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Research Paper

The Role of Light and Colour as Visual Cues in Customer Attraction: Evidence from Restaurant Interiors Environments

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Abstract

The visual atmosphere of hospitality interiors plays a significant role in attracting customers and shaping their perception of space, yet its links to emotional response and time perception remain underexamined within interior architecture research. Addressing this gap, this study examines lighting and colour in restaurant interiors as a representative hospitality setting in which atmospheric variations can substantially influence customer behaviour. Adopting a multidisciplinary quantitative approach that integrates indoor environmental quality (IEQ), marketing, and behavioural psychology, the research tested four hypotheses using data collected from 441 participants in Tehran. A comparative analysis was conducted across four lighting–colour conditions of restaurants: warm/bright, cold/bright, warm/dim, and cold/dim. The findings demonstrate that lighting and colour significantly influence both emotional response and perceived waiting time, although in contrasting ways. The cold/bright condition generated the strongest emotional response, whereas the warm/bright condition was most effective in reducing perceived waiting time. Both variables significantly contributed to customer attraction, with emotion showing the stronger predictive effect (β = 0.520 compared to 0.346). The findings redefine IEQ, focusing on light and colour, as an active and measurable design strategy rather than a passive decorative background.

Keywords: *Indoor environment quality, Light and colour, Restaurant environment, Emotion, Perception of time.*

INTRODUCTION

Indoor environmental quality (IEQ) has become a major focus in interior architecture, particularly in hospitality settings where it significantly affects customers' emotional responses (Bitner, 1992; Leong et al., 2023). Among IEQ components, lighting and colour act as powerful visual stimuli that influence customer attraction, perception, and affective reactions (Shehab & Durmus, 2026). Prior research has approached hospitality image from two main perspectives: first, as a blend of functional and psychological attributes; and second, as a perception-based construct

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shaped more by customer interpretation than by objective physical conditions (Burns & Neisner, 2006).

Customers' perceptions are influenced by emotional reactions to both internal and external environmental cues, although the physical characteristics of the space also play an important role (Kim & Moon, 2009). Despite this body of research, limited attention has been given to the influence of IEQ factors, especially lighting and colour, on customers' perception of time. To address this gap, the current study examines restaurant environments, where perceived waiting time has a substantial impact on customer behaviour (Chien & Lin, 2015). In doing so, the study contributes to interior architecture while extending debates in marketing and behavioural psychology. These interdisciplinary links carry direct implications for the design/use of hospitality environments and their capacity to shape users' emotional responses and marketing outcomes.

LITERATURE REVIEW

Scholarly discussions of commercial interiors have historically emerged from marketing and consumer-behaviour research. Foundational theories such as Kotler's notion of atmospheric influence (1973) and Bitner's servicescape model (1992) established that environmental characteristics—including illumination, colour palettes, spatial arrangement, and acoustics—shape emotional reactions and behavioural responses within consumer settings. Building on this trajectory, the Stimulus–Organism–Response framework proposed by Mehrabian and Russell (1974) became one of the principal explanatory models used to examine how environmental conditions influence approach and avoidance behaviour in hospitality environments (Leong et al., 2023).

Despite the breadth of this literature, its primary orientation toward marketing has restricted the treatment of IEQ to a largely perceptual variable rather than a spatial-design concern (Turley & Milliman, 2000). As a result, interior design dimensions often remain secondary or implicit. This has created a disciplinary divide: consumer researchers tend to evaluate behavioural outcomes without engaging deeply with the design production of space, whereas architectural scholars focus on spatial composition without measuring behavioural perception (Spence, 2021). The lack of integration between these domains continues to limit the conceptual maturity of the field and highlights the need for a more interdisciplinary perspective.

