Asian Management and Business Review, Volume 5 Issue 1, 2025: 35-46

Temporal preferences for ambiance: A study of tourist expectations across the day

Rischa Agustina, Budhi Sholeh Wibowo*

Department of Mechanical and Industrial Engineering, Universitas Gadjah Mada, Yogyakarta, Indonesia

Article History
Received : 2024-08-29
Revised : 2024-12-09
Accepted : 2024-12-10
Published : 2025-02-04

Keywords:
Tourism; consumer behavior; Kansei engineering; ambiance; destination management.

***Corresponding author:**
budhi.sholehwibowo@ugm.ac.id

DOI:
10.20885/AMBR.vol5.iss1.art3

Abstract

Existing studies have recognized the significance of ambiance in influencing tourist behavior and preferences. However, little attention has been given to exploring tourist preferences for specific ambiances throughout the day. This study aims to fill this gap by examining whether temporal preferences for ambiance exist in tourism. We used the Kansei Engineering method to identify the specific ambiance tourists expect at different times of day: morning, afternoon, and evening. A survey of 200 domestic tourists in Yogyakarta, Indonesia, was conducted using semantic differential questionnaires. The results suggest five distinct constructs of ambiance that reflect tourist expectations at different times of the day. The results confirm the existence of temporal preferences for ambiance across the day. Specifically, tourists visiting Yogyakarta prefer peaceful, nature-centric attractions in the morning, cultural experiences and popular places in the afternoon, and romantic ambiances in the evening. Further analysis reveals that this pattern aligns with natural circadian rhythms. This study provides valuable insights for stakeholders to improve tourist experiences by aligning offerings with these temporal preferences.

Introduction

The ambiance of a place (e.g., colors, lights, sounds, scents, and temperatures) plays a significant role in creating a tourist experience. Good ambiance can create an emotional connection with a place, thus leading to higher satisfaction and trust (Cheng et al., 2024; Silva & Correia, 2017). It also influences how tourists perceive places as unique and attractive, which in turn influences their intentions to revisit the place (Melewar et al., 2019).

The ambiance of a place can change throughout the day due to various factors. For instance, the morning period is often characterized by a cooler tone, creating a calm and refreshing ambiance, while the afternoon often carries a warmer tone, creating a more social ambiance (Thibaud, 2015). The dynamics of people's activities also play a crucial role in shaping ambiance. For example, commercial areas might be crowded and energetic during the day but quieter and more peaceful at night (Sparks et al., 2023). Besides, changes in temperature and humidity throughout the day can also impact the ambiance. For example, daytime might be perceived as warmer and drier, while nighttime could be colder and more humid (Cox et al., 2020). While it has been evident that ambiance changes throughout the day, the impact of these changes on tourist decisions and behavior is still understudied.

Our research has two objectives: (1) to investigate whether the temporal preference for ambiance exists amongst tourists and (2) to explore the type of ambiance the tourists expect across the day. From a practical point of view, studying how tourist preferences change over time is important. This understanding can help destination managers create a more enjoyable tourist experience by aligning the offerings with the preferred ambiance. From an academic perspective, this insight can improve our understanding of factors influencing tourist behavior during their trip.

E ISSN 2775-202X
Copyright © 2025 Authors. This is an open-access article distributed under the terms of the Creative Commons Attribution-ShareAlike 4.0 International License (http://creativecommons.org/licences/by-sa/4.0/)

This information can be useful for refining and improving existing theories to better capture and predict tourist behavior.

To achieve our objectives, we employed the Kansei Engineering method to help us better understand tourist preferences toward complex entities such as ambiance, which are often abstract and rooted in sensory experiences. This approach allowed us to capture tourists' expectations and translate them into quantifiable variables and a statistical model.

The remainder of this paper is structured as follows. First, we review the existing literature to analyze the role of ambiance in tourism. Section 3 explains the Kansei Engineering method used in the study. Section 4 presents the study results, while the discussions are provided in Section 5. Finally, we provide the study conclusions in Section 6.

Literature Review

Ambiance comprises a range of sensory elements that contribute to the overall atmosphere of a space. These elements can significantly affect individuals' emotional responses, stress levels, and behavior (Vanhatalo et al., 2022; Zhang & Sanake, 2020). For example, a cheerful ambiance can promote positive emotions, reduce stress, and influence food choices (Masullo et al., 2022). Besides, a good ambiance can stimulate positive emotions and comfort, leading to a memorable experience and increasing revisit intentions (Nabila et al., 2021). In contrast, poor ambiance, such as in shared environments, can also reduce comfort and well-being (Lin, 2004).

