's nighttime dining offerings aligns with the "dual deficiency in distinctiveness" (low importance and satisfaction) observed at Daming Lake. This phenomenon supports the theory of "contextual demand downgrading due to time scarcity in nighttime tourism." Specifically, the time-constrained nature of nighttime visits leads tourists to prioritize efficiency over experiential dining, resulting in a weakened demand for culturally unique or elaborate culinary experiences. This demand divergence phenomenon is similarly reflected in the shopping sector.

5.2. Theoretical and Methodological Comparisons with Existing Research

Theoretically, in contrast to traditional urban tourism studies that predominantly focus on daytime activities, this research represents the first systematic investigation into the multidimensional influencing factors of urban lake nighttime tourism. While Xiong highlighted resource efficiency in nighttime tourism clusters [19], their work did not exam-

ine the unique factors specific to natural aquatic environments. Our identification of the “lighting–ecological coordination” dimension substantiates Wen’s concerns about how excessive lighting may compromise natural landscape authenticity [22], while also providing a new theoretical lens for the sustainable development of urban lake nighttime tourism.

Methodologically, this study advances the traditional Importance-Performance Analysis (IPA) method by using the partial correlation coefficient to calculate the derived importance score, so as to overcome the subjective weighting limitation of the traditional IPA. In this study, the revised IPA proposed by Deng is used to calculate the “derived importance” through the partial correlation coefficient [39], and the objective data is used as a measure of importance to avoid subjective bias. For example, in the case of Daming Lake, the method objectively identifies “The affordable price of nighttime transportation” (derived importance 0.592) as a high-priority improvement item, while the traditional IPA may lead to the misjudgment of priority due to tourists’ subjective cognitive bias, which verifies the scientific validity of the method. At the same time, Jin and Park integrated the IPA and joint analysis in rural tourism research [34], focusing on attribute combination effects. For the first time, this study applies “derived importance” to the nighttime tourism scene of urban lakes, and the indicator system focuses more on nighttime characteristics (such as the “coordination between lighting and environment”).

While the existing literature theoretically emphasizes the importance of cultural representation, it lacks concrete guidance on integrating cultural symbols into actual nighttime lighting designs. Using Daming Lake as a case study, we provide actionable insights for practice, demonstrating how cultural symbols can enhance nighttime tourism experiences. Furthermore, our findings reveal that nighttime transportation services require special attention beyond basic functionality, including operational hours, modal diversity, and wayfinding, aspects frequently overlooked in daytime tourism transportation research.

5.3. Limitations and Future Directions

This study has three main limitations. Firstly, the sample was predominantly composed of individuals aged 21–30 (46.47%), resulting in an inadequate representation of elderly tourists. Secondly, the absence of official nighttime visitor statistics, attributable to the site’s free admission policy, prevented direct representativeness benchmarking. However, as noted in Section 2.3, the implemented sampling protocol provides reasonable confidence in the data’s validity for examining satisfaction determinants within the studied context. Thirdly, the single-case design focusing solely on Daming Lake precludes cross-regional comparisons. Fourthly, the analysis did not account for seasonal variations in nighttime tourism patterns. Future research could advance this field through four key directions: (1) employing mixed methods approaches incorporating in-depth interviews to explore the specific needs of middle-aged and senior tourists; (2) future research could benefit from partnering with municipal authorities to install automated people-counting system; (3) conducting comparative studies of urban lake nighttime tourism models (e.g., West Lake in Hangzhou, East Lake in Wuhan) to develop regional comparative frameworks; and (4) applying time-geography perspectives to examine how seasonal differences (summer vs. winter) in tourist spatiotemporal behaviors influence satisfaction metrics. Furthermore, the rapid development of smart tourism technologies presents promising opportunities to enhance research methodologies. Specifically, integrating IoT sensor data (e.g., real-time monitoring of lighting energy consumption and transportation flows) with tourist satisfaction models could significantly improve the assessment system’s robustness. Subsequent investigations should address current limitations through expanded datasets and more rigorous analytical protocols. Particularly promising is the incorporation of AI-driven techniques such as sentiment analysis to advance theoretical understanding of

nighttime tourism experiences. This research trajectory would not only deepen theoretical insights into urban lake nighttime tourism but also provide evidence-based decision support for scenic area operations within the context of China's "dual carbon" sustainability goals.

6. Conclusions

6.1. High Overall Satisfaction with Distinct Demographic Appeal

Urban lake scenic areas possess inherent advantages for nighttime tourism development by combining picturesque natural landscapes with rich cultural resources, with empirical data showing particularly high participation rates among young tourists (aged 21–30) who prioritize novelty-seeking and immersive experiences—key attributes effectively delivered through nighttime tourism offerings [45]. As exemplified by Jinan's Daming Lake Scenic Area, which has gained significant recognition for its successful nighttime programs, visitor data analysis reveals young tourists demonstrate both elevated engagement and satisfaction scores, confirming strong market viability. These outcomes align with EDT, where perceived value emerges when experiences exceed pre-consumption expectations [36], as demonstrated by Daming Lake's dynamic light installations, like the "Reflection of Foshan" projection mapping, that transcend conventional visual spectacles through embedded historical narratives, creating cognitive–emotional value that enhances satisfaction. To further strengthen its competitive position, Daming Lake could implement adaptive strategies from Seoul's Cheonggyecheon Stream model that synergizes ecological preservation with cultural placemaking, including contextual art integration through site-specific installations, multi-stakeholder design approaches co-created with local artists to maintain authenticity and hydrological ecosystems, and temporal programming of seasonal light festivals to sustain novelty.

6.2. Strategic Preservation of Core Satisfaction Factors in Urban Lake Nighttime Tourism

The high-performance indicator "the rich variety of nighttime toursapes and entertainment products" in Quadrant I serves as a fundamental driver of tourist satisfaction, exemplifying a positive expectation–perception dynamic within the Expectancy–Disconfirmation Theory (EDT) framework. This effect operates through two complementary mechanisms: (1) advanced technological reinterpretation of cultural heritage (e.g., the historically accurate light projections at Lixia Pavilion) that exceeds conventional illumination standards, and (2) strategic integration of cultural IP (e.g., the "Ten Scenes of Daming Lake" collection) into experiential products that address visitors' unmet desires for authentic local cultural immersion. Daming Lake could build upon its current "Ming Lake Show" grand water-screen light performance by drawing inspiration from Hangzhou's West Lake to deeply explore cultural IPs. It could create a similar water-based live performance like "Impression of West Lake" to meet tourists' demands for nighttime tourism experiences. To sustain this competitive advantage, management should prioritize: (a) continuous technological innovation (including holographic displays and interactive projection systems), (b) deepened cultural storytelling (implemented through AR-guided tours and immersive installations), while vigilantly avoiding product standardization that could erode this crucial expectation–performance gap. These core differentiators demand targeted investment and systematic enhancement in the scenic area's long-term development strategy.

6.3. Bridging Satisfaction Gaps Through Functional and Experiential Innovations in Nighttime Tourism

The findings provide clear operational guidance for urban lake scenic area management. For the Priority Improvement Zone (Quadrant IV), the Daming Lake Scenic Area

should focus on three key interventions: (1) Extending the night bus service to 23:00, upgrading the wayfinding system to solve the complaints of tourists about the “early termination of service”, and building a “bus-bike-sharing” intelligent connection network, implementing transparent pricing of nighttime traffic and a “one-ticket” package mechanism to improve transportation diversity, convenience, and affordability; (2) implant cultural symbols such as “Spring Pulse Direction” to enhance the lighting cultural narrative, integrate the AR narrative of “Ten Views of Ming Lake” into the landscape entertainment, and implement anti-skid transformation and infrared early warning on the plank road around the lake to strengthen the cultural connotation and safety guarantee; and (3) implement a third-party quality control mechanism to standardize the pricing of shopping and catering products, so as to improve the current price premium problem.

For Advantage Consolidation Zone (Quadrant I), the “diversity of landscape entertainment” requires deepened cultural storytelling. Drawing lessons from Xi’an “Great Tang All-Day Mall’s” success, the area could develop immersive theatrical performances integrating natural features like the “Thousand-Buddha Mountain Reflection” with Jinan’s notable scholar culture, transforming passive viewing into interactive experiences. Regarding Resource Optimization Zone (Quadrant IV), reduced innovation investment in “dining distinctiveness” is advised, with focus shifted to standardizing existing snack preparation processes to maintain baseline satisfaction.

This three-pronged approach—comprising infrastructure optimization, ecological compliance, and experience enhancement—systematically addresses satisfaction gaps while balancing environmental, economic, and cultural sustainability. The proposed measures demonstrate how targeted operational adjustments can translate theoretical EDT principles into practical management solutions for urban lake nighttime tourism.

6.4. The Effectiveness of Research Methods

A revised IPA method was utilized in this study to conduct a comprehensive investigation into the factors influencing tourist satisfaction in nighttime tourism at the Daming Lake Scenic Area, demonstrating that this approach can accurately evaluate tourist satisfaction and identify critical areas for enhancement. This study offers a significant reference for future research on nighttime tourism in other urban lake scenic areas.

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Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: The data presented in this study are available on request from the corresponding author.