Visual Environment: Lighting and Colour in Hospitality Settings

A substantial body of evidence indicates that lighting conditions and chromatic strategies influence customer mood, comfort, and behavioural intention within commercial interiors (Shehab & Durmus, 2026). Warmer colour schemes and low-temperature lighting environments are frequently linked to calmness, prolonged occupancy, and greater purchasing inclination, while cooler visual atmospheres tend to encourage attentiveness and efficiency-oriented behaviour (Leong et al., 2023). More recent experimental studies have advanced these observations. For example, Shehab and Durmus (2026) found that ambient and display lighting independently shape emotional response, risk perception, and evaluations of IEQ, while Wu et al. (2021) demonstrated that different lighting compositions in restaurant imagery generate distinct behavioural intentions.

The evidence base remains inconsistent. Several reviews have identified contradictory outcomes across studies (Spence, 2021), often due to recurring methodological limitations. Many investigations isolate a single environmental variable without adequately

controlling related factors such as luminance, colour temperature, or material reflectivity, making causal interpretation difficult (Shehab & Durmus, 2026). Additionally, research samples are heavily concentrated in Western hospitality environments and quick-service restaurants, leaving many cultural and regional contexts insufficiently explored. Another persistent issue concerns the oversimplification of colour as a single construct, despite the fact that hue, saturation, and brightness produce different perceptual effects (Farias & Aguiar, 2014; Valdez & Mehrabian, 1994). Although correlations between visual atmosphere and consumer response are widely reported, the literature offers relatively limited guidance for IEQ application.

Waiting Experience and Environmental Perception

Research on service environments has also examined the distinction between actual waiting duration and the way waiting is psychologically experienced (Bielen & Demoulin, 2007). Earlier work by Maister (1984) argued that waiting becomes more tolerable when individuals are occupied, informed, and physically comfortable, and these principles continue to influence contemporary service research. Studies within restaurant contexts indicate that perceived waiting time strongly affects satisfaction, return intention, and customer recommendations (Jo et al., 2025). Chien and Lin (2015), for instance, identified emotional response and perceived waiting duration as two separate mechanisms through which service environments influence customer behaviour, with crowding and communication emerging as particularly influential variables.

This field has generally prioritised managerial and operational concerns—such as queuing systems, employee interaction, and informational strategies—rather than spatial or architectural conditions (Lee & Lambert, 2006). Environmental influences are often reduced to broad notions such as "comfort" or "ambience," without translating them into measurable IEQ dimensions. Worlitz et al. (2019) noted that waiting-environment research lacks methodological consistency and rarely incorporates architectural or design-based frameworks. More recent attention to digital queuing systems and augmented dining technologies (Jo et al., 2025) has further shifted focus away from the physical environment, despite the continued relevance of in-person waiting experiences in restaurants globally.

Indoor Environment Quality and the Perception of Time

A smaller stream of research has begun to investigate whether lighting and colour directly alter temporal perception. Findings from transport and hospitality environments suggest that warm colours and softer lighting may shorten perceived waiting duration, whereas bright, cool-toned settings may intensify awareness of time passing. Bilgili et al. (2020) applied this proposition to restaurant settings and reported shorter perceived waits under green lighting conditions. Although these matters indicate a potentially significant relationship between IEQ and time perception, the empirical evidence remains preliminary. Existing studies often rely on limited sample sizes, short-term simulations, and insufficient control over variables such as brightness and colour temperature. Cross-cultural validation is also largely absent. More importantly, these investigations rarely situate lighting and colour within a broader architectural composition; instead, visual variables are treated as isolated experimental stimuli detached from the holistic spatial experience of interior environments.

At the theoretical level, the continued reliance on the Stimulus–Organism–Response framework (Mehrabian & Russell, 1974) has also been questioned (Leong et al., 2023). Critics argue that

the model inadequately explains the cognitive mechanisms through which individuals process environmental information during waiting experiences (Spence, 2021). Without integrating perspectives from environmental psychology, design theory, and studies of temporal perception, simplified conclusions regarding lighting and waiting experience risk becoming reductive design assumptions rather than evidence-based principles (Leong et al., 2023; Spence, 2021).