Several studies have explored the impact of ambiance on tourist behavior. Through brand identity and sensory marketing theories, Melewar et al. (2019) suggest that the ambiance of a place is crucial in forming positive tourist experiences. These sensory aspects make destinations unique and attractive, which, in turn, positively affect tourists' intention to revisit. Another study found that the aesthetic of a place can also significantly affect tourists' experience, leading to higher satisfaction and a stronger sense of belonging (Cao et al., 2024). Silva and Correia (2017) suggest that a well-designed ambiance can create an emotional attachment to the place, which affects tourists' intentions to revisit. Mattila & Gao (2017) suggest that four types of stimuli in ambiances (i.e., visual, aural, olfactory, tactile) can be manipulated to influence tourist experience and cognitive evaluations. It explains why hotels, restaurants, and tourist attractions invest a large amount of money to renovate their ambiance. Paisri et al. (2022) highlight the positive impact of a better physical environment in a hotel on perceived image and behavioral intentions from tourists. Wang et al. (2020) found that tourists report higher attachment and loyalty to a place that improves their destination fascination, which includes ambiance. These studies provide support for how ambiance can significantly affect tourist decisions and behavior.

Amongst several elements in a site ambiance, natural light is one of the few elements that humans cannot alter. For example, the darkness during nighttime often limits visibility, stimulating fears and a sense of danger (Lyu et al., 2022). From a safety perspective, the lack of light in the evening thus limits activities that can be performed on the destinations. Consequently, the conditions of natural light would affect tourist decisions to visit particular sites (Huang & Wang, 2018). Giordano (2018) explored the role of outdoor lighting, particularly within city beautification and the emergence of night tourism. The study underscores the increasing use of artificial lighting to improve the attractiveness of tourist destinations. Benfield et al. (2018) investigated the impact of light pollution on visitors to natural environments. Their study reveals that light pollution can influence both psychological well-being and cognitive evaluations from customers. The researchers suggest that perfect night skies might not always be perceived as ideal due to their unfamiliar or unrealistic nature.

Existing studies have explored how ambiance can significantly affect tourist decisions and behavior. They also provide support for the idea that tourists may change their destination preferences depending on the time of day. However, they are mainly focused on ambiance as a static factor, neglecting the dynamic of tourist preferences throughout the day. Our study extends the existing literature on ambiance in tourism to include a temporal aspect, specifically focusing on how tourists change their preference for ambiance based on the time of day.

Research Methods

This study used domestic tourists in Yogyakarta City, Indonesia, as the sample. Yogyakarta city has been selected since it has cultural richness, diverse tourism segments, and various ambiance settings. Therefore, it is a representative place for examining the temporal dynamics of tourist ambiance preferences.

The data collection includes an online survey conducted from January to March 2018. The questionnaires were distributed via social media such as WhatsApp, Facebook, and Instagram to reach the target population. A total of 200 respondents participated in the study, with 189 valid responses. The respondents comprised 80 males and 120 females between 18 and 25 years. No incentives were given to respondents to complete the questionnaire.

One of the key challenges in this study is to translate the human perception of ambiance, which is often abstract and qualitative, into tangible parameters. To address this issue, we employed the Kansei Engineering method, which offers a structured framework for translating abstract concepts, such as human feelings, perceptions, and emotions, into concrete design parameters. It has gained growing interest from researchers in studying human perception and emotions toward design elements. The method has been widely applied to a wide array of topics, from urban planning (Castilla et al., 2024), product design (Yang et al., 2023) and service design (Hartono et al., 2024).

The Kansei Engineering approach is based on the concept of "Kansei", which refers to the emotional or sensory response a person experiences when interacting with a product or environment. The process can be divided into three main steps: (1) identifying the emotional and sensory responses (Kansei identification), (2) quantifying these responses into measurable variables (Kansei quantification), and (3) constructing predictive models to understand the relationships between these responses and the stimuli or attributes being studied (Kansei construction). The details are discussed below.

Kansei Identification

The Kansei Engineering process began by selecting a set of adjectives referred to as the "Kansei words" to help respondents articulate their expectations of ambiance. These adjectives were extracted from user reviews on TripAdvisor™ for Yogyakarta's 100 most popular tourist sites. Once the reviews were collected, we analyzed them by breaking down the text into individual words (tokenizing) and labeling the part of speech (POS) for each word. We focused specifically on adjectives, as they are often associated with emotional and sensory descriptors. After the adjectives were identified, we calculated the word frequency to determine how often each word appeared across all reviews. This helped prioritize adjectives most frequently associated with tourists' experiences. We then manually reviewed and grouped the identified adjectives based on similar meanings or shared sensory stimuli. This grouping process ensured that the words were comprehensive but not redundant. Finally, we selected the top 30 unique adjectives from this refined list. The selected adjectives served as the basis to measure and quantify the sensory responses expressed by respondents in relation to the ambiance of the tourist sites under study. The final collection of the Kansei words is provided in Table 1.

Table 1. List of Kansei Words Used in the Study

X1	Fantastic	X11	Unique	X21	Masculine
X2	Elegant	X12	Educational	X22	Quiet
X3	Simple	X13	Variative	X23	Adventurous
X4	Cool	X14	Challenging	X24	Mystic
X5	Historical	X15	Private	X25	Fresh
X6	Beautiful	X16	Artistic	X26	Relaxing
X7	Natural	X17	Popular	X27	Amusing
X8	Traditional	X18	Strategic	X28	Romantic
X9	Crowded	X19	Cheerful	X29	Casual
X10	Cultural	X20	Dim	X30	Skillful

Kansei Quantification

The next step involves quantifying the strength of expectation the tourist had for specific ambiance at different times of the day based on the Kansei words. To achieve this, we used a semantic differential questionnaire, which employs a numerical scale that requires participants to rate their preferences based on opposing pairs of Kansei words. The semantic differential questionnaire is important in Kansei Engineering because it acts as the instrument to quantify complex human sensory responses, which are typically qualitative and difficult to measure directly. The questionnaire addresses this challenge by offering a structured approach for respondents to articulate their preferences.

