https://doi.org/10.62674/ijabmr.2025.v3i02.006

International Journal of Advances in Business and Management Research (IJABMR)

https://ejournal.svgacademy.org/index.php/ijabmr/

OPEN ACCESS

DECODING SERVICESCAPE FROM AMBIENCE TO CUSTOMER SATISFACTION IN INDIAN URBAN RESTAURANTS: A QUANTITATIVE APPROACH USING WILCOXON SIGNED-RANK METHOD

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Original Article

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Abstract

This study explores how ambient settings, specifically lighting, scent, music, and temperature, affect customer satisfaction in Indian urban restaurants. The research is based on the Stimulus-Organism-Response (S-O-R) and the Servicescape Model of Bitner, which intends to quantify expectations/perceptions differences between these sensory dimensions and whether they cause total satisfaction. The survey was given to 250 respondents employing a 5-point Likert scale to obtain expectations and perceptions of ambient conditions. A non-parametric test, which is applicable to ordinal data, the Wilcoxon Signed-Rank Test, was used to test significant differences in expectation and perception scores of each of the factors. Outcomes reveal statistically significant changes across all four ambient variables. Lighting, scent, and music exceeded customer expectations, indicating positive disconfirmation and enhanced satisfaction. On the other hand, temperature fell short of expectations, highlighting discomfort as a key dissatisfaction driver. The findings affirm that ambient cues are not peripheral but central to shaping experiential quality in hospitality settings.This study contributes by assimilating servicescape and S-O-R theories with a non-parametric statistical approach to empirically test expectation–perception gaps in an Indian context.

Keywords: Consumer Satisfaction; Consumer Expectation and Perception; Servicescape; S-O-R Model

Introduction

The range of services offered in today's cutthroat global hotel sector goes beyond fine dining to include sensory and immersive design. The servicescape, coined by Bitner [1], refers to the physical and impressive environment that discreetly but significantly influences client behaviour. This aspect covers thermal relaxation, music, lighting, and fragrance. This study attempts to measure the influence of each ambient variable using the Stimulus–Organism–Response (S-O-R) framework, which explains how environmental stimuli generate emotional and behavioural reactions. In the increasingly competitive restaurant sector, an inclusive understanding of the factors of customer happiness has become crucial. While food quality and service superiority remain crucial, recent literature highlights the relevance of the servicescape – the physical and sensory environment in which services are given – as a key driver of consumer experience. Bitner [1] coined the term "servicescape", which refers to the physical environment that shapes consumer expectations, attitudes, and actions in service environments.

These ambient elements form the sensory backdrop of the dining environment and exert a largely subconscious yet powerful effect on customer moods and perceptions. They expressively contribute to how individuals assess service quality and overall satisfaction, especially in urban restaurant settings where experiential quality progressively

Received 24th October 2025; Revised 12th November 2025; Accepted 25th November 2025

differentiates service offerings. In this evolving landscape, restaurants are no longer evaluated solely on culinary performance; rather, experiential immersion shaped by thoughtfully curated sensory stimuli is a central aspect of competitive positioning. According to this paradigm, the organism (i.e., the consumer) is affected by environmental stimuli (such as music or aroma) through emotional and cognitive reactions, which in turn affect behavioural outcomes like satisfaction, loyalty, and recommendation activities. Within the context of restaurant services, ambient stimuli can be strategically manipulated to positively shape the emotional tone of the dining experience, ultimately enhancing consumer satisfaction and long-term engagement. Despite the increasing recognition of the servicescape's importance, there is a noticeable lack of empirical studies that objectively assess how ambient factors affect customer satisfaction, especially in developing nations like India. Moreover, these urban spaces are shaped by regional climatic variability, spatial constraints, and evolving consumer expectations, which makes them fertile ground for analysing how ambient design elements influence satisfaction across different customer segments. The present study employs a robust quantitative methodology to examine the differential impacts of lighting, fragrance, temperature, and music on customer satisfaction in Indian urban restaurants, thereby addressing existing research deficiencies. By establishing the analysis within the Servicescape and S-O-R frameworks, this research not only contributes to the expanding pool of knowledge in hospitality and service marketing but also provides practical advice for restaurant managers looking for ways to improve the experience through sensory design approaches.

Literature Review

According to the "social-services cape model" put forth by Tombs & McColl-Kennedy [2], consumer behaviour is influenced by both social and physical aspects of the environment, including other customers and service providers. "The design of the physical environment and service staff qualities that characterise the context which houses the service encounter, which elicits internal reactions from customers leading to the display of approach or avoidance behaviours," is the term used to describe the servicescape by Bitner [1]. It has been argued that the servicescape comprises both physical and intangible components such as societal, social, and psychological elements. Numerous factors influence the customer's behavioural intentions and degree of satisfaction, according to service landscape research [3, 4, 5, 6]. Most of the research focused on the service firm's interior appearance, including its equipment, décor, illumination, music, smell, colour, and other aspects. In the following section, a short overview of the past research in servicescapes is presented.