Despite the growing body of scholarship on atmospherics, servicescapes, and perceived waiting time, a significant conceptual gap remains within the literature. *Current studies still lack a comprehensive framework capable of linking IEQ (light and colour) to perceived waiting-time experiences through the mediating roles of emotion, cognition, and customer behaviour.* Existing research frequently isolates environmental stimuli as independent variables without situating them within a coherent spatial and experiential design context. The relational dynamics between IEQ elements, spatial composition, and customers' behavioural and emotional responses remain insufficiently theorised and empirically integrated. In response to this limitation, the present study positions lighting and colour as integral components of IEQ and examines their influence on perceived waiting duration within restaurant environments.

RESEARCH FRAMEWORK AND METHODOLOGY

The research framework, grounded in a pragmatic perspective (Saunders, 2009), conceptualises customer attraction as a key outcome of IEQ and associated customer perceptions. The model is structured around four interrelated constructs: colour, light, perceived waiting time, and emotion (Leong et al., 2023; Russell & Pratt, 1980). To examine the relationships among these mediating variables in an integrated manner, the research model (Figure 1) visually represents the hypothesised pathways and their interconnections. Accordingly, the study tests the following four hypotheses:

H1: Colour and lighting in the environment affect visitors' emotional responses (Valdez & Mehrabian, 1994).

H2: Colour and lighting in the environment affect perceived waiting time (Bilgili et al., 2020).

H3: Emotional stimulation positively affects customer attraction (Mehrabian & Russell, 1974).

H4: Optimal perception of waiting time positively affects customer attraction (Bielen & Demoulin, 2007).

This study adopts a quantitative research design grounded in a postdigital methodological approach (Jandrić et al., 2018), which enables a more efficient and cost-effective process of data collection. Rather than relying on the physical modification of built environments—a resource-intensive approach often constrained by financial and infrastructural limitations in contexts such as Iran—the study employs digital simulation tools to construct experimental settings. In this regard, Autodesk 3ds Max was used to model a restaurant interior, allowing systematic manipulation of lighting and colour conditions across controlled visual scenarios.

As illustrated in Figure 2, four distinct experimental configurations of lighting and colour were developed and presented to participants. The colour schemes were informed by Johannes Itten's colour theory, particularly his framework of contrasts and perceptual interactions between hues (Itten, 1970). This theoretical basis ensured that the visual stimuli reflected established principles of colour harmony and contrast within design theory.