The semantic differential questionnaire was created by pairing each identified Kansei word with its contrasting counterparts, such as Warm vs. Cool or Noisy vs. Quiet. Respondents were asked to recall their trip experiences at different times of day (i.e., morning, afternoon, evening). We then present pairs of opposing adjectives on a 7-point Likert scale to the respondents so they can rate their preferences between the two extremes for that specific time period (see Figure 1). By using this questionnaire, we can gather quantitative data on qualitative responses. This allowed us to identify patterns, preferences, and correlations between emotional responses and design elements.

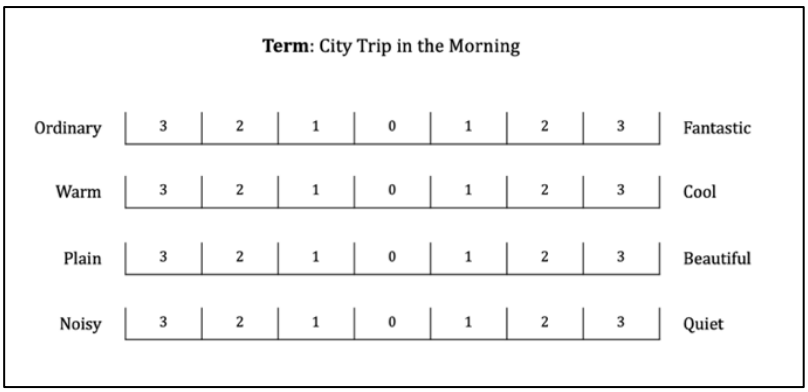

Figure 1. Example of Semantic Differential Questionnaire Used in the Study

Due to the shared meanings among some Kansei words, the responses may suffer from multicollinearity, a statistical issue where variables are highly correlated. The existence of multicollinearity can reduce statistical power and obscure the relationship between Kansei words and the preferred ambiance. To address the issue, we utilized Principal Component Analysis (PCA), a statistical procedure that helps to reduce the dimensionality and multicollinearity in a dataset (James et al., 2021). The output of PCA yields a series of principal components, which are linear combinations of the original variables. This outcome allows us to focus on a more condensed set of principal components that efficiently extract the most relevant information from the dataset. The final number of components used in the study was determined using parallel analysis. This method compares the eigenvalues derived from the compressed dataset to those expected from random data. This approach is often considered to be more reliable than the conventional *Kaiser* criterion, which relies on a specific threshold. Furthermore, we applied VARIMAX rotation to redistribute variance among the components. Such a rotation seeks to maximize the variance of squared component loadings on each variable, minimizing correlations between components. All the statistical calculation is performed using Jamovi™ software.

Kansei Constructions

Kansei construction aims to create a statistical model that maps the relationship between the quantified Kansei, representing the preference toward specific ambiance characteristics, and the time period where those preferences are relevant. To achieve the objective, we employed a multinomial logistic regression as the model. This statistical model is suitable for situations where

the dependent variable is categorical and multinomial, which is relevant for our study, where the tourist preference is measured at three different times of the day.

In our model, the outcome variable (y) is the categorical variable representing the time of day: morning, afternoon, and evening. The predictor variables (x's) are the quantified Kansei, representing the preferred ambiance. The model estimates the likelihood of choosing specific ambiances at different times of day. The coefficients produced by multinomial logistic regression are relatively easy to interpret. It also provides insights into the direction and strength of the relationships between the predictor and the outcome variable.

Results and Discussion

Our survey was conducted online, where about 200 respondents participated and 189 of them provided valid responses. After the data were collected, we examined the relationship among data using Bartlett's test to check if multicollinearity existed. The result suggested significant correlations between variables ($p<0.001$), confirming the existence of multicollinearity in the dataset. Before employing a mitigation strategy, we conducted the Kaiser-Meyer-Olkin (KMO) test to evaluate if a dimension reduction technique such as PCA can mitigate the issue. The result suggests that PCA can retain about 75% of the variance from the dataset. Therefore, the multicollinearity issue in the dataset can be addressed by compressing the variables into a few components such as in PCA.

We then proceed the analysis with PCA to compress the correlated variables into a few uncorrelated components. One challenge to implementing PCA is to determine the optimal number of components to extract from the data. A larger number of components will retain more information but yield a higher correlation among variables, which can lead to lower statistical power. A smaller number would mitigate the multicollinearity issue but lose some information, which can reduce the accuracy. Therefore, to determine the optimal number of components, we used a parallel analysis. Figure 2 shows the result of parallel analysis in the form of a scree plot. The result suggests that the 30 selected Kansei words can optimally be compressed into five principal components. Those five components capture about 50% of the variations from the data. We then use VARIMAX to rotate the final solution to further minimize the correlation between components and achieve a simpler pattern to ease the interpretation.