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References

1. Ruan, W.Q.; Jiang, G.X.; Li, Y.Q.; Zhang, S.N. Night tourscape: Structural dimensions and experiential effects. *J. Hosp. Tour. Manag.* **2023**, *30*, 108–117. [CrossRef]
2. Hosen, M.I.; Hasan, M.M.; Talha, M.; Akter, M.M.; Nasher, N.R. Exploring the cooling benefits of Urban Lakes: A multi-year analysis of Dhaka, Bangladesh. *HydroResearch* **2025**, *8*, 361–373. [CrossRef]
3. Chen, N.; Wang, Y.; Li, J.; Wei, Y.; Yuan, Q. Examining structural relationships among night tourism experience, lovemarks, brand satisfaction, and brand loyalty on “Cultural Heritage night” in South Korea. *Sustainability* **2020**, *12*, 6723. [CrossRef]
4. The Ministry of Culture and Tourism of the People’s Republic of China. Notice of the Ministry of Culture and Tourism on Announcing the List of the First Batch of National Night Culture and Tourism Consumption Clusters. Available online: https://zwgk.mct.gov.cn/zfxgkml/cygz/202107/t20210706_926242.html (accessed on 8 July 2025).
5. Qiu, Y.Q.; Yang, Y.; Wang, X.Q.; Guo, L.B. Tourist satisfaction and review helpfulness: Examining the primary effects, mediating mechanisms, and moderating influences. *Tour. Manag.* **2026**, *112*, 105252. [CrossRef]
6. Li, Q.; Jing, R.Z.; Zhu, X.H. Determinants of travel satisfaction for commercial airlines: A data mining approach. *Eng. Appl. Artif. Intell.* **2024**, *133*, 108597. [CrossRef]
7. Cao, X.X. The Development of Urban Night Tourism in China—A Case Study of Kaifeng. *Commer. Res.* **2008**, *15*, 35–49. [CrossRef]
8. Xie, Y. Research on nighttime tourism products in Xiamen city. *Rural Econ. Sci.* **2020**, *31*, 170–171. [CrossRef]
9. Shi, Z.H. Analysis of tourists’ perception and emotional responses to nighttime tourism in Chengdu based on Weibo big data. *J. Sichuan Prov. Corresp. Inst. Adm.* **2021**, *23*, 82–89. [CrossRef]
10. Zhao, Y.J. Potential and conversion of the night tourism market. *Entertain. Technol.* **2019**, *16*, 6–7. [CrossRef]
11. Liu, D.X.; Li, Q.L. Research on the construction ideas of nighttime tourism scenarios from the perspective of experiential economy. *West Forum Econ. Manag.* **2021**, *32*, 71–79. [CrossRef]
12. Lovatt, A.; O’Connor, J. Cities and the night-time economy. *Plan. Pract. Res.* **1995**, *10*, 127–134. [CrossRef]
13. Song, H.; Kim, M.; Park, C. Temporal distribution as a solution for over-tourism in night tourism: The case of Suwon Hwaseong in South Korea. *Sustainability* **2020**, *12*, 2182. [CrossRef]
14. Weaver, D. Celestial ecotourism: New horizons in nature-based tourism. *J. Ecotourism* **2010**, *9*, 84–99. [CrossRef]
15. Andrea, C.; Crispin, C. Measuring and managing the environmental impact of festivals: The contribution of the Ecological Footprint. *J. Sustain. Tour.* **2017**, *25*, 148–162. [CrossRef]
16. Meier, J.; Hasenöhl, U.; Krause, K.; Pottharst, M. *Urban Lighting, Light Pollution and Society*; Routledge: New York, NY, USA, 2014; pp. 1–324. [CrossRef]
17. Nofre, J. The touristification of nightlife: Some theoretical notes. *Urban Geogr.* **2021**, *42*, 1552–1561. [CrossRef]
18. Ngesan, M.R.; Karim, H.A.; Zubir, S.S.; Ahmad, P. Urban community perception on nighttime leisure activities in improving public park design. *Procedia-Soc. Behav. Sci.* **2013**, *105*, 619–631. [CrossRef]
19. Xiong, S.M.; Wang, H.; Liao, Z.W. Exploring the factors and spatial patterns of national night cultural tourism consumption agglomeration zones in China. *Heliyon* **2024**, *10*, 1–17. [CrossRef]
20. Stabler, M.; Papatheodorou, A.; Sinclair, M.T. *The Economics of Tourism*, 2nd ed.; Routledge: New York, NY, USA, 2010; pp. 4–25. [CrossRef]
21. Wüllenweber, S.; Burrell, A. The crime and the place: Robbery in the nighttime economy. *J. Investig. Psychol. Offender Profiling* **2024**, *21*, 3–19. [CrossRef]
22. Eldridge, A.; Smith, A. Tourism and the night: Towards a broader understanding of nocturnal city destinations. *J. Policy Res. Tour. Leis. Events* **2019**, *11*, 371–379. [CrossRef]
23. Chen, J.B.; Lai, M.T. Research on the influencing factors of satisfaction in cultural and creative parks based on factor analysis and IPA analysis: Taking Guangzhou Hongzhu Factory as an example. *Stat. Manag.* **2017**, *32*, 56–62. [CrossRef]
24. Lu, Y.; He, M.E.; Liu, C. Tourism competitiveness evaluation model of urban historical and cultural districts based on multi-source data and the AHP method: A case study in Suzhou ancient city. *Sustainability* **2023**, *15*, 16652. [CrossRef]
25. Liu, X.L.; Zhang, L. A study of the influence of social reading platform characteristics and perceived value on users’ willingness to continue using it. *New Century Libr.* **2019**, *40*, 53–56. [CrossRef]
26. Dai, Q.W.; Chen, Z.Y.; Wei, Y.R. Analysis on the influencing factors of tourist satisfaction in composite rural tourist places: Taking Guilin Lujia Village as an example. *J. Nat. Sci. Hunan Norm. Univ.* **2022**, *67*, 33–40. [CrossRef]
27. Hu, W.X.; Nie, J.; Jiang, H. Analysis of factors influencing tourist satisfaction in forest parks in Guangzhou City. *J. Southwest For. Univ.* **2020**, *40*, 147–152. [CrossRef]
28. Yang, Z.; Qin, C.Z.; Guo, L.D.; Yu, M.W. The effects of involvement, authenticity, and destination image on tourist satisfaction in the context of Chinese ancient village tourism. *J. Hosp. Tour. Manag.* **2014**, *21*, 51–62. [CrossRef]
29. Sánchez-Sánchez, M.D.; De-Pablos-Heredero, C.; Montes-Botella, J.L. Direct and moderating effects of COVID-19 on cultural tourist satisfaction. *Eur. Res. Manag. Bus. Econ.* **2024**, *30*, 100238. [CrossRef]

30. Christou, P.; Pericleous, K.; Papatheodorou, A. Dazzled by the strobe lights: Tourist experience and complexity in the night-economy. *J. Hosp. Tour. Manag.* **2022**, *52*, 452–458. [CrossRef]
31. Scott, A.; Cohen, D.H. Autonomous vehicles and the future of urban tourism. *Ann. Tour. Res.* **2019**, *74*, 33–42. [CrossRef]
32. Cheng, Y.; Bartesaghi-Koc, C.; Tian, Y.; Shen, L.; Teng, M.; Liu, H.; Wu, C. Where and how to cool through blue infrastructure? Large lake groups to ameliorate urban overheating in a typical inland multi-lake megacity. *Sustain. Cities Soc.* **2023**, *98*, 104869. [CrossRef]
33. Yu, G.; Tang, J.; Na, J.; Ma, T. Nighttime as experiences: The influence of perceived value on urban waterfront night cruise loyalty. *SAGE Open* **2022**, *1*, 1–11. [CrossRef]
34. Bai, H. Research on Water Tourism Development Based on RMP Analysis—A case study of Jintang, Chengdu. Master's Dissertation, Sichuan Agricultural University, Chengdu, China, 2020. [CrossRef]
35. Zhou, X.B.; Yao, Y.X. Research on the development of night tourism in Jiaozuo City. *Mark. Wkly.* **2021**, *34*, 42–44.
36. Oliver, R.L. A cognitive model of the antecedents and consequences of satisfaction decisions. *J. Mark. Res.* **1980**, *17*, 460–469. [CrossRef]
37. Jin, Y.; Park, Y. An integrated approach to determining rural tourist satisfaction factors using the IPA and conjoint analysis. *Int. J. Environ. Res. Public Health* **2019**, *16*, 3848. [CrossRef] [PubMed]
38. Deng, W.J. Using a revised importance-performance analysis approach: The case of Taiwanese hot springs tourism. *Tour. Manag.* **2007**, *28*, 1274–1284. [CrossRef]
39. Dong, G.Z.; Yang, F.Y. A Study on the Evaluation System of Tourist Satisfaction Degree in Tourist Areas. *Tour. J.* **2005**, *20*, 27–30. [CrossRef]
40. Zhu, X.; Liu, M.; Sun, Y.D.; Zhang, R.X.; Gou, H.X. Night Tourism Satisfaction in the Qinghefang Tourism and Leisure Block based on an Improved Kano Model. *J. Resour. Ecol.* **2024**, *15*, 55–65. [CrossRef]
41. Bradshaw, P. Our 'Great Entail': Constructing the Cultural Value of the Lake District. In *Changing Perceptions of Nature. Heritage Matters*. Boydell & Brewer; Convery, I., Davis, P., Eds.; Boydell & Brewer: Martlesham, UK, 2016; pp. 63–72. Available online: <https://www.cambridge.org/core/books/abs/changing-perceptions-of-nature/our-great-entail-constructing-the-cultural-value-of-the-lake-district/F4259CF175F20FF1847877AA36828B9E> (accessed on 22 April 2025).
42. Zhang, R.; Taylor, K. Cultural landscape meanings. The case of West Lake, Hangzhou, China. *Landsc. Res.* **2019**, *45*, 164–178. [CrossRef]
43. Tribe, J.; Snaith, T. From SERVQUAL to HOLSAT: Holiday satisfaction in Varadero, Cuba. *Tour. Manag.* **1998**, *19*, 25–34. [CrossRef]
44. Maital, S. The Experience Economy: Work Is Theatre & Every Business a Stage by B. Joseph Pine II and James H. Gilmore (Book Review). *Sloan Manag. Rev.* **1999**, *40*, 93.
45. Vera, N.; Chang, S. The indirect experiences of young adult tourists with hypothetical cultural festivals/events via Twitter and an official homepage amid COVID-19: Focusing on destination image. *J. Destin. Mark. Manag.* **2022**, *23*, 100694. [CrossRef]

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Article

Be Smart, but Not Humanless? Prioritizing the Improvement of Service Attributes in Smart Hotels Based on an Online Reviews-Driven Method

Zeyu Chen ¹, Stephanie Hui-Wen Chuah ^{2,*} and Kandappan Balasubramanian ¹

¹ School of Hospitality, Tourism, and Events, Taylor's University, Subang Jaya 47500, Selangor, Malaysia; chenzeyu@sd.taylors.edu.my (Z.C.); kandappan.balasubramanian@taylors.edu.my (K.B.)

² Faculty of Economics and Management, Universiti Kebangsaan Malaysia, Bangi 43600, Selangor, Malaysia

* Correspondence: hw.chuah@gmail.com

Abstract: Although integrating smart technologies into service encounters can provide hoteliers with a competitive advantage, managing customer satisfaction in smart hotels remains challenging due to limited knowledge of how to prioritize improvements across smart service and traditional service. Therefore, the study aims to evaluate customer satisfaction with both smart and non-smart technology attributes in smart hotels, identify attributes with high improvement priorities, and uncover factors contributing to customer dissatisfaction. This study proposes a prioritization method for service improvement in smart hotels by analyzing online reviews from 42 smart hotels. The findings reveal that customers' technological needs are well met in smart hotels, but smart hotels need to promptly address three key issues: long check-in wait times, staff attitude and competence, and breakfast quality. To maximize customer satisfaction, managers should adopt a hybrid service model that strikes the right balance between technology and human interaction.

Keywords: smart hotels; customer satisfaction; service attributes; online reviews; text analysis; opportunity algorithm

1. Introduction

As the typical scenario for the application of smart technologies, smart hotels have emerged as a trendy accommodation option [1,2]. Compared to traditional human-staffed hotels, smart hotels can deliver convenience and unique interactive experiences to customers [3]. For instance, upon arrival at smart hotels, guests are assisted by service robots to check in through self-service kiosks or facial recognition, and then enter their rooms through the keyless system [4,5]. During their stay, they can use smart speakers or AI assistants to control room settings such as lighting, temperature, and entertainment systems, offering a more personalized experience [5,6]. In addition, smart hotels offer significant advantages in terms of operations, revenue [7,8], and sustainability [9]. Smart technologies are recognized as critical enablers for advancing eco-efficient innovations [9], which can help to monitor energy and water consumption [10], and improve operational efficiency [11]. These advancements align directly with SDG 9 (industry, innovation, and infrastructure), while also extending to SDG 11 (sustainable cities and communities) via the promotion of resource-efficient buildings and SDG 12 (responsible consumption and production) [9].

Meanwhile, with the development of the Internet and the rise of digital platforms, online reviews have become a major source of information for managers to understand customers' needs and satisfaction [12,13]. Prior studies on smart hotels have capitalized

on online reviews to gain customer insights, but they focus predominantly on customers' perceptions of smart technologies and the association between these smart technologies and customer satisfaction [14,15]. Smart services and amenities are becoming an important attribute for hotel choice [16], but customers' experience of other non-smart attributes should not be ignored. To set the right priorities in customer satisfaction management, the satisfaction and improvement prioritization of different attributes must be well understood [17]. Therefore, it is critical to understand the relative performance and importance of both smart and non-smart service attributes in smart hotels.

