Oh I remember the beauty and aesthetics of guilin!: Exploring the implications of memorability on tourist loyalty through a two-wave panel data

Ethan(Yi) Cao [a], Kim Mee Chong [b], Lei Pan [c,*], Luo Ning [d,**], Fang (Diana) Pan [e], Katherine (Ke) Li [b]

[a] *Guangxi Normal University, China*
[b] *SEGi University, Malaysia*
[c] *Hainan Medical University, Malaysia*
[d] *Director of the Department of Tourism Management, Guangxi Normal University, China*
[e] *Vice dean of the Teachers College for Vocational Education, Guangxi Normal University, China*

A B S T R A C T

The travel and tourism industry is among most severely impacted by natural disasters, terrorism, financial crises, and pandemics. Scholars are currently paying attention to how to revive tourism and establish tourist loyalty in the post-pandemic era. Aesthetics is a fundamental component of the tourist experience, and significantly affects tourist loyalty, intention, and behavior. However, research on destination aesthetics is limited, with most studies neglecting the role of memorability in the outcomes of aesthetics, particularly after the pandemic. Therefore, this study explores the mediating role of memorability in the effects of the aesthetic experiential qualities (scenery, cleanliness, harmony, art/architecture, and genuineness) of a nature-based tourism destination on tourist loyalty. Based on a two-wave panel data approach, 509 survey responses were collected and analyzed using Smarts. The findings indicate that the aesthetic experiential qualities positively affect tourists' memorability. Although three of the five aesthetic qualities (scenery, harmony, art/architecture) demonstrated no direct impact on loyalty, all the qualities had significant indirect effects on loyalty through the mediation of memorability. This study provides insights and new perspectives for promoting tourist loyalty in the context of post-pandemic tourism recovery.

1. Introduction

The COVID-19 pandemic has been a shocking phenomenon that has had detrimental effects penetrating every sector and layer of society [1]. In particular, the tourism industry is vulnerable to crises such as natural disasters, political instability, and global health pandemics. A wealth of scholarly research has highlighted the significant transformation of tourism during the COVID-19 pandemic [2, 3]. The World Tourism Organization (WTO) has since called for governments to respond rapidly and strongly with measures to combat the growing magnitude and scope of the pandemic's impact on the tourism industry. For example, most countries have implemented economic stimulus packages to save their tourism economies. In fact, scholars are optimistic that tourism will bounce back and recover from this crisis [4].

* Corresponding author.
** Corresponding author.
E-mail addresses: Ethan_tsao@outlook.com, Ethancao@gxnu.edu.cn (E. Cao), chongkimmee@segi.edu.my (K.M. Chong), leipanhn@foxmail.com (L. Pan), 541525238@QQ.com, luonig@gxnu.edu.cn (L. Ning), 215854160@QQ.com, panfang@gxnu.edu.cn (F.(D. Pan), 3027344417@qq.com (K.(K. Li).

Although tourism recovery still faces numerous challenges following the COVID-19 pandemic [5–7], recent efforts have shed light on the mechanisms through which such recovery can take place. For example, in terms of destination recovery, Zenker and Kock (2020) found that perceived safety and destination quality significantly influence destination image and tourist intentions [1]. Other studies [8,9] suggest that building trust, sustainability, and responsibility can enhance destination image and visibility, thereby fostering tourist loyalty. While building loyalty should always be a central priority, especially during uncertain times like the COVID-19 pandemic [10–12], most studies have only focused on how the environment, facilities, and infrastructure affect values and loyalty. In contrast, there is a lack of research that delves into aesthetics experiential qualities (AEQs) as predictors of tourist loyalty and, more importantly, the role of memorability as a vital intermediary of tourist loyalty. Although some studies have acknowledged the importance of aesthetics in tourism [13,14], most of them are in cross-sectional nature [15]. Thus, there is a need for more conducing comprehensive research that explores the determinants that affect tourist's loyalty.

To address the aforementioned gaps, this study uniquely emphasizes the crucial role of aesthetics and its interconnectedness with memorability and loyalty in tourism. Using a quantitative research design, the study employs a two-wave panel data approach through survey questionnaires to examine the relationship between these variables. As discussed, the research questions of this study are: *What are the determinants that affecting tourists' loyalty and how does memorability play a role?* Aesthetics, encompassing elements such as viewing, harmony, and sensory etc., play a crucial role in enhancing the overall tourist experience. Memorability, on the other hand, refers to the lasting impression of an experience or destination and its impact on repeat visits and positive word-of-mouth recommendations. By analyzing the collected data, this study seeks to shed light on the factors that drive loyalty among tourists and elucidate the specific role played by memorability in fostering such loyalty.

Overall, the primary goal of this study is to investigate and assess the influence of aesthetics and memorability on fostering tourist loyalty. While aesthetics, referring to the visual and sensory appeal of a destination or experience, has been a focal point in the field of tourism research, the aspect of memorability, which pertains to the ability of tourists to vividly recall and reminisce about their experiences, has often been overlooked. This study aims to shed light on the role of both aesthetics and memorability as essential factors that contribute to the formation and sustenance of tourist loyalty.

The study recognizes that in today's dynamic and challenging tourism landscape, where factors like competition, changing travel patterns, and unforeseen circumstances (e.g., natural disasters, pandemics) can impact the industry, cultivating and maintaining tourist loyalty becomes increasingly crucial for destinations and businesses. Therefore, understanding the mechanisms through which aesthetics and memorability impact tourist loyalty is of paramount importance.

The findings of this study give a more objective and comprehensive picture about how and why certain factors affect travelers and tourism industry on a whole. Given that the pandemic is now a thing of the past, and endemic or post-pandemic has necessitated all sectors to adjust to the new norm, updated and timely research is necessary to enrich existing scholarship. The findings of this study thus offer valuable insights and new perspectives for post-epidemic tourism destination recovery.