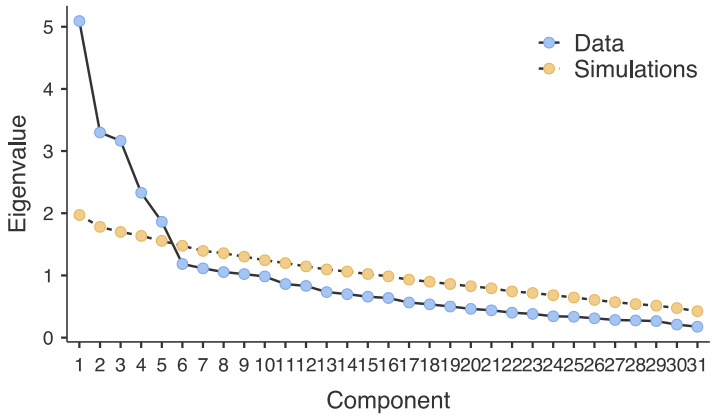

Figure 2. Scree Plots of PCA

The result of PCA is presented in Table 2. It shows the component loadings and the structural relationship between the variables. Note that for a practical reason, the table does not show component loadings that are less than 0.30. The result from PCA suggests that the components successfully compress the 30 Kansei words into five components. It effectively groups correlated Kansei words, e.g., *Elegant, Romantic, Fantastic,* and *Dim,* into a single reasonable component. An appropriate form of the group can also be identified in other components such as C4 (*Cultural*, *Historical*, *Educational*) and C5 (*Adventurous*, *Challenging*, *Skillful*). The logical form of the component confirms the practical significance of the PCA. We labeled each component from PCA based on the

top two Kansei words, that is, *Natural* & *Spacious* (C1), *Elegant* & *Romantic* (C2), *Cheerful* & *Popular* (C3), *Cultural* & *Historical* (C4), *Adventurous* & *Challenging* (C5) as shown in Table 3. Each component represents the joint characteristics of ambiance that the respondent recalls during their trip.

Table 2. Component Scores from PCA

Kansei Words	Component					Uniqueness
	1	2	3	4	5	
Natural	0.683					0.470
Crowded	-0.668					0.403
Beautiful	0.667					0.424
Simple	0.564	-0.390				0.460
Quiet	0.559	0.306	-0.384			0.423
Casual	0.509					0.568
Cool	0.476	0.458				0.498
Traditional	0.459		-0.308	0.433		0.487
Fresh	0.448		-0.322			0.669
Elegant		0.727				0.464
Romantic		0.705				0.415
Fantastic		0.690				0.445
Relaxing	0.341	0.570				0.502
Instagrammable		0.569	0.318			0.554
Dim		0.539	-0.448			0.474
Cheerful		-0.322	0.708			0.343
Popular			0.638			0.448
Variative			0.625			0.588
Strategic			0.486	0.371		0.515
Private	0.419	0.333	-0.483			0.469
Amusing			0.437			0.664
Cultural				0.649		0.544
Historical				0.633		0.487
Educational				0.608		0.504
Artistic				0.600		0.600
Mystic			-0.357	0.561		0.49
Unique	0.401			0.544		0.491
Adventurous					0.768	0.358
Challenging					0.731	0.425
Skillful	-0.385				0.637	0.367
Masculine		-0.344			0.422	0.702

Table 3. Component Summary from PCA

Component	Name	SS Loadings	% of variance	Cumulative %
C1	Natural & Spacious	3.77	12.18	12.2
C2	Elegant & Romantic	3.66	11.82	24.0
C3	Cheerful & Popular	3.22	10.4	34.4
C4	Cultural & Historical	2.80	9.02	43.4
C5	Adventurous & Challenging	2.29	7.39	50.8

To explore the relationship between the identified ambiances and tourist preferences, we developed a statistical model based on multinomial logistics regression. The model aims to investigate the type of ambiance that tourists seek at different times of the day. In this model, we treated the daytime as the categorical dependent variable, which includes three categories: morning, afternoon, and evening. The identified components (C1 to C5) were treated as the independent variables.

The model fit in Table 4 suggests that our model has $R^2_{McF} = 0.479$, which is considered high for a logistics regression model. This score means that the model explains 47.9% of the

variance in the dependent variable. It is important to note that McFadden's R-squared does not behave as Pearson's R-squared in linear regression. The logit model is nonlinear, and the log-likelihood function is not as well-defined as the sum of squared errors. As a result, McFadden's R-squared values are often lower than R-squared values for linear regression models. The model fit suggests that the χ^2 statistic is 199 with a degree of freedom of 10. This means the chi-square statistic is statistically significant at the $p < 0.01$ level. This result indicates that the model is a significant improvement over the null model, meaning that the identified ambiances make a meaningful contribution to explaining tourist preferences across the day.