The purposes of this study are to evaluate customer satisfaction with both smart and non-smart technology attributes in smart hotels, identify attributes with high improvement priorities, and uncover factors contributing to customer dissatisfaction. Therefore, this study proposed a smart hotel service improvement prioritization method based on online reviews. Specifically, (i) 16,964 online reviews of four famous smart hotel brands, including 42 smart hotels, were collected from two popular Chinese online travel agency (OTA) platforms, namely Ctrip and Qunar; (ii) the service attributes of the smart hotels were identified using the topic modeling technique LDA; (iii) a sentiment analysis was implemented to obtain the customer satisfaction/dissatisfaction level of the smart hotel attributes; (iv) the opportunity algorithm was used to quantify the improvement benefits of different attributes, and an opportunity landscape map was drawn to show the improvement priority order; (v) finally, by mining the co-occurrence relationship between sub-attributes and negative-sentiment words and conducting a link analysis, effective service improvement strategies for smart hotels were formulated to enhance customer satisfaction.

2. Literature Review

2.1. Smart Hotels

Smart hotels refer to hotels that leverage cutting-edge information and communication technologies (ICTs) and artificial intelligence (AI) into their service concepts to enhance customer experiences [15,18]. The previous literature on smart hotels has spent considerable effort exploring the factors that influence customers to adopt smart hotel products or visit smart hotels. For instance, Kim and Han's [19] findings suggest that both perceived ease of use and perceived usefulness of technology in smart hotels have a positive impact on customer attitudes, which in turn lead to favorable behavioral intentions. Unlike Kim and Han's [19] findings, Yang et al. [18] found that perceived usefulness has a positive effect on visit intention, while perceived ease of use has a negative effect on visit intention. Yang et al. [18] suggested that one reason for this difference is that the majority of respondents in their study were young and early-middle-aged, with young to early-middle-aged customers choosing smart hotels because they were more eager to try out smart amenities that were new, complex, and difficult to use. In contrast, the respondents in Kim and Han's [19] study were middle-aged and older customers who preferred easy-to-use and practical smart amenities. Besides that, the respondents of Yang et al.'s [18] study were Chinese travelers, while the vast majority (84.6%) of Kim and Han's [19] study respondents were Caucasian/White in the US. Therefore, another possible reason for the gap in respondents' attitudes toward smart technologies between the two studies is cultural differences [20]. For example, for people from low-context cultures (e.g., Europeans and Americans), communication tends to be explicit, so they rely more on the direct and easily understandable verbal expressions of the service robot. But people from high-context cultures (e.g., Asians) expect to see more contextual cues, such as the body language of the service robot [21,22].

Recent studies have further explored the impact of smart attributes on customer experience in smart hotels. Kim and Han [23] identified four key functional attributes of smart hotels: convenience and control, maintenance and security, contactless environment,

and personalization as having an important role in customer experience. Yan et al. [24] used a mixed-method approach to analyze the drivers of choosing smart hotels from the perspective of silver travelers (over 50 years old). Their study found that security and personalization were still important for silver travelers. However, perceived convenience had a negligible effect on the attitudes of silver travelers, which may be because older adults no longer value convenience after getting used to using smart devices over time, while emphasizing other factors. Dai et al. [25] then extended the characterization of smart attributes through qualitative analysis by expanding the perspective to two emotional dimensions, namely hedonic and trendiness. They found that under the influence of the epidemic, customers paid more attention to these two emotional dimensions than the above four functional attributes.

Although the above literature has provided the necessary foundation for understanding customers' antecedents of their behavioral intentions and service experiences in smart hotels, most studies have focused on attributes related to smart technologies while ignoring the customers' experience of other service attributes in smart hotels. However, customers' responses to hotel stays are driven by all the service experiences they accumulate during their stay, which means that they take a comprehensive approach to the entire journey when evaluating their hotel stay [26]. Therefore, while smart service experience is important for customers, understanding customers' evaluations of other non-smart attributes such as price and food is also indispensable for improving services and increasing customer satisfaction in smart hotels.

2.2. Service Attribute Improvement Priority

Customer satisfaction is defined as an overall assessment of product or service attributes by customers [27]. As customers' expectations vary across market segments, the importance of different types of hotel attributes and their impact on satisfaction are also different [27,28]. To gain a competitive edge in the fiercely competitive market, prioritizing service attributes is an important way for managers to improve services [17,29]. Prioritizing service attributes can facilitate the rational allocation of resources, improve key attribute performance, and maximize customer satisfaction [30].

In this research, the opportunity algorithm is employed to determine the strategy for improving smart hotel attributes from the customers' perspective. The opportunity algorithm was originally proposed by Ulwick [31] alongside the outcome-driven innovation (ODI) methodology. It uses importance and satisfaction as two factors to compute an opportunity score on a scale of 0–10. Ulwick posits that innovation opportunities arise when a need is important but not well satisfied; the opportunities for value creation increase as the importance of the need arises and customer satisfaction decreases. These opportunities enable commercial organizations to defend customer loyalty by closing the loyalty gap between merely satisfied and fully satisfied customers [17]. Consequently, the needs that are most important but least satisfied are given the highest priority [32].

Compared to other methods, the opportunity algorithm evaluates both the importance of attributes and their performance and further provides a quantitative opportunity score to determine the priority of attribute improvements [17]. This algorithm identifies attributes perceived as highly important but associated with low satisfaction levels. Additionally, it detects attributes where resources have been overly invested [32]. When consumers perceive certain attributes as unimportant but are highly satisfied with them, this situation may present an opportunity to reallocate resources from these attributes to those with greater importance and lower satisfaction [29].

2.3. Text Analysis of Online Reviews

The online reviews, as a representative form of user-generated content (UGC), provide genuine expressions of customers' experiences and sentiments following their consumption of products and services. These reviews serve multiple purposes: assisting potential consumers in making informed purchase decisions and enabling managers to identify key attributes influencing satisfaction levels [33]. Studying these reviews can provide novel insights into service attributes that have been widely explored in the hospitality industry [17,34]. However, as online reviews are unstructured textual data with fuzziness and randomness, they first need to be converted into analyzable data [12]. More and more scholars have shown considerable interest in text analysis techniques of online reviews, with a primary focus on attribute extraction and sentiment analysis [12,35].

2.3.1. Attribute Extraction

Attribute extraction refers to identifying topics and commonly mentioned topic-related keywords within online reviews [36]. It aims to extract the attributes that customers care about from online reviews by analyzing them and laying the foundation for subsequent sentiment analysis. The attribute extraction methods can be categorized into rule-based and statistical-based methods [37]. Compared to statistical-based methods, rule-based methods have the advantage of not relying on corpus construction and are more efficient in extracting product attributes [35]. However, the rule-based approach requires significant human involvement and may not be flexible enough. In addition, it ignores the indirect dependency between product features and viewpoint words, leading to the loss of recall [35].

Therefore, this research uses a topic modeling technique, namely LDA, to extract the hotel attributes. Topic modeling is a statistical model that can be used to understand the distribution of topics per online review and the distribution of words per topic [38]. LDA is the most common approach to topic modeling [39]. Essentially, LDA assumes that the words in each review are drawn independently from a bag, each containing a set of words. Each bag contains words extracted from a vocabulary, i.e., a distribution of topic words. Topics may be shared by all comments. Each comment will have its proportion of topic mixtures. Topic modeling using LDA can discover potential topics from large amounts of unstructured text data (big data) [40,41]. Compared to other techniques like the probabilistic latent semantic analysis (PLSA) and Gibbs Sampling Dirichlet Multinomial Mixture (GSDMM), LDA provides enhanced scalability, improved interpretability, and quicker training processes [42]. By applying LDA to a given set of online reviews, researchers can obtain the distribution of topics in each review and the distribution of words within each topic, thus inferring the main topics of online reviews [39,43].

2.3.2. Sentiment Analysis

Although the attribute extraction technique helps to identify key service attributes, it cannot reflect the customers' actual perceptions [44]. Therefore, sentiment analysis is used to mine the sentiment information to help managers gain a comprehensive understanding of customer satisfaction/dissatisfaction with product or service attributes [13,45]. Liu and Zhang [46] stated that the computational study of people's opinions, appraisals, attitudes, and sentiments towards entities, individuals, issues, events, topics, and their attributes is referred to as sentiment analysis or opinion mining.

For a long time, the accuracy and applicability of sentiment analysis methods have presented significant challenges [47]. Existing research suggests that machine learning methods trained with specific features on specific datasets can provide more successful sentiment recognition [48], but it requires a large body of data and extensive training to provide the machine learning model with sufficient examples for learning [49,50]. Smart

hotels, as an emerging field, may not be able to collect enough reviews from them for training machine learning algorithms. Moreover, machine learning has limitations in extracting semantic relationships within the context of words [50], while the dictionary-based approaches incorporate both lexical and syntactical details of linguistic content to refine sentiment valence. This means that the negation, intensification, and rhetorical functions of text segments are considered during sentiment scoring [51]. In summary, using a dictionary-based sentiment analysis approach is more suitable for this study.

3. Methodology

3.1. Research Framework

In this section, a conceptual framework is proposed to provide detailed service improvement strategies for smart hotels. As shown in Figure 1, the framework consists of three main parts, which are composed of five steps: in the first step, online reviews are collected and preliminarily filtered; in the second step, smart hotel service attributes and attribute feature words (sub-attributes) are extracted by using the topic modeling technique LDA; in the third step, customer satisfaction is evaluated by a dictionary-based sentiment analysis; in the fourth step, the attribute importance is computed by TD-IDF and combined with the opportunity algorithm to obtain the opportunity score, thereby mapping the opportunity landscape; and in the fifth step, the factors leading to customer dissatisfaction are further revealed through link analysis.

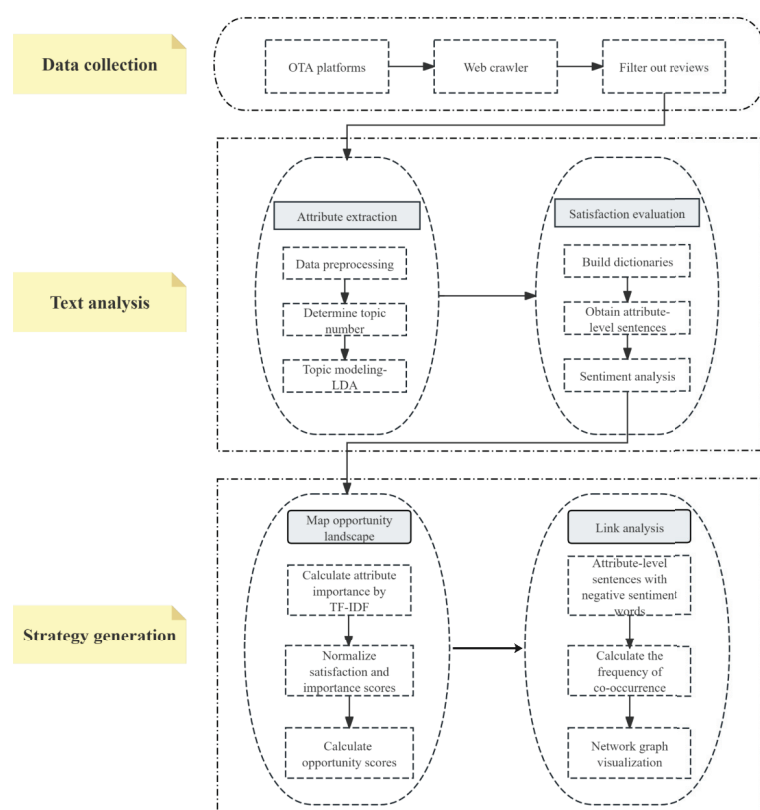


Figure 1. A conceptual framework for generating service improvement strategies for smart hotels. Source: Self-made for this research.