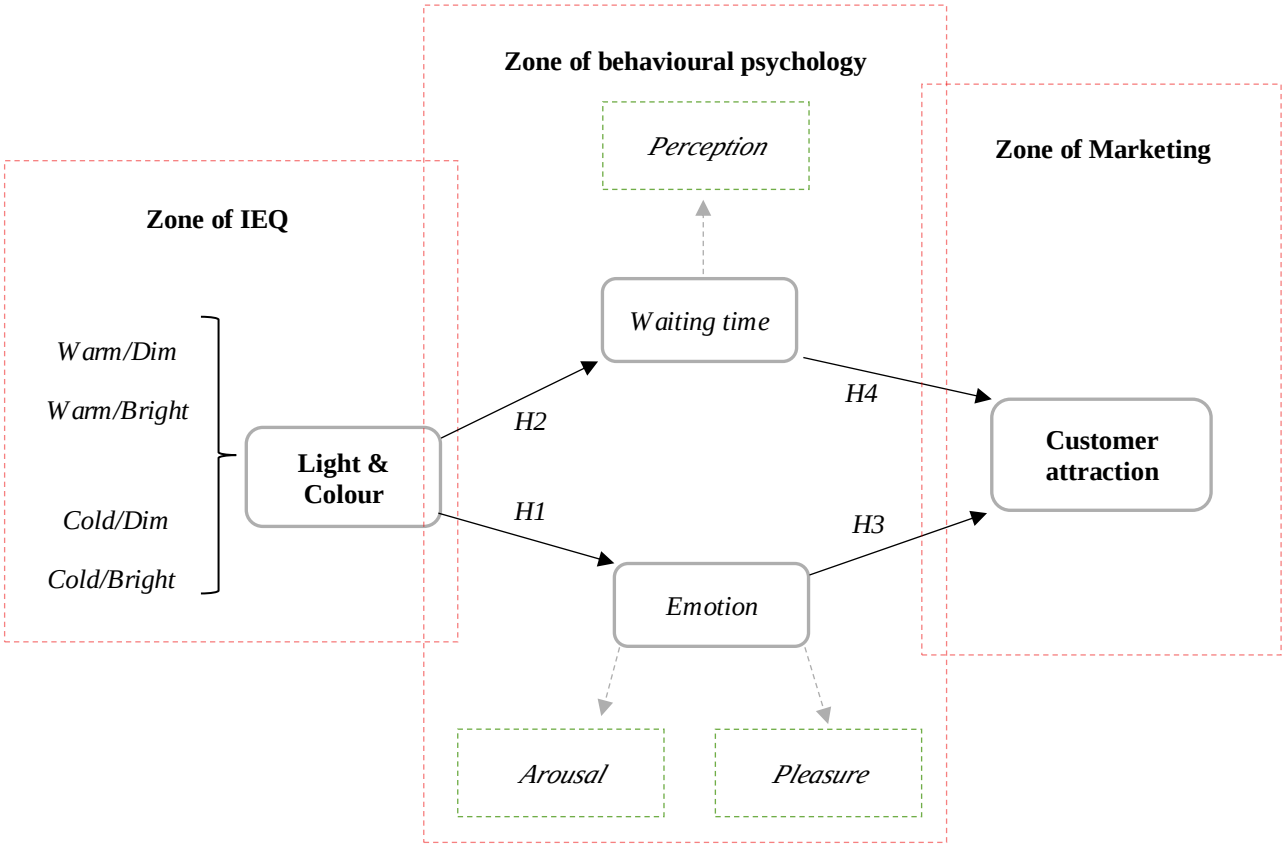

Fig 1. The Research Framework (Source: Authors)

The study employs a correlational design to examine relationships between variables. The target population consisted of restaurant visitors in Tehran. Given the absence of access to a single controlled physical environment with variable lighting and colour conditions, and the financial constraints associated with constructing experimental interiors, the study utilised image-based experimental panels as a data collection instrument. This approach is widely accepted in environmental perception and servicescape research, particularly when real-world manipulation is impractical. Accordingly, data were collected through a structured questionnaire designed to measure emotional response, perceived waiting time, and customer attraction, adapted from established validated scales in environmental psychology and servicescape research (e.g., Bitner, 1992; Mehrabian & Russell, 1974). All items were assessed using a seven-point Likert scale ranging from strong disagreement to strong agreement.

Sample size was determined using Cochran's formula. A total of 468 questionnaires were distributed; after excluding incomplete or invalid responses, 441 valid questionnaires were retained for analysis. Stratified random sampling was employed to ensure representation across different urban and socio-economic contexts within Tehran. Accordingly, data were collected from four geographical zones (North, South, East, and West Tehran) to capture variation across income groups and restaurant types. In addition, the sample was structured to reflect key demographic and behavioural variables, including age, gender, education level, income, type of restaurant visited (fast food, traditional Iranian restaurants, and multi-purpose restaurants), and frequency of restaurant visits. This stratification allowed for a more comprehensive assessment of customer perceptions across diverse consumer segments.

Fig 2. Simulation of Four Different Options of Restaurant IEQ (Lighting and Colour)[1]

Regression analysis and ANOVA were employed to analyse the collected data. Prior to the main analysis, a pilot test was conducted with 30 respondents to assess the reliability of the questionnaire. The results indicated acceptable internal consistency, with Cronbach's alpha values exceeding 0.70 across the measured constructs, confirming the adequacy of the instrument for further analysis (Saunders, 2009).