The model estimates and their corresponding p-values in Table 5 suggest that tourist preferences for ambiance throughout the day differ significantly. However, it is important to note that statistical significance does not necessarily imply practical significance. It is possible that an independent variable has a statistically significant effect on the dependent variable but that the effect is too small to be of practical importance. To assess the practical significance, it is useful to observe the effect size of each variable as shown by the odds ratio (OR). A higher OR indicates a stronger likelihood of a specific time being preferred than the alternative. For example, in the morning, tourists are three times more likely to find a place with natural and spacious vibes than in the afternoon (OR=3.042). During the evening, tourists are twenty-three times more likely to find a place with an elegant and romantic ambiance than in the afternoon (OR = 23.786).

Table 4. Model Fit

Model	R^2_{McF}	Overall Model Test		
		χ^2	df	p
Logistic Regression	0.479	199	10	< .001

Table 5. Model Coefficients

Category	Predictor	Estimate	Std. Error	z	p-value	Odds ratio
Afternoon – Morning	Intercept	-0.247	0.318	-0.778	0.436	0.781
	Natural & Spacious	-2.253	0.389	-5.792	< .001	0.105
	Elegant & Romantic	-1.543	0.433	-3.566	< .001	0.214
	Cheerful & Popular	1.112	0.289	3.844	< .001	3.042
	Cultural & Historical	-0.619	0.292	-2.118	0.034	0.538
	Adventurous & Challenging	0.083	0.324	0.258	0.796	1.087
Evening – Morning	Intercept	-0.078	0.296	-0.265	0.791	0.925
	Natural & Spacious	-1.828	0.372	-4.915	< .001	0.161
	Elegant & Romantic	1.625	0.394	4.125	< .001	5.080
	Cheerful & Popular	0.350	0.265	1.322	0.186	1.420
	Cultural & Historical	-0.408	0.25	-1.634	0.102	0.665
	Adventurous & Challenging	-1.314	0.308	-4.267	< .001	0.269
Evening – Afternoon	Intercept	0.168	0.318	0.531	0.596	1.184
	Natural & Spacious	0.425	0.339	1.254	0.21	1.530
	Elegant & Romantic	3.169	0.492	6.439	< .001	23.786
	Cheerful & Popular	-0.761	0.286	-2.662	0.008	0.467
	Cultural & Historical	0.211	0.302	0.699	0.485	1.235
	Adventurous & Challenging.	-1.397	0.318	-4.395	< .001	0.247

The results from logistic regression confirm that the temporal preference for ambiance exists. This finding is important because it verifies that tourists have distinct preferences for ambiance at different times of the day. Understanding this temporal preference for ambiance is crucial for tourism stakeholders and destination managers as it provides insights into how to tailor offerings and experiences to better match tourists' preferences throughout the day. By acknowledging and accommodating these temporal variations in ambiance preferences, stakeholders can enhance the overall tourist experience, leading to increased satisfaction, longer stays, and positive word-of-mouth recommendations.

The contribution of each ambiance in shaping tourists' preferences can be visually explained with marginal means plots in Figure 3. The plots show the likelihood of preferences at each time period (morning, afternoon, and evening). Each time period is represented by a separate line or bar on the plot, with the x-axis indicating the time of day and the y-axis representing the likelihood of selecting each ambiance preference. The figures visually depict how the preferences for specific ambiances vary across different time periods. This allows for a clearer understanding of temporal patterns in tourists' preferences across the day.