3.2. Data Collection

To obtain the most representative data for this study, we selected popular OTA platforms (Ctrip and Qunar) as data sources and used web-scraping software to extract online travel reviews. Ctrip (<http://www.ctrip.com>) and Qunar (<http://www.qunar.com>) are both well-known OTA platforms and have frequently been used as data sources in similar

studies [52–54]. Ctrip is the largest online travel agency in China [55], allowing customers to share their authentic experiences, opinions, and comments about hotels and destinations. The platform strictly verifies that only consumers who have stayed at the hotels can rate and comment, removing any irrelevant or manipulated reviews. Qunar is one of the most popular travel platforms in China with more than 600 million users and it requires that only real consumers who have stayed at the hotel can rate and comment [53]. These stringent measures ensure the authenticity and objectivity of the reviews on Ctrip and Qunar, making these two platforms become reliable sources for data collection in this study.

In this study, the online reviews of a total of 42 smart hotels, including four representative smart hotel brands, i.e., Flyzoo (1), Lyz (4), Henn-na (22), and Yotel (15), were used as samples. These four hotel brands were chosen because they are widely recognized as smart service providers in the hotel industry and have frequently been selected as representative samples in high-tech hotel studies [5,14,56,57]. Table 1 contains their geographical distribution.

Table 1. Distribution by country of smart hotels.

Country	Flyzoo	Henn-na	Yotel	LYZ	Total
China	1	0	0	4	5
Japan	0	20	0	0	20
Netherlands	0	0	1	0	1
Portugal	0	0	1	0	1
Singapore	0	0	1	0	1
South Korea	0	1	0	0	1
Switzerland	0	0	1	0	1
Turkey	0	0	1	0	1
United Kingdom	0	0	5	0	5
United States	0	1	5	0	6

In May 2024, 16,964 initial online reviews were collected from Ctrip and Qunar through a reliable data-crawling software, namely Octopus [44]. The initial online reviews were then screened in the following three ways: (i) duplicate reviews were removed, (ii) reviews automatically given by the platform system, e.g., “user has rated it positively”, (iii) reviews with fewer than two Chinese words were deleted as they usually did not provide useful information. Finally, we obtained 16,744 online reviews for data analysis.

3.3. Topic Modeling Approach

This study applied a topic modeling tool, LDA, to identify the smart hotel attribute and the corresponding feature words of the attributes from the review dataset. With the LDA approach, researchers can quickly discover themes (i.e., attributes that affect hotel customer satisfaction) from a large number of documents (i.e., online reviews). The LDA model is implemented by using the Gensim module in Python3.10.

Before using LDA for topic modeling, we performed the following two steps: preprocessing of data and determination of the number of topics. The online review preprocessing consisted of three parts: word segmentation, part-of-speech tagging (POST), and word removal. To improve the quality of the topics and the accuracy of the model, we also removed terms that appeared in more than 80% of the comments. This is because terms that occur too frequently cannot be used to distinguish topics [58], and they also increase

the computational effort required to run the program [59,60]. Python's Jieba library was used to implement text preprocessing.

When using LDA for topic modeling, the number of topics needs to be given in advance [61]. The results of LDA model clustering are strongly influenced by the number of topics. Too many topics will result in many topics with no obvious semantic pointers, and vice versa with multiple layers of semantic information overlaid on top of each other [62]. This study uses perplexity as an evaluation metric to determine the appropriate number of topics. Perplexity is a common metric used in topic modeling to evaluate how well the model fits a given dataset [63–66]. Theoretically, the lower perplexity score signifies improved generalization performance [39]. However, the perplexity value will decrease when the number of topics increases, leading to topic redundancy and complicating subsequent analysis. Thus, the number of topics is determined by the inflection point on the line chart in practice [67,68].

3.4. Dictionary-Based Sentiment Analysis

This research adopts a dictionary-based sentiment analysis to explore customers' satisfaction and dissatisfaction with smart hotel attributes. There are many publicly available sentiment dictionaries for Chinese texts, e.g., the HowNet sentiment dictionary, Li Jun's commendatory and derogatory dictionary of Tsinghua University, and the National Taiwan University sentiment dictionary (<https://github.com/ppzhenghua/SentimentAnalysisDictionary>) (accessed on 30 May 2024). However, online reviews contain a lot of sentiment words in the field of smart hotels, such as 'futuristic' and 'effortless'. Therefore, we decided to build a sentiment dictionary based on the HowNet sentiment dictionary that can be used to filter the sentiments contained in customers' online reviews of smart hotels. In the study, we found that there are 93 duplicates in the sentiment dictionary of the HowNet sentiment dictionary, so we first de-emphasized them. Secondly, considering that hotel reviews are mostly expressed as nouns, adjectives, and adverbs [69], we implemented recognition and counted word frequencies for the word items labeled as the above lexical properties in the corpus. On this basis, the reference to Li Jun's commendatory and derogatory dictionary of Tsinghua University supplements the HowNet sentiment dictionary with 492 new commendatory words and 991 new derogatory words. The final complete sentiment dictionary for smart hotels contains 9059 positive words and 8639 negative words.

In addition to improving the accuracy of sentiment orientation to the online reviews, the consideration of degree words and negation words is also important because these words affect the sentiment value [12,70]. Degree words refer to words that do not have an emotional tendency by themselves but can enhance or diminish the intensity of emotion. The HowNet degree word dictionary classifies degree words into six levels, namely, most, over, very, more, -ish, and insufficient, totaling 220 words. Each degree adverb in the dictionary is assigned a modification weight based on its effect of strengthening or weakening. To be specific, degree adverbs like very, too much, and extremely are assigned a modification weight of 2 as they amplify the sentiment intensity of sentiment words. Conversely, adverbs like slightly, a little, and a bit weaken the sentiment intensity, thus receiving a modification weight of 0.5. In summary, modification weights are assigned to the degree adverbs by their impact on sentiment strength. Negative adverbs such as no, not, never, and seldom can reverse sentiment orientation. Hence, their modification weights are set to -1 . We merged several negative dictionaries and collected a total of 91 negative adverbs.

After building the sentiment word dictionary, the degree adverb dictionary, and the negative adverb dictionary. We referred to the work of Hu et al. [71], cutting online reviews

into sentences, and then matching the sentences with attribute feature words to determine which attribute they belong to obtain attribute-level sentences. Finally, according to the following Equation (1), the sentiment score of the attribute feature word (t_i) is calculated, where t is the number of negation words; $\text{degree}(k)$ is the weight of degree word k ; and $\text{sen}(j)$ is the sentiment value of sentiment word j .

$$\text{Sen}(t_i) = \left[\sum_j^n (-1)^t * \text{degree}(k) * s(j) \right] \quad (1)$$

3.5. Opportunity Algorithm

In this step, the opportunity algorithm is used to combine the importance and satisfaction scores of hotel attributes to evaluate their opportunity potential and generate an opportunity landscape map. The attribute satisfaction is obtained through the sentiment analysis in the previous step, while the attribute importance is calculated by using the Term Frequency–Inverse Document Frequency (TF-IDF) algorithm. The TF-IDF algorithm serves as an effective technique for determining the importance of attributes within the hotel sector [66]. It adeptly eliminates non-essential words while pinpointing the key aspects that are most valued by individuals. The importance of each sub-attribute t_i to a customer can be calculated by the equation below.

$$\text{TF-IDF}(t_i) = \text{TF} * \text{IDF} = \frac{n_{i,j}}{\sum_k n_{k,j}} * \log \frac{|D|}{|\{j : t_i \in d_j\}| + 1} \quad (2)$$

For the opportunity score calculation, we also need to normalize the sentiment scores (satisfaction) and TF-IDF scores (importance) of all sub-attributes [72]. According to the opportunity algorithm, hotel attributes that are most important but least satisfied present the highest improvement opportunity. Equations (3) and (4) illustrate how to normalize the satisfaction and importance of the sub-attribute, and finally, the opportunity score of each sub-attribute can be calculated by Equation (5).

$$\overline{\text{Satisfaction}}_{t_i} = \frac{\text{Sen}(t_i) - \text{Sen}_{\text{Min}}}{\text{Sen}_{\text{Max}} - \text{Sen}_{\text{Min}}} \quad (3)$$

$$\overline{\text{Importance}}_{t_i} = \frac{\text{TF} * \text{IDF}(t_i) - \text{TF} * \text{IDF}_{\text{Min}}}{\text{TF} * \text{IDF}_{\text{Max}} - \text{TF} * \text{IDF}_{\text{Min}}} \quad (4)$$

$$\text{Opportunity}_{t_i} = \overline{\text{Importance}}_{t_i} + \text{Max}(\overline{\text{Importance}}_{t_i} - \overline{\text{Satisfaction}}_{t_i}, 0) \quad (5)$$

3.6. Link Analysis of Dissatisfaction Factors and Hotel Attributes

The opportunity algorithm can quantify the improvement benefits of different attributes to specify a prioritization strategy. However, to develop specific service improvement strategies, we also need to identify the reasons for customer dissatisfaction. Therefore, this section mines the co-occurring relationships between attribute feature words and negative sentiment words and constructs a link analysis to determine which factors contribute to customers' negative sentiment towards this attribute.

Link analysis can visualize the linking relationships between multiple words and terms as well as the strength of the links [72]. The frequency of co-occurrence of attribute words with sentiment words is counted by iterating over reviews containing attribute feature words, and finally, the links between sentiment and attribute words are visualized through a network graph.

4. Findings

4.1. LDA Results

With the method proposed in Section 3.3, perplexity was computed for topic counts ranging from 2 to 20, with topic models with 8 topics obtaining the most favorable perplexity scores from the comment set, as shown in Figure 2. LDA allows feature words to overlap between topics, i.e., high-frequency feature words can appear on more than one topic [12,39]. Therefore, the output may contain some similar topics or noise words, and the final topics and related feature words need to be manually adjusted [12,43]. For each topic, 10 feature words with high frequency were selected as sub-attributes, and the naming of the topic was based on the semantic relationship between these feature words. One researcher performed the initial naming of each topic and then confirmed by another researcher [40,61]. The final topics are the hotel attributes that managers need to focus on, while the feature words under the attributes are the customers' 10 most concerned sub-attributes [12]. Table 2 illustrates the attributes of smart hotels and the corresponding sub-attributes.

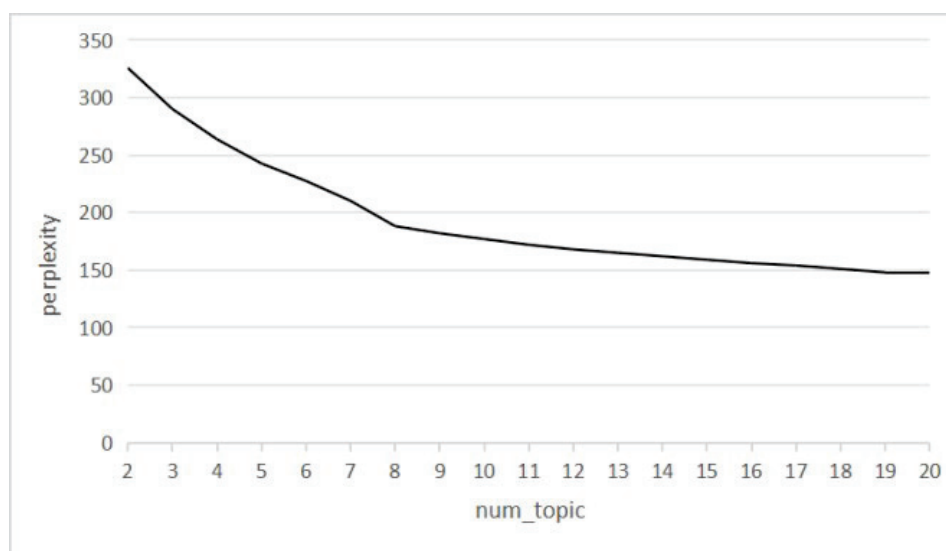


Figure 2. Perplexity across different numbers of topics. Source: Self-made for this research.

Table 2. The attributes and sub-attributes extracted from smart hotel online reviews.