In the main study, participants were first exposed to the simulated restaurant images representing different lighting and colour conditions. They were then asked to complete a structured questionnaire based on these visual stimuli. The instrument consisted of two sections: the standard PAD (Pleasure–Arousal–Dominance) scale (Mehrabian & Russell, 1974), and a set of researcher-developed items measuring perceived waiting time. Following data collection, responses were analysed statistically, and reliability was assessed separately for each construct to ensure internal consistency across the different measurement scales.

RESULTS

Based on statistical significance, lighting and colour have a significant impact on perceived waiting time, with the strongest effect observed in the warm/bright condition; therefore, H1 is supported. According to the results presented in the following table, the mean differences between cold/dim and cold/bright, cold/bright and warm/dim, and finally warm/bright and both cold/dim and warm/dim conditions are statistically significant. The largest difference is observed between the warm/bright and warm/dim conditions (0.5783), indicating that the warm/bright condition has the strongest effect on perceived waiting time.

This suggests that, in the majority of respondents, exposure to warm/bright environments reduces perceived waiting time and increases tolerance within the space. Overall, it can be argued that lighting and colour, as a combined IEQ factor in restaurant environments,

[1] The images used in this study were originally developed in Effects of Interior Colors, Lighting and Decors on Perceived Sociability, Emotion and Behaviour Related to Social Dining (Wardono et al., 2012).

significantly influence time perception. In particular, the findings of this study indicate that the warm/bright condition is associated with higher levels of perceived satisfaction and a more favourable waiting experience.

Waiting Time

As presented in Table 1, among the six examined customer characteristics, age and type of restaurant showed a significant influence on perceived waiting time. Younger respondents (18–25 years) showed a stronger preference for the warm/bright condition compared to other age groups. As age increased (25–35, 35–45, and above 45), preference for the warm/bright condition gradually decreased, while preference for the cold/bright condition showed a slight increase. Although these differences were more noticeable in the oldest group (above 45), they were not statistically strong, and overall, the warm/bright condition remained the most preferred across all age categories.

This pattern may be explained by a greater tendency among older participants to prefer cooler colour environments, which are often associated with relaxation and reduced anxiety. In contrast, consistent with earlier findings, warm/bright environments appear to enhance users' adaptive comfort and reduce perceived waiting time, thereby contributing to higher overall satisfaction.

Regarding restaurant type, respondents generally preferred the warm/bright condition across all categories. However, this preference was strongest in fast-food restaurants, which may be partly explained by the relatively younger demographic profile of the sample.

Emotion

Based on statistical the significance presented in Table 2, lighting and colour have a significant impact on emotion; therefore, H2 is supported, with the strongest effect observed in the cold/bright condition. According to the results presented in the following table, the mean differences between cold/bright and both warm/dim and cold/dim conditions, as well as between warm/bright and both warm/dim and cold/dim conditions, are statistically significant. The largest difference is observed between the cold/bright and warm/dim conditions (0.8162), indicating that the cold/bright condition exerts the strongest influence on emotional response.

Overall, these findings suggest that this lighting–colour configuration has a greater capacity to regulate users' emotional states. As indicated in the conceptual model, emotion is composed of two key dimensions—pleasure and arousal—both of which are significantly influenced by lighting and colour conditions. Variations in optical spectra and levels of brightness can therefore modify emotional responses by altering both pleasure and arousal.

In this context, increased brightness appears to enhance pleasure by promoting a sense of psychological comfort, relaxation, and calmness among participants. At the same time, the cooler colour spectrum is associated with reduced arousal levels, making it the most effective spectral condition within the framework of this study. Consequently, it can be concluded that the cold/bright condition exerts the strongest overall influence on emotional response.

Among the six examined customer characteristics, only age showed a significant effect on emotional response. All age groups expressed a preference for the cold/bright condition over the other lighting–colour settings; however, this preference was stronger among younger participants (below 18 and 18–25 years) compared to older groups.