For this study, Guilin was chosen as the case study destination for several reasons. Firstly, Guilin is a nature-based tourist destination, which aligns with the focus of this study on aesthetics in nature-based tourism. Additionally, Guilin is considered a bellwether of China's tourism industry. Located in the south of China, Guilin is a regular setting for the United Nations World Tourism Organization/Asia-Pacific Tourism Association International Forum on Tourism Trends and Prospects [16]. Finally, Guilin is one of China's most popular tourist destinations [17], with high annual visitor numbers, as shown in Fig. 1.

2. Literature review and hypothesis development

2.1. Tourist loyalty

Loyalty in tourism is a complex construct that includes both behavioral and attitudinal components. Revisiting and recommending a destination are the most commonly used indicators of loyalty [18], which are traditionally measured using behavioural, attitudinal, or composite measures. Behavioral loyalty is often interpreted as the number of recurring visits to a destination [19]. Meanwhile, attitudinal loyalty is the strongest form of loyalty and refers to the positive feelings towards a destination based on emotional
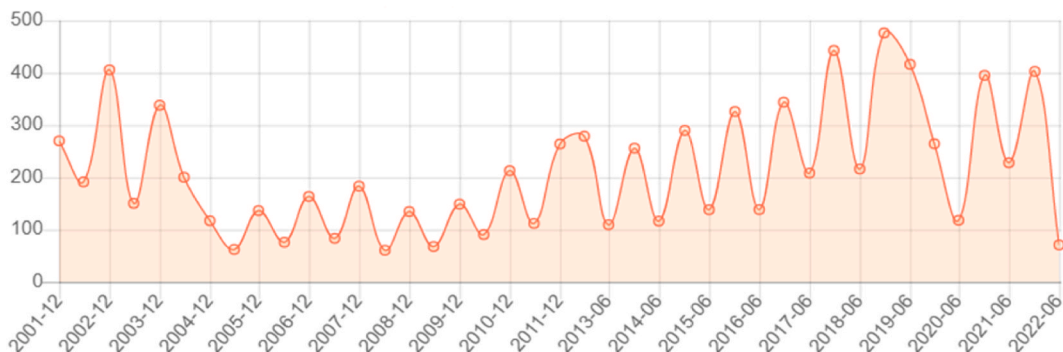

Fig. 1. Visitor numbers in Guilin (in 10,000), 2001–2022.

attachment. These feelings manifest as tourists' eagerness and willingness to recommend the destination to others, even if they do not revisit themselves [20]. Numerous studies [9,21,22]have proposed elaborate models of structural relationships that define destination loyalty in terms of revisit and recommendation intentions. However, Breiby and Slåtten (2018) and Sthapit et al. (2019) suggested that loyalty includes not only the intention to revisit and recommend, but also the intention to visit other similar destinations and engage in positive word-of-mouth communication [23,24].

2.2. Aesthetics experiential qualities (AEQs)

The definition of aesthetics or AEQs lacks consensus in the literature [13,14,25]. In tourism, aesthetics may possess specific characteristics. Tourists have the opportunity to immerse themselves in an environment that differs from their everyday life during a tourism experience, making them more sensitive to external stimuli and allowing for a more complex interaction with the environment. As a result, the aesthetic criteria that researchers use to evaluate everyday environments may vary from those that tourists use to evaluate destinations as beautiful [26].

Tourism research indicates that the AEQs of a destination may affect tourists' loyalty through their experiences. Several studies [14, 23,25–27] have recognized the importance of AEQs and shown that the quality of the aesthetic experience influences satisfaction and the intention to recommend a destination. Tourists may recommend a destination or business to others if they are satisfied with it. However, they may not return to the same destination even if the experience was once-in-a-lifetime. Table 1 summarizes previous studies on AEQs and illustrates the relationship between aesthetic dimensions and loyalty. Based on prior research, five AEQs were selected for examination in this study: scenery/views, cleanliness, harmony, art/architecture, and genuineness.

As one of the most important AEQs, the scenery/view of a destination encompasses its views and photo points along the road, cultural landscapes (e.g., farms, old towns, etc.), and natural attractions [28]. Scenery and landscapes with natural aesthetic values are not only as attractive as urban landscapes, but also offer a sense of fascination, such as when driving down a narrow, winding road. Breiby and Slåtten (2018) have shown that scenery directly increases tourist satisfaction, through which it indirectly encourages the intentions to recommend the place to others and to visit similar places [23]. Previous studies [26,29,30] support that scenery/view affects loyalty. Thus, the following hypothesis was proposed.

H1a. There is a positive correlation between scenery and tourist loyalty.

In the context of tourism, cleanliness is embodied in the ability to breathe fresh and clean air, experience unspoiled nature, observe a pristine landscape, and walk on clean and well-maintained paths [26]. It is also important to note that the World Heritage Site (2022) links clean aesthetics to sustainable tourism development and tourism impacts on the environment [31]. Breiby and Slåtten (2018) have shown that a clean environment affects tourists' intention and frequency of visiting similar routes [23]. Thus, it was hypothesized that.

H1b. There is a positive correlation between Cleanliness and tourist loyalty.

Harmony is a result of the interaction between nature and the individual [28]. Previous research on environmental psychology has established harmony as a significant dimension of AEQs [32], which has been corroborated by empirical studies in tourism [23,29]. For example, when visitors stay in a place where they are in close proximity to nature and where the business's architecture blends seamlessly with the landscape, they feel a sense of "oneness" with nature. Breiby and Slåtten (2018) and other studies have demonstrated that tourists' perception of harmony has a positive impact on their decisions about their destination [23]. Therefore, the following hypothesis was formulated.

H1c. There is a positive correlation between Harmony and tourist loyalty.

Table 1
Summary of AEQs.