Attributes	Sub-Attributes
Bedroom	Space, Window, Air Conditioner, Design, Light, Refrigerator, Sleep, Bedding, Soundproof, Table
Bathroom	Bathroom, Shower, Towel, Bathtub, Hot Water, Shampoo, Hairdryer, Close Stool, Washroom, Body Lotion
Human Service	Check-In, Staff, Room Service, Front Desk, Check-Out, Luggage, Waiter, Reservation, Treatment, Response
Value	Price, Free, Cost-Effective, Cheap, Worth, Charge, Deposit, Affordable, Value, Cost
Facility	Facility, Bar, Lift, Lobby, Gym, Swimming pool, Car park, Spa, Equipment, Sofa
Food	Breakfast, Restaurant, Coffee, Drinks, Bread, Cocktail, Coffeemaker, Dinner, Lunch, Buffet
Location	Location, On Foot, Airport, Metro, Scenery, Station, City Center, Transportation, Convenience Store, Train Station
Smartness	Automated Check-In, Automated Check-Out, Facial Recognition, Dinosaur Robots, Delivery Robots, Smart Television, Tmall Genie, Intelligent system, High Technology, Electric Bed

4.2. Computing Satisfaction Degree of Smart Hotel Attributes

After building the dictionaries, the satisfaction degree of each sub-attribute is calculated by performing sentiment analysis. Since some comments involve multiple sub-attributes, the study divided the comments into attribute-level sentences to improve the accuracy of sentiment analysis. We retained the comments containing the sub-attributes and finally collected 45,209 sentences. According to Liu et al. [49], a review is considered positive when the sentiment score is greater than 0, and the higher the score, the higher the customer satisfaction. If the sentiment score of a review is less than 0, the review is labeled as negative, and the lower the score, the higher the level of customer dissatisfaction. A neutral review indicates that the review's final positive score is equal to the negative score or that no sentiment words were identified. According to the above rules and Equation (1) in Section 3.4, the number of positive and negative comments and average sentiment scores for the sub-attributes under each attribute can be found in Appendix A.1. Table 3 shows the number of positive and negative comments for each attribute, as well as the average sentiment scores.

Table 3. Number of positive and negative comments and average sentiment score for each attribute.

	Po.	Ne.	Sen
Bedroom	1717	1291	1.63727
Bathroom	1363	959	1.85682
Human Service	8427	2575	2.91659
Value	1806	537	2.46139
Facility	2613	945	2.19266
Food	3147	1025	2.58981
Location	5162	934	2.42242
Smartness	2446	696	3.22167

By calculating the sentiment scores for the attribute-level sentences, we can obtain the number of positive and negative comments under each attribute and the satisfaction level (average sentiment score) for each attribute. As shown in Figure 3, the Human Service attribute received both the most positive and negative comments. The Smart attribute, which is distinct from the traditional hotel attributes, did not gain lots of reviews and only ranked fifth. But its proportion of positive reviews ranked second among all attributes, and combined with the data in Appendix A.1, the other smart sub-attributes had far more positive than negative reviews, except for the sub-attribute Dinosaur Robots.

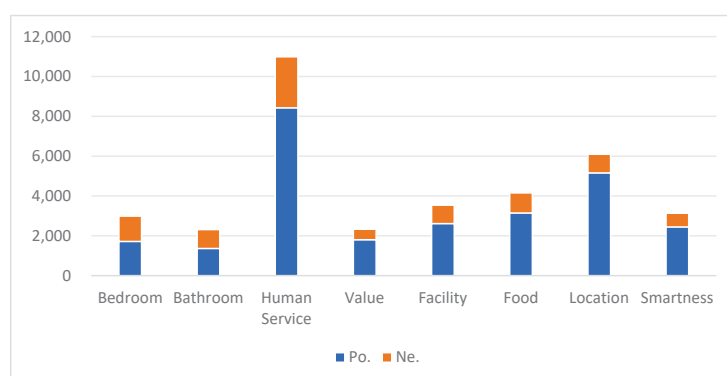


Figure 3. Comparison of positive and negative comments for each attribute. Source: Self-made for this research.

4.3. Improvement Strategy Generation

4.3.1. Opportunity Landscape Map

Following the equations mentioned in Section 3.5, we calculated the opportunity scores of all sub-attributes and ranked them in order from highest to lowest (found in Appendix A.2) and then mapped the opportunity landscape of smart hotel attributes (Figure 4) by SPSS Statistics 27. The opportunity landscape map, derived from the importance and satisfaction values, is divided into three areas: served-right, over-served, and underserved. Needs in the served-right area are considered appropriately satisfied, those in the over-served area are deemed excessively satisfied, and those in the underserved area are viewed as less satisfied relative to their importance [32]. The reference points on the horizontal and vertical axes are the mean values of Importance and Satisfaction.

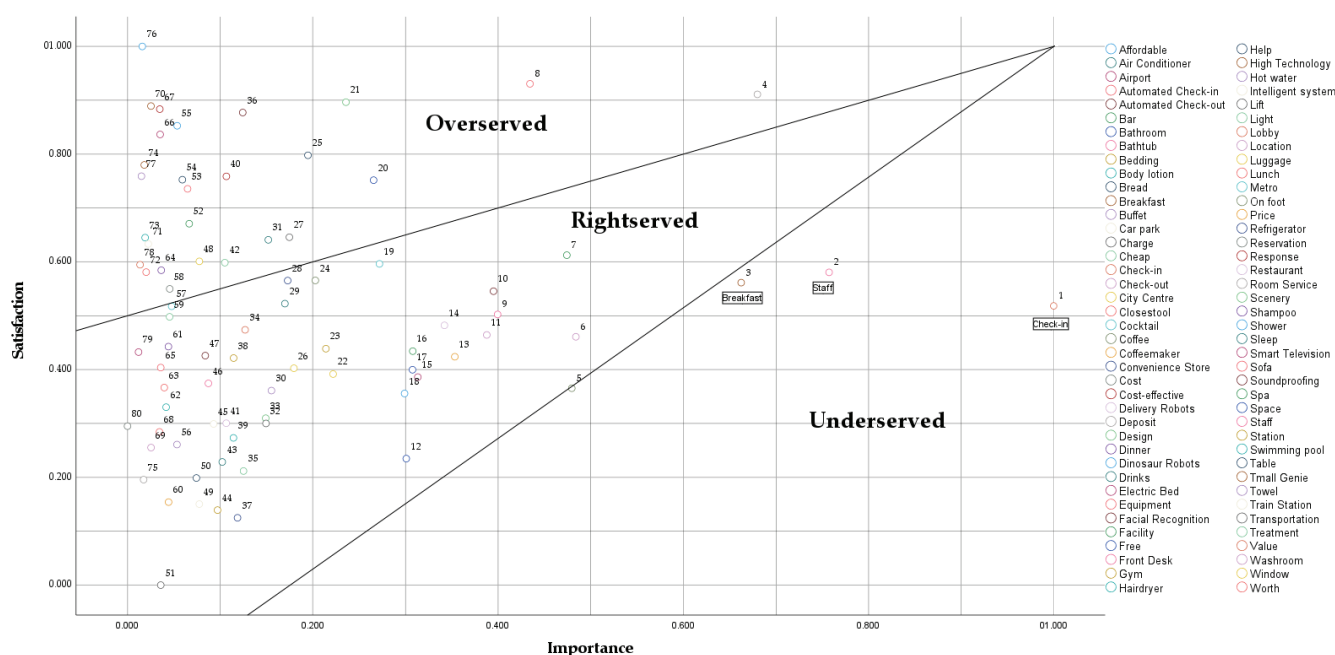


Figure 4. Opportunity landscape map of smart hotel sub-attributes (Number = Opportunity score rank). Source: Self-made for this research.

According to the landscape map, three sub-attributes have high opportunity scores and are located in the under-served category: ‘check-in’, ‘staff’, and ‘breakfast’. Combined with the data from Table A2 (found in Appendix A.2), these 3 sub-attributes rank first, second, and fourth out of 80 sub-attributes in terms of importance to smart hotel customers, but the satisfaction performance is all just at the average level. Therefore, improvements in these three sub-attributes will help smart hotels generate more effective benefits, especially when resources are limited.

4.3.2. Specific Improvement Directions

Although three sub-attributes located in the under-served category were identified using the opportunity landscape map, there is still a need for specific improvement directions. Therefore, the link analysis method proposed in Section 3.5 is utilized to extract the negative sentiment words mentioned by customers for these three sub-attributes. As shown in Figure 5, the ten most frequent negative sentiment words mentioned by customers under these three sub-attributes are displayed, with the width of the line indicating the co-occurrence frequency.

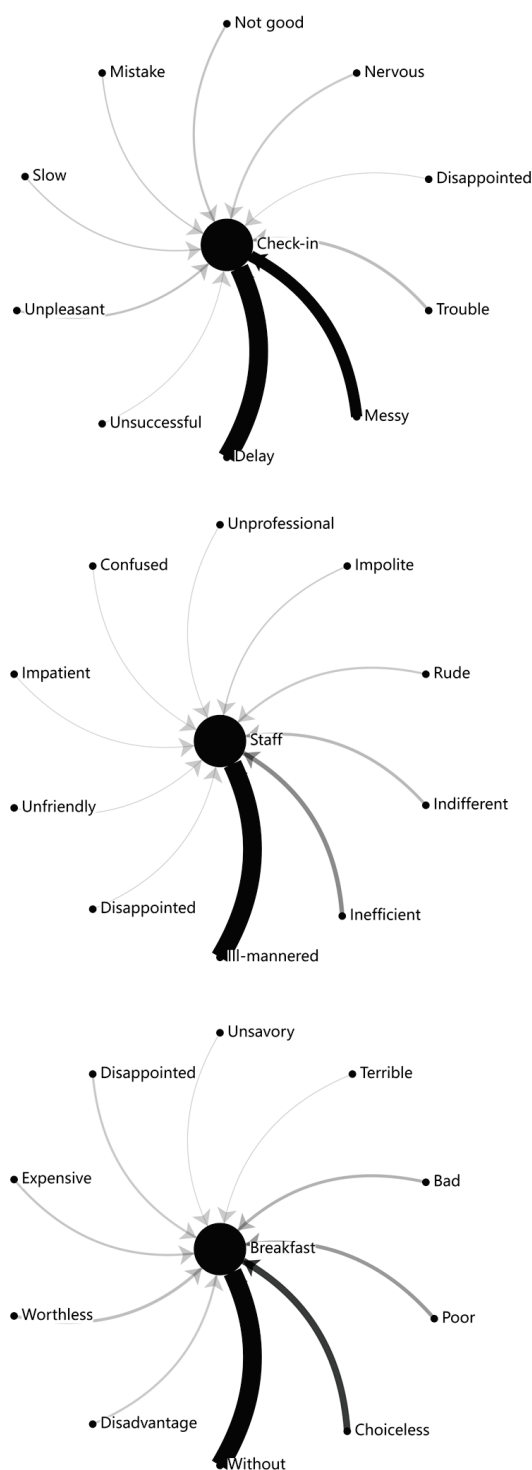


Figure 5. Link analysis of check-in, staff, and breakfast. Source: Self-made for this research.

The link analysis shows that for the sub-attribute 'check-in', which is under the Human-Service attribute, the long wait is the most dissatisfying sub-attribute for customers, with many customers commenting "The disadvantage is that check-in is a bit crowded, and delays are too long", "check-in is too messy and the wait is too long", and so on. Another sub-attribute 'staff' which is also under the Human Service attribute, has problems with the service attitude and ability. Customers reported that some staff in the smart hotels were ill-mannered and could not help when they had problems with the smart equipment. And for the 'breakfast' sub-attribute, the key issues for smart hotels are the absence of offering as well as limited options.