This finding may be partly explained by the fact that the "cold" colour used in this study was green, which holds specific cultural and religious significance in the Iranian context and is widely regarded as a sacred or positively symbolic colour.

Finally, based on statistical analysis (See Table 3), both perceived waiting time and emotion had a significant impact on customer attraction; accordingly, H3 and H4 are supported. However, as indicated in the regression results, emotion ($\beta = 0.520$) exerts a stronger influence on customer attraction than perceived waiting time ($\beta = 0.346$). This suggests that aligning lighting and colour conditions with human emotional responses can play a key role in enhancing customer satisfaction within restaurant environments and in shaping users' emotional experience.

Table 1. Perceived Waiting Time (Source: Authors)

Dependent Variable: Waiting Time						
Colour/Light	(J) Colour/Light	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
WARM/DIM	COLD/DIM	-.0910	.19028	.633	-.4650	.2830
	COLD/BRIGHT	-.4419*	.18594	.018	-.8074	-.0765
	WARM/BRIGHT	-.5793*	.18717	.002	-.9471	-.2114
COLD/DIM	WARM/DIM	.0910	.19028	.633	-.2830	.4650
	COLD/BRIGHT	-.3509	.18778	.062	-.7200	.0182
	WARM/BRIGHT	-.4883*	.18900	.010	-.8597	-.1168
COLD/BRIGHT	WARM/DIM	.4419*	.18594	.018	.0765	.8074
	COLD/DIM	.3509	.18778	.062	-.0182	.7200
	WARM/BRIGHT	-.1373	.18463	.457	-.5002	.2256
WARM/BRIGHT	WARM/DIM	.5793*	.18717	.002	.2114	.9471
	COLD/DIM	.4883*	.18900	.010	.1168	.8597
	COLD/BRIGHT	.1373	.18463	.457	-.2256	.5002

Based on observed means. The error term is Mean Square (Error) = 1.900.

*. The mean difference is significant at the .05 level.

Table 2. Impact on Emotion (Source: Authors)

Dependent Variable: EMOTION						
Colour/Light	(J) Colour/Light	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
WARM/DIM	COLD/DIM	-.0241	.16584	.885	-.3501	.3020
	COLD/BRIGHT	-.8162*	.16584	.000	-1.1422	-.4901
	WARM/BRIGHT	-.7497*	.16303	.000	-1.0702	-.4292
COLD/DIM	WARM/DIM	.0241	.16584	.885	-.3020	.3501
	COLD/BRIGHT	-.7921*	.16584	.000	-1.1182	-.4660
	WARM/BRIGHT	-.7257*	.16303	.000	-1.0462	-.4051
COLD/BRIGHT	WARM/DIM	.8162*	.16584	.000	.4901	1.1422
	COLD/DIM	.7921*	.16584	.000	.4660	1.1182
	WARM/BRIGHT	.0664	.16303	.684	-.2541	.3870
WARM/BRIGHT	WARM/DIM	.7497*	.16303	.000	.4292	1.0702
	COLD/DIM	.7257*	.16303	.000	.4051	1.0462
	COLD/BRIGHT	-.0664	.16303	.684	-.3870	.2541

Based on observed means. The error term is Mean Square (Error) = 1.334.

*. The mean difference is significant at the .05 level.

Table 3. Coefficients (Source: Authors)

Coefficients						
Model		Unstandardized Coefficients		Standardized Coefficients	Model	Sig.
		B	Std. Error	Beta		
1	Constant	.587	.057		10.331	.000
	Emotion	.681	.053	.520	12.859	.000
	Waiting time	.398	.047	.346	8.540	.000
a. Dependent Variable: Customer attraction						

DISCUSSION

The four hypotheses tested in this study were all supported, and the pattern of results extends, refines, and in some places complicates the existing literature on IEQ, atmospherics, and perceived waiting time.