Papers	Dimensions					
	Harmony	Variation/contrast	Scenery/views	Genuine-ness	Art/architecture	Cleanliness
Breiby & Slåtten (2015)	X	X	X	X		X
Breiby (2015)	X		X	X		X
Loyalty:						
Recommend						
Revisit						
Visit similar roads						
Breiby (2018)	X		X	X	X	X
Loyalty:						
Revisit						
Visit similar roads						
Zhang & Xu (2020)	X					
Loyalty:						
Recommend						
Revisit						
Visit similar roads						

X = Suggested dimension of aesthetic experiential qualities.

Art/architecture is an aesthetic dimension that adds unique design features to tourism businesses, reflecting how art can offer tourists a new experience of nature [30]. Tourists have shown a particular interest in this dimension, as highlighted in the research of Breiby (2014; 2015) [30] [28]. However, Breiby's (2018) study in a nature-based context found no significant effect of art and architecture on loyalty [23]. Nevertheless, it is suggested that this relationship should be explored further in different contexts. Thus, the following hypothesis was proposed.

H1d. There is a positive correlation between Art/architecture and tourist loyalty.

Genuineness is a dimension that emphasizes the desire for authentic and local experiences, such as trying traditional food and meeting friendly locals [30]. The feeling of authenticity can also depend on other factors such as the overall theme, design, or art. Previous research has highlighted the importance of local food and beverage, local craftsmanship, and unique accommodation for this AEQ [33,34]. Additionally, Sthapit et al. (2017) found that emotions related to food consumption play a crucial role in tourists' memories, which in turn influence their attachment and behavioral intentions towards a place [35]. Access to cultural heritage, a sense of the place's atmosphere, and avoiding overcrowding by other tourists are also important for experiencing genuineness in a man-made environment. Notably, Breiby and Slåtten (2018) have revealed that genuineness positively impacts tourist loyalty in terms of revisiting [23]. Thus, it was hypothesized that.

H1e. There is a positive correlation between Genuineness and tourist loyalty.

2.3. Memorability

According to Merriam-Webster (2021), memorability refers to the ability of an experience to be easily remembered and worth remembering [36]. The literature on memory has identified several factors that increase the memorability of an event, including emotions, cognitive evaluations, and novel experiences. Correspondingly, Kim et al. (2012) defined memorable experiences as those that involve sociable, pleasant, happy, irritated, guilty, sad, and worried emotions that are retained in an individual's memory [37]. People remember both positive and negative emotions, even if they cannot vividly recall their previous experiences. Individuals' evaluations of their cognitive functioning, including meaningfulness and challenge, have also been found to enhance memory recall. Memory influences consumer choices and creates future purchases by influencing the consumer decision process, as shown in the marketing literature.

In recent years, tourism experiences have become increasingly important due to increasing competition [38,39]. Given that Pine et al. (1999) identified aesthetics, education, entertainment, and escapism as the four areas of experience in the advent of the experience economy era, aesthetics can affect tourists' memorability of a particular destination [40]. Studies have shown that a tourist's memory of a place or an unforgettable event can affect their likelihood of revisiting the destination [41,42]. The goal of a
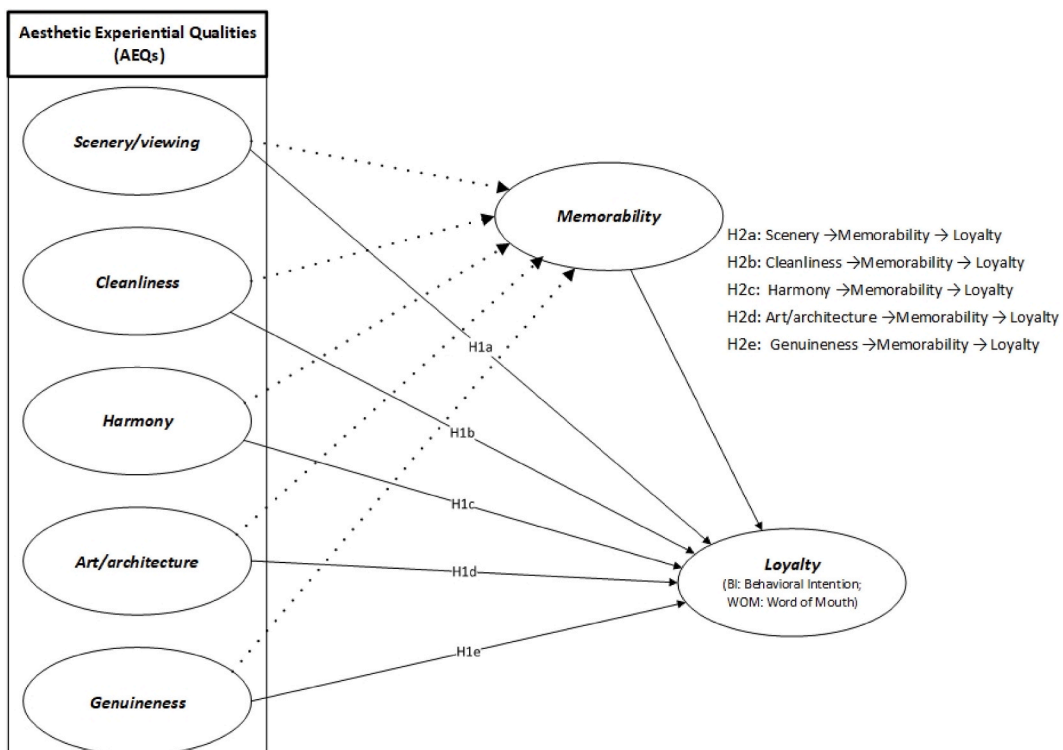

Fig. 2. Conceptual framework.

tourism experience is to create a lasting memory that tourists can recall and share on their social networks [41,43]. Therefore, providing an unforgettable experience for tourists is necessary to gain a competitive advantage in the market.