5. Discussion and Conclusions

5.1. Discussion

This study contributes to the existing literature on smart hospitality and tourism by extracting insights from online reviews of smart hotels from a customer perspective. The novel analytical framework proposed in this study can be a valuable tool for stakeholders to understand customers' preferences and needs. Smart technologies can help hotels reduce the negative impact on the environment [10], but it is also necessary for smart hotels to meet customer expectations to ensure the long-term sustainability of the smart hotel industry [9]. The study's findings are beneficial for managers in crafting effective and actionable service improvement strategies for smart hotels.

Through the LDA model, this study identified eight service attributes that matter to guests in smart hotels. It is worth noting that while smart hotels are known for their high-tech and automated services, they are not yet capable of being completely 'unmanned' in reality. Although smart technologies are gradually transforming hotel operations through automation, some traditional hotel attributes cannot be fully replaced by machines. As the results in Figure 3 indicate, the Human Service attribute received the most comments. This finding is consistent with previous research [22,73]; although tourists have a positive attitude toward the use of smart technology in the tourism and hospitality industry, a wide variety of occasions still require human service staff.

Next, sentiment analysis of online reviews effectively revealed the performance of smart hotels at the attribute level. While most smart services are praised rather than complained about by customers, managers still need to understand the double-edged sword effect of technology and remedy the failure of smart services in time [74,75]. As shown in Appendix A.1, the dinosaur robots at the front desk have the lowest ranking among smart technologies, with the number of complaints exceeding the number of positive comments. This suggests that managers should avoid using dinosaur robots at reception counters, as their appearance may mismatch with hospitality standards of professionalism and warmth, making some guests feel uneasy and unwelcome. This finding is also consistent with previous research [76], where the perception of robots' warmth positively impacts customer value co-creation. Thus, robots that do not meet the standards in hospitality (e.g., hospitableness and warmth) will result in value co-destruction, which could harm the customer experience.

Finally, although previous studies have used online reviews to explore the factors that influence the customer experience in smart hotels [77,78], they have been unable to provide prioritization of improvements as well as provide actionable indicators of service improvement. According to the opportunity algorithm and the opportunity landscape map, this study identified three sub-attributes of smart hotels—namely, 'check-in', 'staff', and 'breakfast'—that should be prioritized for improvement. The link analysis results identified specific factors that contribute to customer dissatisfaction, providing valuable insights for managers to develop targeted service improvement strategies. For example, customer dissatisfaction with the sub-attribute 'check-in' is mainly due to the long waiting times. With the development of various technologies in the hotel industry, long waits and slow responses are unacceptable to customers [33]. Therefore, smart hotels that have not yet been equipped with automated kiosks are urged to install them to optimize customer experience [57]. Moreover, managers should train employees on how to provide appropriate alternatives when faced with smart amenity failures, such as providing manual scanning when self-service kiosks are unable to recognize customer identification information, thereby compensating for smart service failures.

5.2. Theoretical Implications

First, this study extends customer satisfaction research in the context of smart hotels. While previous studies have primarily examined satisfaction with smart technology-related attributes and their link to overall satisfaction [14,15], they have largely overlooked customers' experience with non-smart attributes in smart hotels. Effective implementation of smart technologies can significantly improve customer experience and satisfaction [79], while neglecting customers' non-technological needs can lead to serious negative consequences. The findings of this study indicate that non-smart attributes are still important indicators for customers to evaluate the goodness of smart hotel services as well as influencing customer satisfaction. It also reveals a dire need for improvement in non-smart attributes, particularly the "human service" attribute.

Second, this study introduces a new domain-specific sentiment dictionary for the hospitality and tourism industry. By pre-generating the sentiment dictionary for the specific domain, sentiment analysis was performed on smart hotel reviews, providing insights into guest satisfaction with each attribute of the smart hotel. Hence, it makes a significant contribution to text analysis in hospitality and tourism research.

Finally, as one of the first studies to quantify the benefits of improving hotel attributes using the opportunity algorithm, this research provides smart hotel scholars with a novel quantitative approach for prioritizing service enhancements.

5.3. Managerial Implications

In addition to theoretical contributions, this study also provides practical insights that can be applied to managerial practices in smart hotels. This study analyzes customer-generated big data (online reviews) to gain insights into customers' needs and satisfaction with smart hotel products and services, thereby improving service quality and meeting customer expectations. Analyzing online reviews can also enable hotels to optimize operations and reduce operational costs [80].

The findings reveal that even for well-known smart hotel brands, some of their smart hotels are not equipped with self-service kiosks, which has led to the dissatisfaction of many customers. Given that some non-smart hotels are already equipped with self-service terminals and mobile check-in, current smart hotels need to standardize their level of smartness, clarify their uniqueness and competitiveness, and highlight their advantages [81].

Our study's findings also provide valuable guidance for smart hotel managers on resource allocation. While smart technologies such as self-service systems and robotics have positively impacted hotel financial performance [82], the initial investment required to implement these technologies, along with the additional update costs due to the rapid pace of technological change, presents a formidable financial challenge for hotel management. Therefore, when customers perceive a smart technology as unimportant but are highly satisfied with it, managers should reallocate resources from this technology to one of higher importance and lower satisfaction. Meanwhile, due to rapid technological development, the technological competencies of employees need to be adapted and updated, as it directly affects the competitiveness of hospitality organizations [83].

Moreover, to maximize customer satisfaction, managers should adopt a hybrid service model that strikes the right balance between technology and human interaction. For example, they can utilize smart check-ins, delivery robots, and voice assistants for room temperature control to enhance efficiency and convenience. On the other hand, human staff should remain available to provide appropriate customer service, such as addressing technical failures and offering emotional support.

5.4. Limitations and Future Research

First, although the data sources chosen in this research have a higher number of reviews from smart hotels located in Asia (e.g., Flyzoo and Henn-na) compared to Western travel platforms such as Tripadvisor, the results of the study may vary across cultures because Ctrip and Qunar are both Chinese travel platforms. Previous research has demonstrated that customers from different cultures have different expectations and attitudes toward smart technologies [20], so future research could explore how cultural differences affect customers' perceptions of smart hotel service prioritization by integrating online reviews from more travel platforms to obtain insight from other regions and cultures. In addition, future research could consider using qualitative methods such as semi-structured interviews to obtain data. Combining online platform data with interview data can be beneficial in eliminating potential bias in online reviews, as reviewers are more likely to write reviews when they have had an extremely positive or negative experience [84]. Finally, we identified customer satisfaction and preference for different smart hotel attributes from online reviews without considering the impact of demographic variables (e.g., age, gender, occupation, etc.) on customer satisfaction and preference. Future research could incorporate these factors into the study through methods such as questionnaires for a more nuanced view of customer behavior.

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Appendix A

Appendix A.1

Table A1. Number of positive and negative comments and average sentiment score for each sub-attribute.

		Po.	Ne.	Sen
Bedroom	Space	409	281	2.0035
	Window	303	174	1.9718
	Air	225	49	2.9571
	Conditioner			
	Design	154	91	1.6478
	Light	146	154	1.2603
	Refrigerator	114	185	0.9167
	Sleep	103	91	1.3266
	Bedding	91	115	0.9731
	Soundproofing	87	69	2.1071
	Table	85	82	1.2087
		1717	1291	1.63727
Bathroom	Bathroom	352	332	1.351
	Shower	431	233	1.829
	Towel	162	144	1.8505

Table A1. Cont.

		Po.	Ne.	Sen
Bathroom	Bathtub	99	70	1.9034
	Hot Water	60	52	1.4545
	Shampoo	74	16	2.1732
	Hairdryer	66	24	1.7288
	Close Stool	50	43	1.8727
	Washroom	30	33	1.4321
	Body Lotion	39	12	2.973
		1363	959	1.85682
Human Service	Check-In	2590	844	2.4723
	Staff	2065	499	2.7184
	Room Service	1812	329	4.0248
	Front Desk	627	348	2.4092
	Check-Out	645	317	2.2591
	Luggage	349	86	3.5775
	Waiter	107	62	2.799
	Reservation	74	39	2.5969
	Treatment	62	45	2.392
	Response	96	6	3.9167
		8427	2575	2.91659
Value	Price	603	243	2.0988
	Free	576	72	3.3951
	Cost-Effective	211	43	3.4229
	Cheap	183	54	2.7895
	Charge	23	49	0.4227
	Worth	62	19	2.5472
	Deposit	28	25	1.197
	Affordable	57	4	4.3768
	Value	42	16	2.7742
	Cost	21	12	1.5897
		1806	537	2.46139
Facility	Facility	1050	297	2.8444
	Bar	560	165	2.14
	Lift	158	117	1.6094
	Lobby	190	83	2.2965
	Gym	175	60	2.0893
	Swimming	148	73	1.5035
	Pool	63	67	1.0172
	Car Park	106	24	3.0755
	Spa	107	33	3.3314
	Equipment	56	26	2.0194
	Sofa	2613	945	2.19266
Food	Breakfast	1491	491	2.6431
	Restaurant	644	165	2.3293
	Coffee	314	148	2.6591
	Drinks	297	78	2.4887
	Bread	90	29	3.3986
	Cocktail	88	20	2.4692
	Coffeemaker	58	47	1.032
	Dinner	67	20	2.7339
	Lunch	55	11	2.72
	Buffet	43	16	3.4242
		3147	1025	2.58981

Table A1. *Cont.*

		Po.	Ne.	Sen
Location	Location	1164	246	2.2456
	On Foot	859	160	1.868
	Airport	533	157	1.9499
	Metro	526	80	2.7804
	Scenery	545	45	3.9675
	Station	403	65	2.1581
	City Center	327	51	2.0146
	Transportation	361	49	2.9763
	Convenience	296	60	2.6579
	Store	148	21	1.6059
	Train Station	5162	934	2.42242
Smartness	Automated	981	155	4.1025
	Check-In	730	255	2.5799
	Automated	224	40	3.8918
	Check-Out	135	168	1.6111
	Facial	111	16	3.7945
	Recognition	83	10	3.7308
	Dinosaur	56	15	3.939
	Robots	47	17	2.9268
	Delivery	48	6	3.507
	Robots	31	14	2.1333
	Smart	2446	696	3.22167
	Television			
	Tmall Genie			
	Intelligent			
	System			
	High			
	Technology			
	Electric Bed			

*Appendix A.2***Table A2.** Results of attribute satisfaction (sentiment score), importance, and opportunity.

	Satisfaction	Importance	Opportunity
Check-In	0.5183	1	1.4817
Staff	0.5806	0.75736	0.93412
Breakfast	0.5615	0.66246	0.76342
Room Service	0.911	0.67994	0.67994
On Foot	0.3655	0.47959	0.59368
Location	0.461	0.48402	0.50704
Facility	0.6125	0.47425	0.47425
Automated	0.9306	0.43445	0.43445
Check-In	0.5024	0.39948	0.39948
Front Desk	0.5456	0.3951	0.3951
Automated	0.4644	0.38783	0.38783
Check-Out	0.2348	0.3009	0.367
Check-Out	0.4239	0.35333	0.35333
Bathroom	0.4822	0.3421	0.3421
Price	0.3862	0.31338	0.31338
Restaurant			
Airport			

Table A2. Cont.