H1: Colour and light affect customer emotions. The data confirm that lighting and colour exert a significant effect on visitors' emotional states, with the cold/bright condition producing the strongest impact (the largest mean difference, 0.8162, was between cold/bright and warm/dim). This aligns with the broader servicescape and S-O-R tradition (Burns & Neisner, 2006; Chien & Lin, 2015) and with recent experimental evidence that chromatic lighting independently modulates emotional state (Shehab & Durmus, 2026). However, the finding that cold/bright dominated emotion regulation diverges from Western hospitality studies that consistently associate warm tones with pleasure (Leong et al., 2023). A culturally specific reading is plausible: the cold colour used in this study was green, which holds symbolic value in Iranian culture. This directly supports the critique advanced earlier that atmospherics research over-generalises Western samples and underweights cultural context.

H2: Colour and light affect perceived waiting time. Light and colour significantly affected perceived waiting time, with warm/bright conditions producing the strongest reduction in perceived duration. This converges with Bilgili et al., (2020), who found that lighting colour reliably shifted waiting-time perceptions in restaurant settings, and with earlier transit-environment studies showing that warm hues combined with controlled brightness compress perceived time. The present work advances this evidence in two ways: it tests the joint manipulation of colour and lighting rather than isolating one cue—addressing the variable-interaction gap identified in the review—and it draws on a larger, stratified Tehran sample (n = 441) than Bilgili et al.'s (2020) n = 68. The age effect (younger respondents preferred warm/bright more strongly; preferences shifted toward cold/bright with age) further suggests that perceived-time research should disaggregate demographic strata rather than treat the customer as a uniform organism, a limitation flagged by Worlitz et al. (2019).

H3: Emotional stimulation affects customer attraction. Emotion exerted a significant and comparatively large effect on customer attraction ($\beta = 0.520$). This finding consolidates the S-O-R proposition that affective response mediates between environmental stimuli and approach behaviour (Leong et al., 2023; Mehrabian & Russell, 1974), and it is consistent with Chien and Lin (2015) two-route model, in which the emotional route was the stronger predictor of approach behaviour in fast-food contexts. The result also reinforces Spence's (2021) argument that sensory-emotional design should be treated as a primary, not residual, lever in hospitality interiors.

H4: Perceived waiting time affects customer attraction. Perceived waiting time also significantly affected customer attraction

(β = 0.346), confirming the long-standing claim that subjective rather than objective wait duration shapes service evaluation (Bielen & Demoulin, 2007). However, the weaker beta relative to emotion implies that compressing perceived time is necessary but not sufficient for customer attraction. This nuance Chien and Lin (2015) account for by suggesting that the interaction between the emotional and time-perception routes—rather than either route in isolation—is what designers should ultimately target.

Limitations

Although image-based experimental methods are well established in environmental perception research, they cannot fully reproduce embodied, real-world spatial experience. The sample is limited to one metropolitan context (Tehran), which restricts generalisability. In addition, only a narrow range of lighting and colour parameters was examined.

Future research should extend this framework to in-situ settings, incorporate a broader range of cultural contexts, and include more granular IEQ variables such as correlated colour temperature, hue–saturation–brightness combinations, and material reflectance. Such extensions would enable a shift from correlational findings toward a more comprehensive, design-oriented theory of environmental influence on consumer behaviour.

CONCLUSION

This study investigated whether IEQ—specifically the combined effects of lighting and colour—influences customers' emotional responses and perceived waiting time in restaurant interiors, and whether these factors subsequently affect customer attraction. Based on a stratified sample of 441 restaurant visitors in Tehran, all four hypotheses were supported. Lighting and colour significantly influenced both emotional response and perceived waiting time, while both constructs significantly predicted customer attraction, with emotion emerging as the stronger predictor (β = 0.520 vs. 0.346). In particular, cold/bright conditions were most effective in enhancing emotional response, whereas warm/bright conditions were most effective in reducing perceived waiting time.