While Sthapit and Coudounaris (2018) found no significant effects of hedonistic factors, local culture, and meaningfulness on memory, other studies indicate that hedonistic experiences like immersing in local culture may increase memorability [44]. Another study by Sthapit et al. (2019) found that memorability has a direct influence on behavioral intention when a trip experience is memorable [24]. Consistent with other studies, this finding indicates that tourists' past experiences (e.g., aesthetics experiences) influence their decision to return to a tourist destination by being memorable.

Based on the above discussion, the following hypotheses were established.

H2a. Memorability mediates the relationship between scenery and tourist loyalty.

H2b. Memorability mediates the relationship between cleanliness and tourist loyalty.

H2c. Memorability mediates the relationship between harmony and tourist loyalty.

H2d. Memorability mediates the relationship between art/architecture and tourist loyalty.

H2e. Memorability mediates the relationship between genuineness and tourist loyalty.

The identified constructs and their relationships are illustrated in the study's conceptual framework in Fig. 2.
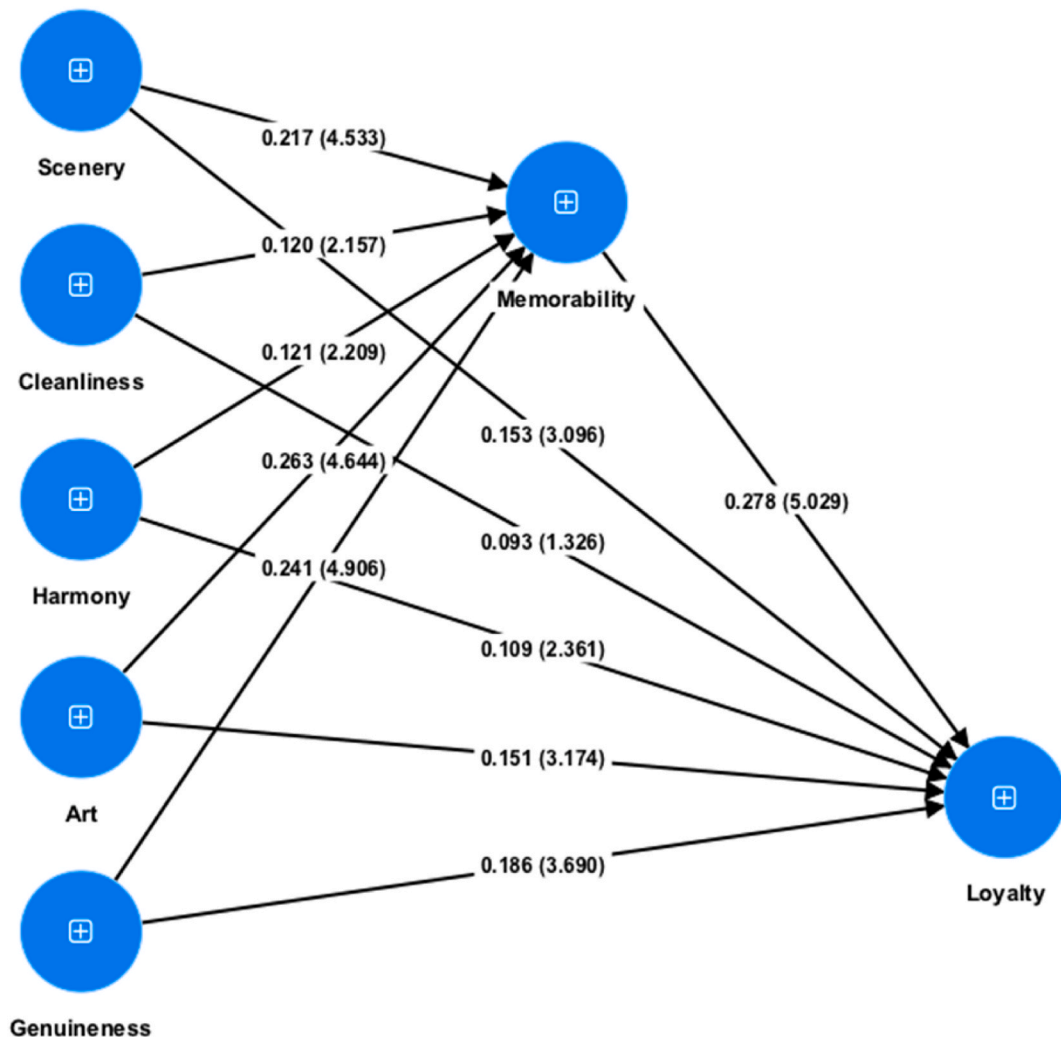

Fig. 3. Results of model.

3. Methodology

3.1. Data collection method

This study used a two-wave survey design to collect panel data (see Fig. 3). To do so, we employed the sampling services of WenJuanxing, a reputable technology platform and market research company that arranges samples from the Chinese consumer population based on census data. The utilization of WenJuanXing, a prominent commercial survey company in China (www.wjx.cn), for data collection in this study offers several advantageous reasons. Firstly, the decision to use this platform stems from its ability to contribute to sample homogeneity and data quality. WenJuanXing employs rigorous quality control measures to filter out invalid or unreliable responses, ensuring that the collected data maintains a high level of accuracy and integrity. This enhances the robustness of the study's findings and minimizes the potential for biases that could arise from a less regulated data collection process.

Secondly, WenJuanXing boasts a substantial online panel comprising over 2.6 million members in China. This extensive panel provides access to a diverse and representative sample of respondents, allowing for a more comprehensive and nuanced exploration of the research objectives. The large pool of potential participants enables the study to capture a wide range of perspectives and experiences, thereby increasing the generalizability of the findings to the broader population.