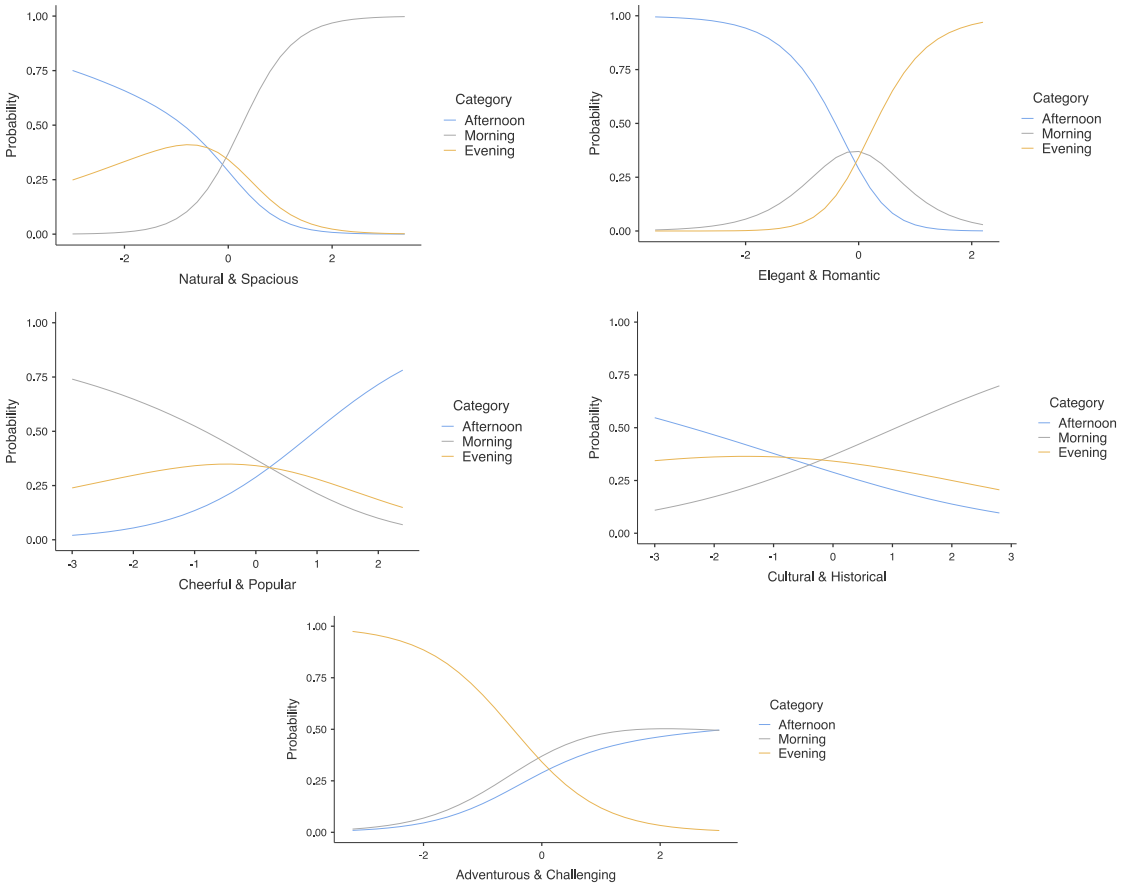

Figure 3. Marginal Means Plots Showing How Each Ambiance Affects Tourists' Temporal Preferences Across the Day

The marginal means plots in Figure 3 have interesting patterns. There is a strong preference for *Natural & Spacious* ambiance in the morning, suggesting that tourists enjoy open and peaceful environments to start their day. Conversely, the preference for *Elegant & Romantic* ambiance peaks in the evening, indicating a desire for a romantic environment as the sun sets. *Cheerful & Popular* ambiance is preferred during the afternoon, and *Cultural & Historical* ambiance receives higher preference levels in the morning. Lastly, *Adventurous & Challenging* ambiance is less favored in the evening, suggesting that tourists prefer more relaxed activities in the evening. These insights elucidate how tourist preferences for specific ambiances change throughout the day. The results also show sensible patterns in tourist preference. For example, tourists prefer natural and open spaces in the morning while avoiding places with a lively and busy atmosphere. Natural settings like parks, gardens, or scenic landscapes offer a sense of peacefulness and connection with nature that many tourists favored during this time.

Our findings align with the understanding that ambiance significantly influences tourist behavior and intentions (Wang et al., 2020). The temporal preference toward specific ambiances is in line with the results from previous studies highlighting the importance of ambiance elements, such as natural light, in shaping perceptions and influencing behavioral intentions (Castilla et al., 2024; Lyu et al., 2022). The studies suggest that the absence of natural light during nighttime may

limit visibility and stimulate fears, thus making tourists avoid challenging and natural places. However, intervening with artificial lighting can create an elegant ambiance that attracts tourists to enjoy city nightlife (Giordano, 2018; Masullo et al., 2022). Furthermore, the impact of cultural and historical ambiances in shaping tourist preference aligns with the literature emphasizing the role of sustainability and aesthetic experience in reused heritage sites (Folgado-Fernández et al., 2024; Lee et al., 2023). Similarly, the impact of a well-designed store ambiance may correspond to the tourists' preference for cheerful and popular places during the afternoon (Al-Sulaiti, 2022; Nabila et al., 2021).

Several factors may contribute to this temporal preference behavior, including physiological and circadian rhythms. The study by Gullo et al. (2019) shows that people's tendency to seek specific types of activities is highly associated with their circadian rhythms. In their experiments, Gullo et al. show that people seek less variety in the morning. However, as the day progresses, variety-seeking behavior increases, likely due to higher physiological arousal and body temperature. This variety-seeking behavior peaked during the evening when people returned to choosing simpler activities. Similar conclusions were also found by Shawa et al. (2018), highlighting that light exposure can influence preference in activities.

Similar to those studies, we observed that tourists' preferences throughout the day change along with the circadian rhythms. Our findings suggest that tourists in the morning tend to find a relaxing and peaceful environment. Besides, mornings are typically less crowded, allowing tourists to enjoy a spacious ambiance without feeling overwhelmed by crowds or noise. Prominent sites in Yogyakarta, such as Jomblang Cave, Mount Merapi, and Imogiri Pine Forest, renowned for their natural beauty and expansive landscapes, will likely appeal to tourists seeking this tranquil morning experience.

In the afternoon, tourists gravitate towards cheerful and popular locations. During this time, natural light is typically abundant and bright, providing optimal lighting for outdoor activities and sightseeing. The ample sunlight improves visibility, making it easier for tourists to explore busy city streets, cultural landmarks, and popular attractions. Popular attractions in Yogyakarta, like Malioboro Street Market, and cultural destinations like Prambanan Temple and Kraton Palace will likely attract tourists in the afternoon.