These results contribute to the literature in three main ways. Empirically, the study provides robust evidence from a relatively large sample that treats lighting and colour as interacting environmental parameters rather than isolated stimuli, addressing a limitation common in prior research. Theoretically, it integrates the atmospherics and servicescape tradition with service management research on perceived waiting time, offering a more unified explanatory model and addressing a long-standing lack of conceptual integration. Culturally, the strong performance of green—an emotionally significant colour in the Iranian context—as a key emotional driver challenges dominant Western assumptions regarding the universal effectiveness of warm-toned environments and highlights the importance of context-sensitive IEQ research.

From a design and practice perspective, the findings suggest that no single lighting–colour configuration can be considered universally optimal. Instead, designers must navigate a trade-off between enhancing emotional experience and reducing perceived waiting time, with appropriate solutions depending on spatial function, user demographics, and cultural context. Framing IEQ as an intentional and measurable design instrument, rather than a passive aesthetic backdrop, provides a more precise basis for improving both experiential quality and operational performance in hospitality environments.

Implications

Theoretical Contributions: This study contributes to the atmospherics and servicescape

discourse in several important respects. First, it conceptualises IEQ through the combined interaction of lighting and colour rather than examining these variables independently, thereby addressing the interactional limitations identified in earlier research. Second, the study integrates two largely disconnected research trajectories—namely, studies on the psychological effects of lighting and colour in environmental settings and research on perceived waiting time within service environments—into a unified analytical framework. In doing so, it responds directly to the lack of theoretical integration within current scholarship. Third, the findings indicate that emotional response exerts a stronger influence on customer attraction than perceived waiting time. This outcome extends the explanatory capacity of the S–O–R framework by demonstrating that the cognitive and emotional dimensions of the "organism" stage require more nuanced treatment than is typically offered in contemporary servicescape studies.

Implications for Design Practice: The findings also carry practical implications for interior designers and restaurant operators. The results suggest that there is no universally ideal lighting–colour configuration suitable for all restaurant contexts. Cooler and brighter environmental conditions appear more effective for emotional balance and controlled stimulation, whereas warmer and brighter settings are more successful in reducing perceived waiting duration. Rather than treating these outcomes as contradictory, they can be strategically integrated within spatial programming. For instance, warm and bright atmospheric conditions may be more appropriate in waiting and queuing areas, while cooler and brighter compositions may better support seating and dining spaces. Similarly, adaptive lighting systems with adjustable colour temperature could allow restaurants to modify environmental conditions throughout different phases of the customer experience. The findings further indicate that demographic characteristics influence environmental preference: younger customer groups appear more responsive to warm and bright settings, whereas colder and brighter atmospheres remain effective for older users.

Cultural and Methodological Significance: The prominence of green lighting in generating positive emotional responses introduces an important cultural dimension to the interpretation of atmospheric effects. In the Iranian context, where green possesses strong cultural associations, the findings challenge assumptions within predominantly Western literature that warm-toned environments universally produce the most favourable emotional outcomes. This suggests that IEQ strategies should not rely on universalised design assumptions but instead account for cultural and contextual specificity. Accordingly, future servicescape and environmental psychology models would benefit from incorporating cultural variables more explicitly into their analytical frameworks.

Interdisciplinary Relevance: The study also contributes to cross-disciplinary dialogue between marketing, environmental psychology, and interior architecture. From a marketing perspective, it redefines IEQ not merely as a background atmospheric condition but as an active and measurable design mechanism capable of shaping behavioural responses. From an interior architecture perspective, the research provides empirical support for spatial and sensory design decisions that are frequently justified only through aesthetic judgement or professional intuition. Moreover, the conceptual framework developed in this study has applicability beyond restaurant settings. Similar models examining the relationships between lighting, colour, emotion, and temporal perception may be extended to healthcare environments, transportation terminals, hospitality queues, and other waiting-oriented spaces, thereby opening broader opportunities for multidisciplinary research and evidence-based spatial design.

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