In October 2021, the platform sent out 650 invitations to its online panel members, of whom 590 completed the Wave 1 survey. Subsequently, the Wave 2 survey was disseminated to the Wave 1 respondents in May 2022, with 86.3 % of them completing it (n = 509). Both the response rate and retention rate were deemed satisfactory for opt-in panel surveys [45]. Ultimately, 509 finalized responses were used as the sample size for statistical analysis.

The questionnaire was divided into two parts. The first part aimed to investigate tourist loyalty, memorability, and the AEQs (scenery, cleanliness, harmony, art/architecture, and genuineness). As shown in Table 2, the measurement scales for these constructs were adapted from previous studies [23,46,47], containing a total of 31 items rated on a 7-point Likert scale (1 = strongly disagree; 7 = strongly agree). The second part contained questions related to the demographic information of the respondents, such as gender, age, and education level.

3.2. Research ethics

The study was approved by the ethics committee of the university where the first author. None of the participants were minors. Before filling out the questionnaire, we ask participants to agree to the following statement (in both English and Chinese): "*This is a tourism research questionnaire. All the submitted data are anonymous and will not collect your privacy. The collected data will be used for academic research purposes only. This questionnaire is only applicable to tourists who have arrived in Guilin in 2020 or later. Thank you very much for filling in this questionnaire, if you do not agree with the above statements, please withdraw from the questionnaire.*"

Table 2
Measurement scales.

Variables	Items
Loyalty	Loy_1: I will recommend Guilin to other people
	Loy_2: I will say positive things about Guilin to other people
	Loy_3: I will encourage friends and relatives to visit Guilin
	Loy_4: I will revisit Guilin in the next three years
Memorability	Mem_1: I have wonderful memories of tourism experiences in Guilin
	Mem_2: I won't forget my tourism experiences in Guilin
	Mem_4: I will remember my tourism experiences in Guilin
Scenery/viewing	SV_1: Good viewpoints of the natural landscape
	SV_2: Arranged viewpoints along the route
	SV_3: Good view of the cultural landscape
Cleanliness	Cle_1: Pure natural environment along the route
	Cle_2: Minimal litter along the route
	Cle_3: Cleanliness of the businesses
	Cle_4: Good opportunities for drinking clean water
Harmony	Har_1: Places to experience silence and calm
	Har_2: Accommodation close to nature
	Har_3: Businesses' architecture harmonizes with landscape
	Har_4: Businesses' interior harmonizes with the surrounding outdoors
Art/architecture	AA_1: Architecture enhances experience of nature
	AA_2: Signage in the natural surroundings
	AA_3: The artworks at viewpoints enhance experiences of nature
	AA_4: Businesses are artistically conscious
Genuineness	Gen_1: Encountering flora in the natural surroundings
	Gen_2: Good opportunities to eat local dishes
	Gen_3: Businesses reflect traditions
	Gen_4: Good opportunities to observe wildlife

4. Findings

The data was analyzed using regression-based partial least squares structural equation modeling (PLS-SEM) with SPSS 26.0 and SmartPLS 4. PLS-SEM is suitable for analyzing small sample sizes and does not strictly require normal distribution of data. Compared to CB-SEM, PLS-SEM has no strict requirement for normal distribution of data and is also suitable for small sample, more importantly. PLS-SEM is a causal prediction method of SEM, so this technique overcomes the obvious dichotomy between interpretation and prediction, and prediction is the basis for developing management implications [48].

4.1. Demographics

The respondents' demographic profile is summarized in Table 3. Generally, the percentage of male respondents was higher than that of females, with respondents mainly concentrated in the 18 to 30 age group mainly because this age is energetic enough to travel around. Additionally, the majority of respondents reported having an undergraduate level of education. Table 4 give the details of descriptive statistics of the Likert scales.

4.2. Measurement model

The measurement model was evaluated to assess the validity and internal consistency of the constructs. The results of the constructs' reliability and convergent validity are presented in Table 5. First, the reflective measurement model requires outer loadings above 0.8 to ensure that an indicator's variance can be explained by the construct to a greater extent than 50 % [49]. In the current study, all the loadings of the measurement model were above 0.8, indicating acceptable item reliability. Next, although Cronbach's alpha is commonly used to assess internal consistency, Dijkstra and Henseler (2015) suggested using rho_A as a measure of a construct's reliability, which falls between Cronbach's alpha and composite reliability [48,50]. Acceptable reliability values are more than 0.70 [49]. In this study, all the variables had Cronbach's alpha values and rho_A values above 0.70, as well as composite reliability values between 0.7 and 0.95, indicating acceptable reliability. Subsequently, to demonstrate convergent validity at the construct level, the average variance extracted (AVE) is commonly used, with an acceptable value of 0.50 or higher [49]. As shown in the table, all variables reported AVEs greater than 0.5, confirming acceptable convergent validity. Overall, all the indicators and constructs satisfied the reflective measurement criteria for reliability and convergent validity.

As the final step in the measurement model, discriminant validity was assessed using the Heterotrait-Monotrait (HTMT) ratio of correlations criterion. As shown in Table 6, all the constructs' HTMT scores were below 0.9, as recommended by Hair, Risher et al. (2019) [49]. This confirmed the existence of discriminant validity among the constructs under study.

4.3. Collinearity

Collinearity must be examined prior to evaluating the structural relationships to ensure that it does not influence the regression results. A VIF value above 5.0 may indicate collinearity among predictor constructs, while a value closer to 3.0 or below is ideal [49]. As shown in Tables 7 and 8, all the outer VIF values were less than 5.0 and all the inner VIF values were around 5.0, indicating that there was no issue of collinearity in this study.