	Satisfaction	Importance	Opportunity
Bar	0.4343	0.30793	0.30793
Space	0.3998	0.30764	0.30764
Shower	0.3557	0.29908	0.29908
Metro	0.5963	0.27194	0.27194
Free	0.7517	0.26564	0.26564
Scenery	0.8965	0.2358	0.2358
Window	0.3918	0.22196	0.22196
Station	0.4389	0.21415	0.21415
Coffee	0.5656	0.20278	0.20278
Help	0.7979	0.19477	0.19477
City Center	0.4026	0.17963	0.17963
Transportation	0.6458	0.17473	0.17473
Convenience Store	0.5653	0.1729	0.1729
Drinks	0.5225	0.1699	0.1699
Towel	0.3611	0.15536	0.15536
Air Conditioner	0.641	0.15201	0.15201
Lift	0.3001	0.1495	0.1495
Design	0.3098	0.14918	0.14918
Lobby	0.4739	0.12694	0.12694
Light	0.2118	0.12519	0.12519
Facial Recognition	0.8773	0.12438	0.12438
Refrigerator	0.1249	0.11873	0.11873
Gym	0.4215	0.11453	0.11453
Swimming Pool	0.2733	0.11434	0.11434
Cost-Effective	0.7588	0.10671	0.10671
Delivery Robots	0.3005	0.10658	0.10658
Cheap	0.5986	0.10506	0.10506
Sleep	0.2286	0.10227	0.10227
Bedding	0.1392	0.09715	0.09715
Train Station	0.2992	0.09293	0.09293
Bathtub	0.3745	0.08732	0.08732
Soundproofing	0.426	0.08393	0.08393
Luggage	0.601	0.07756	0.07756
Car Park	0.1504	0.07749	0.07749
Table	0.1988	0.07435	0.07435
Charge	0	0.03589	0.07178
Spa	0.6709	0.06659	0.06659
Equipment	0.7356	0.06484	0.06484
Bread	0.7526	0.05923	0.05923
Dinosaur Robots	0.8527	0.05364	0.05364
Hot Water	0.2609	0.05339	0.05339
Cocktail	0.5176	0.04764	0.04764
Reservation	0.5499	0.04557	0.04557
Treatment	0.498	0.0454	0.0454
Coffeemaker	0.1541	0.04431	0.04431
Shampoo	0.4427	0.04413	0.04413
Hairdryer	0.3303	0.04168	0.04168
Close Stool	0.3667	0.03967	0.03967
Dinner	0.5845	0.03643	0.03643
Sofa	0.4038	0.03587	0.03587
Smart Television	0.8366	0.03522	0.03522
Response	0.8836	0.03486	0.03486
Worth	0.2844	0.03448	0.03448
Washroom	0.2553	0.02541	0.02541

Table A2. Cont.

	Satisfaction	Importance	Opportunity
Tmall Genie	0.8893	0.02531	0.02531
Intelligent System	0.6333	0.02241	0.02241
Lunch	0.581	0.02012	0.02012
Body Lotion	0.645	0.01903	0.01903
High Technology	0.78	0.01812	0.01812
Deposit	0.1958	0.01739	0.01739
Affordable	1	0.01592	0.01592
Buffet	0.7591	0.01499	0.01499
Value	0.5947	0.01355	0.01355
Electric Bed	0.4326	0.01191	0.01191
Cost	0.2951	0	0

References

1. Stylos, N.; Fotiadis, A.K.; Shin, D.; Huan, T.T. Beyond smart systems adoption: Enabling diffusion and assimilation of smartness in hospitality. *Int. J. Hosp. Manag.* **2021**, *98*, 103042. [CrossRef]
2. Cheong, F.; Law, R. Human employees versus robotic employees: Customers and hotel managers' perceived experience at unmanned smart hotels. *Cogent Soc. Sci.* **2023**, *9*, 2202937. [CrossRef]
3. Wang, J.; Fu, X. Unveiling the human-robot encounter: Guests' perspectives on smart hotel experience. *J. Hosp. Tour. Technol.* **2024**. [CrossRef]
4. Lim, W.M.; Teh, P.; Ahmed, P.K.; Cheong, S.; Ling, H.; Yap, W. Going keyless for a seamless experience: Insights from a unified hotel access control system. *Int. J. Hosp. Manag.* **2018**, *75*, 105–115. [CrossRef]
5. Kabadayi, S.; Ali, F.; Choi, H.; Joosten, H.; Lu, C. Smart service experience in hospitality and tourism services. *J. Serv. Manag.* **2019**, *30*, 326–348. [CrossRef]
6. Chen, Y.; Xue, T.; Tuomi, A.; Wang, Z. Hotel robots: An exploratory study of Generation Z customers in China. *Tour. Rev.* **2022**, *77*, 1262–1275. [CrossRef]
7. Buhalis, D.; Leung, R. Smart hospitality—Interconnectivity and interoperability towards an ecosystem. *Int. J. Hosp. Manag.* **2018**, *71*, 41–50. [CrossRef]
8. Buhalis, D.; O'Connor, P.; Leung, R. Smart hospitality: From smart cities and smart tourism towards Agile business ecosystems in networked destinations. *Int. J. Contemp. Hosp. Manag.* **2022**, *35*, 369–393. [CrossRef]
9. Casais, B.; Ferreira, L. Smart and sustainable hotels: Tourism agenda 2030 perspective article. *Tour. Rev.* **2023**, *78*, 344–351. [CrossRef]
10. Antonova, N.; Ruiz-Rosa, I.; Mendoza-Jiménez, J. Water resources in the hotel industry: A systematic literature review. *Int. J. Contemp. Hosp. Manag.* **2021**, *33*, 628–649. [CrossRef]
11. Ivars-Baidal, J.A.; Vera-Rebollo, J.F.; Perles-Ribes, J.; Femenia-Serra, F.; Celdrán-Bernabeu, M.A. Sustainable tourism indicators: What's new within the smart city/destination approach? *J. Sustain. Tour.* **2021**, *31*, 1556–1582. [CrossRef]
12. Zhang, C.; Xu, Z.; Gou, X.; Chen, S. An online reviews-driven method for the prioritization of improvements in hotel services. *Tour. Manag.* **2021**, *87*, 104382. [CrossRef]
13. Song, Y.; Liu, K.; Guo, L.; Yang, Z.; Jin, M. Does hotel customer satisfaction change during the COVID-19? A perspective from online reviews. *J. Hosp. Tour. Manag.* **2022**, *51*, 132–138. [CrossRef]
14. Luo, J.M.; Vu, H.Q.; Li, G.; Law, R. Understanding service attributes of robot hotels: A sentiment analysis of customer online reviews. *Int. J. Hosp. Manag.* **2021**, *98*, 103032. [CrossRef]
15. Wu, H.; Cheng, C. Relationships between technology attachment, experiential relationship quality, experiential risk and experiential sharing intentions in a smart hotel. *J. Hosp. Tour. Manag.* **2018**, *37*, 42–58. [CrossRef]
16. Chiang, C.; Chen, W.; Hsu, C. Classifying technological innovation attributes for hotels: An application of the Kano model. In *Future of Tourism Marketing*; Routledge: London, UK, 2021; pp. 28–39. [CrossRef]
17. Yang, T.; Wu, J.; Zhang, J. Knowing how satisfied/dissatisfied is far from enough: A comprehensive customer satisfaction analysis framework based on hybrid text mining techniques. *Int. J. Contemp. Hosp. Manag.* **2023**, *36*, 873–892. [CrossRef]
18. Yang, H.; Song, H.; Cheung, C.; Guan, J. How to enhance hotel guests' acceptance and experience of smart hotel technology: An examination of visiting intentions. *Int. J. Hosp. Manag.* **2021**, *97*, 103000. [CrossRef]
19. Kim, J.J.; Han, H. Hotel service innovation with smart technologies: Exploring consumers' readiness and behaviors. *Sustainability* **2022**, *14*, 5746. [CrossRef]
20. Koç, E.; Yazıcı Ayyıldız, A.; Baykal, M. Tourist behavior after service robots. *J. Multidiscip. Acad. Tour.* **2024**, *9*, 87–98. [CrossRef]

21. Wang, L.; Rau, P.P.; Evers, V.; Robinson, B.K.; Hinds, P. When in Rome: The role of culture & context in adherence to robot recommendations. In Proceedings of the 2010 5th ACM/IEEE International Conference on Human-Robot Interaction (HRI), Osaka, Japan, 2–5 March 2010; pp. 359–366. [CrossRef]
22. Ayyıldız, A.Y.; Baykal, M.; Koç, E. Attitudes of hotel customers towards the use of service robots in hospitality service encounters. *Technol. Soc.* **2022**, *70*, 101995. [CrossRef]
23. Kim, J.J.; Han, H. Hotel of the future: Exploring the attributes of a smart hotel adopting a mixed-methods approach. *J. Travel Tour. Mark.* **2020**, *37*, 804–822. [CrossRef]
24. Yan, Z.; Balasubramanian, K.; Konar, R.; Chen, L.; Wei, Y. Smart hotel in the eyes of the silver: Developing and testing the silver tourists' behavioural intention scale. *Curr. Issues Tour.* **2024**, *7*, 1–20. [CrossRef]
25. Dai, A.; Zhang, J.; Pai, C.K.; Lee, T.J. The impact of the perception of smart hotel attributes and perceptions of service innovation on tourist happiness and brand loyalty. *Int. J. Hosp. Manag.* **2025**, *127*, 104107. [CrossRef]
26. Kim, J.J.; Lee, M.J.; Han, H. The psychology of vacationers' hotel brand choice in a post-pandemic world. *J. Vacat. Mark.* **2022**, *29*, 206–221. [CrossRef]
27. Srivastava, A.; Kumar, V. Hotel attributes and overall customer satisfaction: What did COVID-19 change? *Tour. Manag. Perspect.* **2021**, *40*, 100867. [CrossRef]
28. Füller, J.; Matzler, K. Customer delight and market segmentation: An application of the three-factor theory of customer satisfaction on life style groups. *Tour. Manag.* **2008**, *29*, 116–126. [CrossRef]
29. Zhang, C.; Xu, Z. Gaining insights for service improvement through unstructured text from online reviews. *J. Retail. Consum. Serv.* **2024**, *80*, 103898. [CrossRef]
30. Violante, M.G.; Vezzetti, E. Kano qualitative vs quantitative approaches: An assessment framework for products attributes analysis. *Comput. Ind.* **2017**, *86*, 15–25. [CrossRef]
31. Ulwick, A. *What Customers Want: Using Outcome-Driven Innovation to Create Breakthrough Products and Services*; McGraw Hill Professional: New York, NY, USA, 2005.
32. Jeong, B.; Yoon, J.; Lee, J. Social media mining for product planning: A product opportunity mining approach based on topic modeling and sentiment analysis. *Int. J. Inf. Manag.* **2019**, *48*, 280–290. [CrossRef]
33. Özen, İ.A.; Özgül Katlav, E. Aspect-based sentiment analysis on online customer reviews: A case study of technology-supported hotels. *J. Hosp. Tour. Technol.* **2023**, *14*, 102–120. [CrossRef]
34. Zarezadeh, Z.Z.; Rastegar, R.; Xiang, Z. Big data analytics and hotel guest experience: A critical analysis of the literature. *Int. J. Contemp. Hosp. Manag.* **2022**, *34*, 2320–2336. [CrossRef]
35. Fan, Z.; Li, G.; Liu, Y. Processes and methods of information fusion for ranking products based on online reviews: An overview. *Inf. Fusion* **2020**, *60*, 87–97. [CrossRef]
36. Bigorra, A.M.; Isaksson, O.; Karlberg, M. Aspect-based Kano categorization. *Int. J. Inf. Manag.* **2019**, *46*, 163–172. [CrossRef]
37. Ji, F.; Cao, Q.; Li, H.; Fujita, H.; Liang, C.; Wu, J. An online reviews-driven large-scale group decision making approach for evaluating user satisfaction of sharing accommodation. *Expert Syst. Appl.* **2023**, *213*, 118875. [CrossRef]
38. Campbell, J.C.; Hindle, A.; Stroulia, E. Latent Dirichlet allocation. In *The Art and Science of Analyzing Software Data*; Morgan Kaufmann: Burlington, MA, USA, 2015; pp. 139–159. [CrossRef]
39. Blei, D.M.; Ng, A.Y.; Jordan, M.I. Latent Dirichlet allocation. *J. Mach. Learn. Res.* **2003**, *3*, 993–1022.
40. Guo, Y.; Barnes, S.J.; Jia, Q. Mining meaning from online ratings and reviews: Tourist satisfaction analysis using latent dirichlet allocation. *Tour. Manag.* **2017**, *59*, 467–483. [CrossRef]
41. Ahani, A.; Nilashi, M.; Zogaan, W.A.; Samad, S.; Aljehane, N.O.; Alhargan, A.; Mohd, S.; Ahmadi, H.; Sanzogni, L. Evaluating medical travelers' satisfaction through online review analysis. *J. Hosp. Tour. Manag.* **2021**, *48*, 519–537. [CrossRef]
42. Sam, S.J.I.; Jasim, K.M.; Babu, M. Customers' metaverse service encounter perceptions: Sentiment analysis and topic modeling. *J. Hosp. Mark. Manag.* **2024**, *34*, 92–114. [CrossRef]
43. Bi, J.; Liu, Y.; Fan, Z.; Zhang, J. Exploring asymmetric effects of attribute performance on customer satisfaction in the hotel industry. *Tour. Manag.* **2020**, *77*, 104006. [CrossRef]
44. Wu, J.; Zhao, N. What consumer complaints should hoteliers prioritize? Analysis of online reviews under different market segments. *J. Hosp. Mark. Manag.* **2022**, *32*, 1–28. [CrossRef]
45. Zhao, M.; Liu, M.; Xu, C.; Zhang, C. Classifying travellers' requirements from online reviews: An improved Kano model. *Int. J. Contemp. Hosp. Manag.* **2023**, *36*, 91–112. [CrossRef]
46. Liu, B.; Zhang, L. A survey of opinion mining and sentiment analysis. In *Mining Text Data*; Springer: Boston, MA, USA, 2012; pp. 415–463. [CrossRef]
47. Yu, Y.; Chen, J.; Mehraliyev, F.; Hu, S.; Wang, S.; Liu, J. Exploring the diversity of emotion in hospitality and tourism from big data: A novel sentiment dictionary. *Int. J. Contemp. Hosp. Manag.* **2024**, *36*, 4237–4257. [CrossRef]