During the evening, tourists seek out elegant and romantic settings while avoiding adventurous or challenging vibes. As the sun sets, natural light fades, creating softer and warmer lighting. This change sets a more intimate tone, which resonates with tourists' preferences for romantic environments. Dining places in Yogyakarta, such as Abhayagiri and Sasanti restaurants, are well-known for their romantic ambiance and thus will likely align with tourists' preferences during the evening time.

Implication and Conclusion

Our study employs a Kansei Engineering method to explore tourists' temporal preferences for specific ambiance. It provides a fresh perspective on how ambiance influences tourist experiences. The research considers a wide range of ambiance categories and examines tourists' preferences across different times of the day.

The study provides evidence on the existence of temporal preferences for ambiance among tourists. In the morning, tourists prefer a natural and spacious ambiance, avoiding places with a cheerful and popular atmosphere. During the afternoon, tourists showed a heightened inclination toward cheerful and popular places and cultural and historical attractions. In the evening, tourists leaned towards elegant and romantic places, avoiding attractions with an adventurous and challenging ambiance. This temporal preference may be associated with physiological factors, such as circadian rhythms, which are strongly affected by natural light exposure.

Understanding these temporal preferences is crucial for tourism stakeholders and destination managers to tailor offerings and experiences to better match tourists' preferences throughout the day. For example, managers can tailor marketing strategies to highlight the unique ambiance of attractions during different times. Marketing campaigns can promote the natural and spacious aspects in the morning, cheerful and popular aspects in the afternoon, and elegant and

romantic features in the evening. Travel agencies can also design a special tour that aligns with tourists' temporal preferences. Additionally, the Kansei Engineering framework can also be adopted to develop smart tourism solutions that can help guide tourists to experiences that match their ambiance preferences during specific times or update ambiance features based on the current time of day. By accommodating these temporal preferences for ambiance, stakeholders can enhance the overall tourist experience and satisfaction.

While our study offers some new insights, it is important to recognize certain limitations in the study. Firstly, our study was based on responses collected from domestic tourists in Yogyakarta that can restrict the generalizability of findings to international tourists or those from different cultural backgrounds. Besides, our study relies on a set of Kansei words from online reviews, which could introduce a bias toward specific ambiances that are only mentioned in those reviews.

Future research can address these limitations to improve the generalizability of the findings. Specifically, researchers could expand the target population to include international tourists for a more general and broader understanding. Besides, future research could use multiple sources for Kansei words, such as focus groups or interviews, to minimize potential bias from online reviews and capture a wider range of ambiance preferences.

References

Al-Sulaiti, I. (2022). Mega shopping malls technology-enabled facilities, destination image, tourists' behavior and revisit intentions: Implications of the SOR theory. *Frontiers in Environmental Science*, *10*. https://doi.org/10.3389/fenvs.2022.965642

Benfield, J. A., Nutt, R. J., Taff, B. D., Miller, Z. D., Costigan, H., & Newman, P. (2018). A laboratory study of the psychological impact of light pollution in national parks. *Journal of Environmental Psychology*, *57*, 67–72. https://doi.org/10.1016/j.jenvp.2018.06.006

Cao, E., Chong, K. M., Pan, L., Ning, L., Pan, F. D., & Li, K. K. (2024). Oh, I remember the beauty and aesthetics of Guilin!: Exploring the implications of memorability on tourist loyalty through a two-wave panel data. *Heliyon*, *10*(1). https://doi.org/10.1016/j.heliyon.2023.e23365

Castilla, N., Blanca-Giménez, V., Pérez-Carramiñana, C., & Llinares, C. (2024). The influence of the public lighting environment on local residents' subjective assessment. *Applied Sciences*, *14*(3), 1234. https://doi.org/10.3390/app14031234

Cheng, P., Wang, W., & Yang, S. (2024). Doing the right thing: How to persuade travelers to adopt pro-environmental behaviors? An elaboration likelihood model perspective. *Journal of Hospitality and Tourism Management*, *59*, 191–209. https://doi.org/10.1016/j.jhtm.2024.04.009

Cox, D. T. C., Maclean, I. M. D., Gardner, A. S., & Gaston, K. J. (2020). Global variation in diurnal asymmetry in temperature, cloud cover, specific humidity, precipitation, and its association with leaf area index. *Global Change Biology*, *26*(12), 7099–7111. https://doi.org/10.1111/gcb.15336

Folgado-Fernández, J. A., Huete-Alcocer, N., Hernández-Rojas, R., & Vileikis, O. (2024). Information sources and tourism heritage: A sustainable economy perspective. *Journal of Cultural Heritage Management and Sustainable Development*. https://doi.org/10.1108/JCHMSD-05-2023-0062

Giordano, E. (2018). Outdoor lighting design as a tool for tourist development: The case of Valladolid. *European Planning Studies*, *26*(1), 55–74. https://doi.org/10.1080/09654313.2017.1368457