4.4. Structural model

In the structural model evaluation, path coefficients were used to evaluate the strength of the relationships between variables. According to Urbach and Ahlemann (2010) [49], path coefficients with values of 0.19 or greater are considered small, coefficients of 0.32 or greater are considered medium, and coefficients of 0.67 or greater are considered large. To test whether the path coefficients of the hypothesized relationships were significantly higher than these recommended thresholds, bootstrapping with 5000 resamples was

Table 3
The demographic profile of respondents.

Demographic variables		Frequency	Percent
Gender	Female	233	45.8 %
	Male	276	54.2 %
Age	16–20	7	1.4 %
	21–30	179	35.2 %
	31–40	126	24.8 %
	41–50	98	19.3 %
	51–60	87	17.1 %
	>60	12	2.4 %
Education	High school	85	16.7 %
	Undergraduate	236	46.4 %
	Graduate	133	26.1 %
	Others	55	10.8 %

Table 4
Descriptive of variables.

	Loyalty	Memorability	Scenery	Cleanliness	Harmony	Art	Genuineness
N	509	509	509	509	509	509	509
Missing	0	0	0	0	0	0	0
Mean	5.25	5.28	5.32	5.27	5.25	5.8	5.26
Median	5.75	5.67	5.67	5.75	5.75	5.75	5.75
Standard deviation	1.55	1.53	1.55	1.52	1.5	1.5	1.49
Minimum	1	1	1	1.25	1	1	1
Maximum	7	7	7	7	7	7	7

Table 5
Assessment of construct reliability and convergent validity.

Latent Variables	Items	Outer Loadings	Cronbach's Alpha	rho_A	Composite Reliability	AVE
Loyalty	Loy_1	0.932	0.945	0.945	0.960	0.858
	Loy_2	0.934				
	Loy_3	0.929				
	Loy_4	0.909				
Memorability	Mem_1	0.926	0.931	0.931	0.956	0.878
	Mem_2	0.941				
	Mem_4	0.945				
Scenery/viewing	SV_1	0.925	0.913	0.913	0.945	0.852
	SV_2	0.929				
	SV_3	0.915				
Cleanliness	Cle_1	0.925	0.937	0.937	0.955	0.841
	Cle_2	0.932				
	Cle_3	0.916				
	Cle_4	0.895				
Harmony	Har_1	0.900	0.927	0.928	0.948	0.821
	Har_2	0.915				
	Har_3	0.910				
	Har_4	0.900				
Art/architecture	AA_1	0.842	0.904	0.905	0.933	0.777
	AA_2	0.900				
	AA_3	0.891				
	AA_4	0.891				
Genuineness	Gen_1	0.915	0.930	0.931	0.950	0.827
	Gen_2	0.923				
	Gen_3	0.914				
	Gen_4	0.885				

Table 6
Assessment of Discriminant Validity using the HTMT Criterion.

	Art/architecture	Cleanliness	Genuineness	Harmony	Loyalty	Memorability	Scenery/viewing
Art/architecture							
Cleanliness	0.830						
Genuineness	0.869	0.852					
Harmony	0.864	0.818	0.835				
Loyalty	0.802	0.864	0.886	0.866			
Memorability	0.869	0.843	0.846	0.831	0.856		
Scenery/viewing	0.880	0.846	0.870	0.851	0.886	0.851	

conducted and p-values, t-value were calculated. The results can be found in Fig. 3 and Table 9.

4.5. Mediation

The bootstrap function in SmartPLS was utilized to test the mediating effect of memorability between AEQs and loyalty, the results of which are in Table 12. It was revealed that memorability mediates the effects of all five AEQs (scenery, cleanliness, harmony, art/architecture, and genuineness) on tourist loyalty. Therefore, H2a to H2e were supported.

Table 7
Outer VIF values.

Latent Variables	Items	Outer VIF
Loyalty	Loy_1	4.438
	Loy_2	4.397
	Loy_3	4.243
	Loy_4	3.421
Memorability	Mem_1	3.291
	Mem_2	4.076
	Mem_4	4.335
Scenery/viewing	SV_1	3.304
	SV_2	3.346
	SV_3	2.861
Cleanliness	Cle_1	4.157
	Cle_2	4.496
	Cle_3	3.585
	Cle_4	2.946
Harmony	Har_1	3.087
	Har_2	3.652
	Har_3	3.507
	Har_4	3.123
Art/architecture	AA_1	2.088
	AA_2	2.988
	AA_3	2.904
	AA_4	2.834
Genuineness	Gen_1	3.560
	Gen_2	4.071
	Gen_3	3.562
	Gen_4	2.785

Table 8
Inner VIF values.

	Memorability	Loyalty
Scenery/viewing	5.330	
Cleanliness	5.004	
Harmony	5.027	
Art/architecture	5.013	
Genuineness	5.635	
Memorability		1.000

Table 9
Path coefficients.

	Path coefficients	Sample mean	Standard deviation	T-value	P-value
Scenery - > Loyalty	0.153	0.155	0.049	3.096	0.002
Scenery - > Memorability	0.217	0.220	0.048	4.533	0.000
Cleanliness - > Loyalty	0.093	0.093	0.070	1.326	0.185
Cleanliness - > Memorability	0.120	0.120	0.056	2.157	0.031
Harmony - > Loyalty	0.109	0.109	0.046	2.361	0.018
Harmony - > Memorability	0.121	0.121	0.055	2.209	0.027
Art - > Loyalty	0.151	0.150	0.047	3.174	0.002
Art - > Memorability	0.263	0.262	0.057	4.644	0.000
Genuineness - > Loyalty	0.186	0.186	0.050	3.690	0.000
Genuineness - > Memorability	0.241	0.238	0.049	4.906	0.000
Memorability - > Loyalty	0.278	0.276	0.055	5.029	0.000

The path coefficient of Scenery - > Loyalty is significant, so the H1a is accepted; the path coefficient of Cleanliness - > Loyalty is not significant, so the Ha1b is rejected; the path coefficient of Harmony - > Loyalty is significant, so the Ha1c is accepted; the path coefficient of Art/architecture - > Loyalty is significant, so the Ha1d is accepted; the path coefficient of Genuineness - > Loyalty is significant, so the Ha1e is accepted.