48. Zhang, H.; Gan, W.; Jiang, B. Machine learning and lexicon based methods for sentiment classification: A survey. In Proceedings of the 2014 11th Web Information System and Application Conference, Tianjin, China, 12–14 September 2014; pp. 262–265. [CrossRef]
49. Liu, Y.; Huang, K.; Bao, J.; Chen, K. Listen to the voices from home: An analysis of Chinese tourists' sentiments regarding Australian destinations. *Tour. Manag.* **2019**, *71*, 337–347. [CrossRef]
50. Wu, S.; Xu, Y.; Wu, F.; Yuan, Z.; Huang, Y.; Li, X. Aspect-based sentiment analysis via fusing multiple sources of textual knowledge. *Knowl.-Based Syst.* **2019**, *183*, 104868. [CrossRef]
51. Nie, R.; Tian, Z.; Wang, J.; Chin, K.S. Hotel selection driven by online textual reviews: Applying a semantic partitioned sentiment dictionary and evidence theory. *Int. J. Hosp. Manag.* **2020**, *88*, 102495. [CrossRef]
52. Wu, H.; Xu, K.; Hu, T.; He, B.; Xie, D. 'Instant noodle crisis': Understanding tourist and public sentiments towards collective tourist environmentally irresponsible behaviour in a tourist destination in China. *Curr. Issues Tour.* **2023**, *27*, 4391–4409. [CrossRef]
53. Xu, Y.; Li, S.; Law, R.; Jin, Y.; Lyu, Z. How does the COVID-19 pandemic influence tourist rating behaviour? An empirical exploration based on expectation theory. *Curr. Issues Tour.* **2023**, *26*, 4052–4068. [CrossRef]
54. Wang, Z.; Zhang, S.; Liu, W. When a villager is a rural homestay operator: Role expectation research using the machine learning model? *Curr. Issues Tour.* **2024**, *28*, 1002–1020. [CrossRef]
55. Wang, W.; Ying, S.; Lyu, J.; Qi, X. Perceived image study with online data from social media: The case of boutique hotels in China. *Ind. Manag. Data Syst.* **2019**, *119*, 950–967. [CrossRef]
56. Davari, D.; Vayghan, S.; Jang, S.; Erdem, M. Hotel experiences during the COVID-19 pandemic: High-touch versus high-tech. *Int. J. Contemp. Hosp. Manag.* **2022**, *34*, 1312–1330. [CrossRef]
57. Wong, I.A.; Zhang, T.; Lin, Z.; Peng, Q. Hotel AI service: Are employees still needed? *J. Hosp. Tour. Manag.* **2023**, *55*, 416–424. [CrossRef]
58. Rabadán-Martín, I.; Barcos-Redín, L.; Pereira-Delgado, J.; Aguado-Correa, F.; Padilla-Garrido, N. Topic-based engagement analysis: Focusing on hotel industry Twitter accounts. *Tour. Manag.* **2025**, *106*, 104981. [CrossRef]
59. Sarkar, D. *Text Analytics with Python: A Practitioner's Guide to Natural Language Processing*; Apress: Berkeley, CA, USA, 2019. [CrossRef]
60. Kaveski Peres, C.; Pacheco Paladini, E. Exploring the attributes of hotel service quality in Florianópolis—SC, Brazil: An analysis of TripAdvisor reviews. *Cogent Bus. Manag.* **2021**, *8*, 1926211. [CrossRef]
61. Albayrak, T.; Dursun-Cengizci, A.; Fong, L.H.N.; Caber, M. The changing role of hotel attributes in destination competitiveness throughout a crisis. *Int. J. Contemp. Hosp. Manag.* **2024**, *36*, 3264–3282. [CrossRef]
62. Tian, C.; Zhang, J.; Liu, D.; Wang, Q.; Lin, S. Technological topic analysis of standard-essential patents based on the improved latent Dirichlet allocation (LDA) model. *Technol. Anal. Strat. Manag.* **2022**, *36*, 2084–2099. [CrossRef]
63. An, Q.; Ma, Y.; Du, Q.; Xiang, Z.; Fan, W. Role of user-generated photos in online hotel reviews: An analytical approach. *J. Hosp. Tour. Manag.* **2020**, *45*, 633–640. [CrossRef]
64. Li, R.; Li, Y.; Ruan, W.; Zhang, S.; Wang, M. Sentiment mining of online reviews of peer-to-peer accommodations: Customer emotional heterogeneity and its influencing factors. *Tour. Manag.* **2023**, *96*, 104704. [CrossRef]
65. Lee, S.; Hong, S.; Kim, J.; Meng, Z.M. Exploring the role of ethical experiences and psychological well-being in travel satisfaction: An animal welfare perspective in elephant-based tourism. *Tour. Manag. Perspect.* **2024**, *51*, 101248. [CrossRef]
66. Wu, D.C.; Zhong, S.; Song, H.; Wu, J. Do topic and sentiment matter? Predictive power of online reviews for hotel demand forecasting. *Int. J. Hosp. Manag.* **2024**, *120*, 103750. [CrossRef]
67. Qin, M.; Sun, M.; Li, J. Impact of environmental regulation policy on ecological efficiency in four major urban agglomerations in eastern China. *Ecol. Indic.* **2021**, *130*, 108002. [CrossRef]
68. Hu, T.; Chen, H. Little-known leisure places: Chinese tourists' preferences for visiting niche tourism destinations. *Asia Pac. J. Tour. Res.* **2023**, *28*, 1261–1278. [CrossRef]
69. Li, J.; Xu, L.; Tang, L.; Wang, S.; Li, L. Big data in tourism research: A literature review. *Tour. Manag.* **2018**, *68*, 301–323. [CrossRef]
70. Zhang, J.; Lu, X.; Liu, D. Deriving customer preferences for hotels based on aspect-level sentiment analysis of online reviews. *Electron. Commer. Res. Appl.* **2021**, *49*, 101094. [CrossRef]
71. Hu, F.; Teichert, T.; Deng, S.; Liu, Y.; Zhou, G. Dealing with pandemics: An investigation of the effects of COVID-19 on customers' evaluations of hospitality services. *Tour. Manag.* **2021**, *85*, 104320. [CrossRef] [PubMed]
72. Wu, J.; Yang, T.; Zhou, Z.; Zhao, N. Consumers' affective needs matter: Open innovation through mining luxury hotels' online reviews. *Int. J. Hosp. Manag.* **2023**, *114*, 103556. [CrossRef]
73. Tuomi, A.; Tussyadiah, I.P.; Stienmetz, J. Applications and implications of service robots in hospitality. *Cornell Hosp. Q.* **2020**, *62*, 232–247. [CrossRef]
74. Pitardi, V.; Wirtz, J.; Paluch, S.; Kunz, W.H. Service robots, agency and embarrassing service encounters. *J. Serv. Manag.* **2021**, *33*, 389–414. [CrossRef]

75. Borghi, M.; Mariani, M.M. Asymmetrical influences of service robots' perceived performance on overall customer satisfaction: An empirical investigation leveraging online reviews. *J. Travel Res.* **2023**, *63*, 1086–1111. [CrossRef]
76. Zhang, X.; Balaji, M.; Jiang, Y. Robots at your service: Value facilitation and value Co-creation in restaurants. *Int. J. Contemp. Hosp. Manag.* **2022**, *34*, 2004–2025. [CrossRef]
77. Qi, H.; Mo, R. Exploring customer experience of smart hotel: A text big data mining approach. *E3S Web Conf.* **2021**, *251*, 01034. [CrossRef]
78. Kaewkamol, P.; Chen, Y. Customer satisfaction factors of smart hotels based on customer reviews in online platform. In Proceedings of the 2023 Joint International Conference on Digital Arts, Media and Technology with ECTI Northern Section Conference on Electrical, Electronics, Computer and Telecommunications Engineering (ECTI DAMT & NCON), Phuket, Thailand, 22–25 March 2023; pp. 43–46. [CrossRef]
79. Elshaer, A.M.; Marzouk, A.M. Memorable tourist experiences: The role of smart tourism technologies and hotel innovations. *Tour. Recreat. Res.* **2022**, *49*, 445–457. [CrossRef]
80. Iranmanesh, M.; Ghobakhloo, M.; Nilashi, M.; Tseng, M.; Yadegaridehkordi, E.; Leung, N. Applications of disruptive digital technologies in hotel industry: A systematic review. *Int. J. Hosp. Manag.* **2022**, *107*, 103304. [CrossRef]
81. Song, B.; Xia, H.; Law, R.; Muskat, B.; Li, G. Discovery of smart hotels' competitiveness based on online reviews. *Int. J. Hosp. Manag.* **2024**, *123*, 103926. [CrossRef]
82. Yağmur, Y.; Demirel, A.; Kılıç, G.D. Top quality hotel managers' perspectives on smart technologies: An exploratory study. *J. Hosp. Tour. Insights* **2023**, *7*, 1501–1531. [CrossRef]
83. Hsu, H.; Tseng, K. Facing the era of smartness: Constructing a framework of required technology competencies for hospitality practitioners. *J. Hosp. Tour. Technol.* **2022**, *13*, 500–526. [CrossRef]
84. Rouliez, P.; Tojib, D.; Tsarenko, Y. The influence of online review exposure on reviewers' intensity level of negative word of mouth. *J. Hosp. Tour. Res.* **2019**, *43*, 712–733. [CrossRef]

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Grosspeteranlage 5
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