Gullo, K., Berger, J., Etkin, J., & Bollinger, B. (2019). Does time of day affect variety-seeking? *Journal of Consumer Research*, *46*(1), 20–35. https://doi.org/10.1093/jcr/ucy061

Hartono, M., Prayogo, D. N., Ronyastra, I. M., & Baredwan, A. (2024). Kansei engineering with online review mining methodology for robust service design. *Theoretical Issues in Ergonomics Science*, *25*(4), 495–520. https://doi.org/10.1080/1463922X.2023.2261995

Huang, W. J., & Wang, P. (2018). "All that's best of dark and bright": Day and night perceptions of Hong Kong cityscape. *Tourism Management*, *66*, 274–286. https://doi.org/10.1016/j.tourman.2017.12.006

James, G., Witten, D., Hastie, T., & Tibshirani, R. (2021). *An Introduction to Statistical Learning*. Springer US. https://doi.org/10.1007/978-1-0716-1418-1

Lee, Y.-J., Tsai, I.-Y., & Chang, T.-Y. (2023). Exploring tourist behavior in a reused heritage site. *Journal of Hospitality & Tourism Research*, *47*(6), 1071–1088. https://doi.org/10.1177/10963480211020089

Lin, I. Y. (2004). Evaluating a servicescape: The effect of cognition and emotion. *International Journal of Hospitality Management*, *23*(2), 163–178. https://doi.org/10.1016/j.ijhm.2003.01.001

Lyu, J., Krasonikolakis, I., & Vrontis, D. (2022). A systematic literature review of store atmosphere in alternative retail commerce channels. *Journal of Business Research*, *153*, 412–427. https://doi.org/10.1016/j.jbusres.2022.08.050

Masullo, M., Cioffi, F., Li, J., Maffei, L., Scorpio, M., Iachini, T., Ruggiero, G., Malferà, A., & Ruotolo, F. (2022). An investigation of the influence of the night lighting in a urban park on individuals' emotions. *Sustainability*, *14*(14), 8556. https://doi.org/10.3390/su14148556

Mattila, A. S., & Gao, L. (2017). *Atmospherics and the Touristic Experience* (pp. 151–160). https://doi.org/10.1007/978-3-319-42773-7_10

Melewar, T. C., Rodrigues, C., & Dennis, C. (2019). Branding places: Developing a sensorial brand identity model: An abstract. In *Developments in Marketing Science: Proceedings of the Academy of Marketing Science*. https://doi.org/10.1007/978-3-030-02568-7_247

Nabila, D. F., Setiawan, B., & Riana, F. D. (2021). The influence of store atmosphere on revisit intention at shopping tourism. *Agricultural Social Economic Journal*, *21*(4), 301–310. https://doi.org/10.21776/ub.agrise.2020.021.4.6

Paisri, W., Ruanguttamanun, C., & Sujchaphong, N. (2022). Customer experience and commitment on eWOM and revisit intention: A case of Taladtongchom Thailand. *Cogent Business & Management*, *9*(1). https://doi.org/10.1080/23311975.2022.2108584

Shawa, N., Rae, D. E., & Roden, L. C. (2018). Impact of seasons on an individual's chronotype: Current perspectives. *Nature and Science of Sleep*, *10*, 345–354. https://doi.org/10.2147/NSS.S158596

Silva, R., & Correia, A. (2017). Places and tourists: Ties that reinforce behavioural intentions. *Anatolia*, *28*(1), 14–30. https://doi.org/10.1080/13032917.2016.1240093

Sparks, K., Piburn, J., Berres, A., Urban, M., & Thakur, G. (2023). Temporal dynamics of place and mobility. In *Advances in Scalable and Intelligent Geospatial Analytics: Challenges and Applications*. https://doi.org/10.1201/9781003270928-5

Thibaud, J.-P. (2015). The backstage of urban ambiances: When atmospheres pervade everyday experience. *Emotion, Space and Society*, *15*, 39–46. https://doi.org/10.1016/j.emospa.2014.07.001

Vanhatalo, S., Liedes, H., & Pennanen, K. (2022). Nature ambience in a lunch restaurant has the potential to evoke positive emotions, reduce stress, and support healthy food choices and sustainable behavior: A field experiment among Finnish customers. *Foods*, *11*(7), 964. https://doi.org/10.3390/foods11070964

Wang, Y.-C., Liu, C.-R., Huang, W.-S., & Chen, S.-P. (2020). Destination fascination and destination loyalty: Subjective well-being and destination attachment as mediators. *Journal of Travel Research*, *59*(3), 496–511. https://doi.org/10.1177/0047287519839777

Yang, M., Jiang, P., Zang, T., & Liu, Y. (2023). Data-driven intelligent computational design for products: Method, techniques, and applications. *Journal of Computational Design and Engineering*, *10*(4), 1561–1578. https://doi.org/10.1093/jcde/qwad070

Zhang, L., & Sanake, S. (2020). Social welfare-based human comfort aggregation model to facilitate healthy and comfortable indoor environments. *Journal of Architectural Engineering*, *26*(3). https://doi.org/10.1061/(ASCE)AE.1943-5568.0000422