The explanatory power of a model is typically assessed by examining its variance, which is measured using R^2. Depending on the context, R^2 values of 0.75, 0.50, and 0.25 can be considered substantial, moderate, and weak, respectively (Hair et al., 2011). However, when predicting human attitudes, perceptions, and intentions, an R^2 value exceeding 0.90 is indicative of overfitting [49]. In this study, as shown in Table 10, the R^2 value of loyalty was 0.804, which can be considered substantial. In other words, the significant aesthetic qualities explained 80 % of the variance in tourists' loyalty.

Table 10
The R^2 values of Endogenous construct.

	R Square	R Square Adjusted
Loyalty	0.848	0.846
Memorability	0.842	0.840

In PLS-SEM, the PLS predict procedure utilizes holdout sample-based predictions and performs cross-validation k-fold [48,49]. According to Shmueli et al. (2019), the procedure should be executed 10 times [48,49]. Several prediction statistics can be employed to evaluate prediction error, such as the mean absolute error (MAE) and root mean squared error (RMSE). The results of PLS Predict are presented in Table 11. None of the indicators in the PLS-SEM analysis had an RMSE (or MAE) value that exceeded the benchmark Naive LM. Therefore, the model exhibited superior predictive capability.

Table 11
PLS Predict power test.

PLS Predict	RMSE	MAE	MAPE	Q^2_predict
Loy_1	0.778	0.578	16.824	0.663
Loy_2	0.732	0.551	15.500	0.681
Loy_3	0.764	0.553	15.965	0.632
Loy_4	0.876	0.607	20.919	0.576
Mem_3	0.674	0.478	12.530	0.723
Mem_1	0.586	0.423	12.067	0.787
Mem_2	0.652	0.468	11.977	0.738
LM Benchmark	**RMSE**	**MAE**	**MAPE**	**Q^2_predict**
Loy_1	0.797	0.572	16.321	0.647
Loy_2	0.732	0.534	14.145	0.682
Loy_3	0.790	0.559	15.814	0.607
Loy_4	0.903	0.614	20.822	0.550
Mem_3	0.701	0.488	12.853	0.700
Mem_1	0.612	0.436	12.294	0.768
Mem_2	0.669	0.464	11.790	0.724

Table 12
Mediation effects.

	Mediation	Sample mean	Standard Deviation	T-value	P-value
Scenery - > Memorability - > Loyalty	0.060	0.061	0.019	3.121	0.002
Cleanliness - > Memorability - > Loyalty	0.033	0.033	0.016	2.027	0.043
Harmony - > Memorability - > Loyalty	0.034	0.033	0.016	2.073	0.038
Art - > Memorability - > Loyalty	0.073	0.072	0.021	3.419	0.001
Genuineness - > Memorability - > Loyalty	0.067	0.066	0.020	3.428	0.001

5. Discussion

The travel and tourism sector is particularly vulnerable to the impacts of natural disasters, terrorism, financial crises, and pandemics [4,51,52]. Therefore, it is crucial to focus on how to recover tourist destinations during and after such predicaments. Cultivating tourist loyalty, specifically, should always be a top priority in nature-based tourism destination management. Aesthetics, among other factors, plays a catalytic role in securing loyalty as tourists seek beauty.

This study focused on five experiential qualities of aesthetics or AEQs (i.e., scenery, cleanliness, harmony, art/architecture, and genuineness) as predictors of tourist loyalty towards a nature-based tourism destination. The findings show that most constructs of AEQs are directly and positively correlated with tourist loyalty. Moreover, all five AEQs were found to indirectly impact loyalty through the significant mediating effect of memorability. This indicates that the most memorable aesthetic experiences, events, landscapes, buildings, and so on can increase tourists' intention to revisit, recommend, and spread positive word-of-mouth about a nature-based destination.

From the findings, scenery/views, harmony, and art/architecture are still central and vital dimensions of the aesthetic experience, as confirmed by their indirect impacts. Tourists' viewing of magnificent natural attractions, such as beautiful mountains, has an indirect effect on loyalty, meaning that the memorable experience of spectacular and overwhelming views leads to repeat visits, recommendations, and positive word-of-mouth. These loyalty behaviors can also be increased by focusing on unforgettable harmony when developing tourist destinations, such as "the atmosphere inside" tourism businesses, seeing and hearing animals in nature, and experiencing plants in nature. It is useful, as well, to incorporate memorable art/architecture viewpoints and ensure that businesses are artistically conscious to trigger tourists' memorability and thereby increase their loyalty. Similarly, genuineness is significant both

directly and indirectly in cultivating tourist loyalty. This finding reflects the growing interest in experiencing the business of tourism in an authentic way. Friendly hosts who reflect local traditions and history and create a sense of place are essential to enhancing the tourist experience. This focus on genuineness aligns with the tourism trend of emphasizing local experiences.

Cleanliness is the most crucial aspect of the aesthetic experience, but it is not significant as evident in our findings. Previous studies found that experiencing fresh and clean air, being surrounded by nature (e.g., natural water), enjoying a fresh and verdant view of nature, having clean and tidy tourism facilities (e.g., toilets), and exploring well-maintained walking paths is essential for tourists' visits, recommendations, and positive word-of-mouth. But in this study, it is not significant, it might because the pandemic situation, which people pay less attention on that issue and people are quarantined at home for a long time, thus grasping opportunity to going out.

6. Theoretical and practical implications

This study is theoretically important. It contributes to the research on tourism AEQs and tourist behavior. Previous studies have investigated AEQs in tourism destinations, but only considered satisfaction as a mediator. This study goes further by highlighting the importance of memorability as a mediator between AEQs and tourist loyalty. The framework presented in this paper is, to the researcher's best knowledge, the first to incorporate all these variables to provide comprehensive insights on the factors influencing loyalty. As such, it broadens our understanding of the impact of aesthetic dimensions on tourist loyalty and fills a research gap in this area.

From a practical perspective, this study emphasizes the significance of memorability as a primary marketing strategy for tourism service providers and managers. Tourist memory is a crucial factor in determining the quality of the tourist experience; therefore, creating unforgettable and authentic experiences should be a priority. In the post-epidemic era, especially, tourism destination managers need to understand tourist behavior and design effective marketing strategies to attract visitors. Making destinations more memorable can build destinations' resilience in the face of future pandemics, crises, or disasters.

Furthermore, managers should consider aesthetic dimensions, especially cleanliness and authenticity, when measuring tourists' experiences. For example, some villages or resorts could place a strong emphasis on aesthetics, especially cleanliness and authenticity. Waste management and beach cleanliness are prioritized, ensuring that the natural beauty of the coastline is preserved. Additionally, the architecture and design of the village/resort buildings reflect the traditional coastal style, creating an authentic and charming atmosphere. Aesthetics can influence tourists' decision making, behavior, and intention to recommend or revisit a destination. This information can help managers predict whether tourists are likely to spread positive or negative word-of-mouth. Negative aesthetic perceptions can have a ripple effect, influencing other parts of the tour or even the entire destination. Therefore, it is essential to prioritize aesthetics in tourism development and management.

7. Conclusions

To conclude, this study explores the impact of aesthetics and memorability on tourist loyalty during and after the pandemic through a two-wave panel data. As per the findings, this study confirmed the role of aesthetics in fostering loyalty in terms of scenery/views, harmony, and art/architecture and genuineness. More importantly, it found the mediating effect of memorability, which reelects the importance of this factors. Because memorability acts as a bridge that connects the positive aesthetic experiences gained by tourists with the development of a lasting emotional connection to the destination, ultimately influencing their decision to remain loyal to tourism destination even amidst challenges such as the pandemic. The findings help to untangle the mechanism behind decision-making and behavioral intention among tourists.

Limitation and future research

It should be noted that this study is limited by its site-specific nature and the use of a convenience sample. Therefore, caution should be exercised when generalizing the findings to other tourist destinations. Future studies should employ a systematic sampling method to recruit more respondents. This study is only contextualized in Guilin, Guangxi Province China. Further research should be conducted in a broader range of tourist destinations to validate the results. Additionally, despite Guilin being an international tourist destination, the sample of this study mainly consisted of Chinese domestic tourists, with limited representation from international tourists. This is because foreign tourists were not allowed to enter China during the study period due to the pandemic's impacts. In future research, it would be beneficial to include a more diverse sample that includes international tourists. Lastly, this study proposed a path model to explore the determinants of loyalty, however, there are still many other contributing factors and future studies should dig out more to enrich the scholarship.

Data availability statement

Data included in article/supp. material/referenced in article.

CRediT authorship contribution statement

Ethan(Yi) Cao: Conceptualization, Methodology, Writing - original draft. **Kim Mee Chong:** Conceptualization. **Lei Pan:**

Investigation, Project administration. **Luo Ning:** Conceptualization, Data curation. **Fang (Diana) Pan:** Writing - review & editing. **Katherine (Ke) Li:** Writing - review & editing.

Declaration of competing interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests:

Ethan(Yi) Cao reports administrative support was provided by Guangxi Normal University.

Appendix. Questionnaire

Part I

Please read the following statement and tick the appropriate box (✓)

1 Strongly disagree**;**
2 Quite disagree**;**
3 Disagree**;**
4 Neutral**;**
5 Agree**;**
6 Quite agree**;**
7 Strongly agree

Loyalty	1	2	3	4	5	6	7
Loy_1: I will recommend Guilin to other people							
Loy_2: I will say positive things about Guilin to other people							
Loy_3: I will encourage friends and relatives to visit Guilin							
Loy_4. I will revisit Guilin in the next three years							
Memorability	1	2	3	4	5	6	7
Mem_1: I have wonderful memories of tourism experiences in Guilin							
Mem2: I won't forget my tourism experiences in Guilin							
Mem3: I will remember my tourism experiences in Guilin							
Scenery/viewing	1	2	3	4	5	6	7
SV_1: Good viewpoints of the natural landscape							
SV_2: Arranged viewpoints along the route							
SV_3: Good view of the cultural landscape							
Cleanliness	1	2	3	4	5	6	7
Cle_1: Pure natural environment along the route							
Cle_2: Minimum of litter along the route							
Cle_3: Cleanliness of the businesses							
Cle_4: Good opportunities for drinking clean water							
Harmony	1	2	3	4	5	6	7
Har_1: Places to experience silence and calm							
Har_2: Accommodation close to nature							
Har_3: Businesses' architecture harmonizes with landscape							
Har_4: Businesses' interior harmonizes with the surroundings outdoors							
Art/architecture	1	2	3	4	5	6	7
AA_1. Architecture enhances experience of nature							
AA_2. Signage in the natural surroundings							
AA_3. The artworks at viewpoints enhance experiences of nature							
AA_4. Businesses are artistically conscious							
Genuineness	1	2	3	4	5	6	7
Gen_1: Encountering flora in the natural surroundings							
Gen_2: Good opportunities to eat local dishes							
Gen_3: Businesses reflect traditions							
Gen_4: Good opportunities to observe wildlife							

Part II Demographic

Gender

☐ Female

☐ Male

Age

☐ 16-20
☐ 21-30
☐ 31-40
☐ 41-50
☐ 51-60
☐ >60 more

Education level

☐ High school
☐ Undergraduate
☐ Graduate
☐ Others

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