One environmental stimulus is not what predetermines the judgement of a customer about a particular service. As a rule, customers perceive servicescapes as a whole and pay attention to a multitude of factors in their quest to understand their level of satisfaction [1, 7]. Bitner [1] claimed that the primary characteristics of the servicescape influence the holistic views of customers (i.e., perceived quality) and their responses of internal (i.e., contentment with the servicescape) and external (i.e., approach/avoidance, remaining, and support) responses. According to Lin & Mattila [8], the service experiences involve the judging of the servicescape and the staff interactions. Research has shown that music plays an important role in servicescapes in that it can arouse intense emotions and create a perception of customers, their moods and their purchasing habits [4], as well as have an impact on the level of relaxation and satisfaction in customers [9].

Research carried out in hotels and restaurants shows that the speed of the music can determine the rate of shopping, the duration of stay, and the amount of money one spends [6]. Moreover, noises and loudness usually affect the customers negatively. Noise has been described by people as unpleasant and annoying [10]. Temperature is one of the factors that may be unpleasant unless it is handled well. The environment that is too hot or too cold can harm customers [11]. The desire for a consumer to purchase may be affected by smell. According to the decision made by Morrin & Ratneshwar [12], pleasant scents will make customers spend more time in the servicescape. As the study by Hirsch [13] argued, bakeries have the potential of increasing their sales by 300 per cent through the application of scent. Starbucks coffee chains, operating in the service context, have much emphasis on scent [14]. It has been found that lighting has been one of the strongest physical stimulators in restaurants. The preferred levels of lighting relate to people's emotional reactions. As an example, bright lights at fast-food restaurants (such as McDonald's) could be a sign of fast service and affordable prices, whereas low-level lights could be a sign of full service and expensive prices [9]. Since it enables the customers to receive implicit messages on the criteria and expected behaviour of the servicescape [1], the decor, the quality of the

materials used in the building, paintings, and flooring are visual signifiers that generate the right mood in the servicescape [15].

Décor is important in the social setting of a restaurant in that it contributes to human behaviour, especially social intimacy [16]. Like this, a customer's perception of a restaurant's success or failure, price or affordability, and reliability can all be influenced by its décor [1]. Customers' perceptions of quality and enthusiasm levels may be directly impacted by furnishings, and their willingness to return may be indirectly impacted [9]. Customers' comfort levels and opinions of the quality of the service are influenced by the furnishings in a restaurant [1, 17, 18, 19, 20]. Wakefield & Blodgett [21] pointed out that as "customers remain in the same seat for extended periods of time," comfort becomes crucial. One important aspect of the service environment has been identified as cleanliness [22]. Customers' satisfaction levels and perceptions of service quality are impacted [21]. It affects how consumers perceive the service at first and, consequently, whether they plan to use it again [23]. Basic contentment results from expectations being confirmed when cleanliness meets expectations. Positive disconfirmation and positive emotions occur when service scape cleanliness surpasses initial expectations [24].

According to a 2003 study by Hoffman et al. [25], consumers blamed servicescape failures on unclean rooms and other areas. Customer retention rates were lowest for businesses with the worst cleanliness issues. The study discovered a correlation between a casino's cleanliness and its patrons' satisfaction with the service, willingness to promote it, intention to return, and desire to stay. In their study, Vilnai-Yavetz & Gilboa [24] discovered that cleanliness influences patrons' inclination to return to restaurants and is a significant predictor of approach behaviour. According to Eiseman [26], the colour of an interior setting is a strong visual component. Colour has been found to influence people's emotions and moods. Brightly coloured walls and seats may be more visually appealing than dull facades and chairs [27]. As a result, at a restaurant, the appropriate colour schemes will either energise or calm patrons. Superior table décor, including glasses, cutlery, flatware, and table coverings, can affect how patrons perceive the overall quality of restaurant service. Additionally, table décor (such as candles and fresh flowers) might provide patrons the impression that they are in a fine dining establishment.

A restaurant's spatial arrangement, including the placement of the service areas, restrooms, entry, doors, and corridors, is crucial. In service areas that are accessible, customers might spend more time. The extra time could raise the probable amount of money they spend. Time and money spent in hotels are positively correlated, according to research in the hotel industry [28]. Communication can be greatly aided by signage that subtly conveys to patrons the restaurant's image, standards, and anticipated conduct. Additional interior design components like banners, pictures, decorative signs, and other fixtures may further enhance the servicescape's perceived quality. The manners, qualifications, and behaviour of the staff are related to the service presentation. Employees in restaurants have a major impact on patrons' opinions, intents to buy, and loyalty. Frontline service providers' behaviours have a significant impact on customers' perceptions of their service [8]. Clients regard staff competence as the key criterion for choosing service providers. The appearance of the staff can significantly enhance the customer experience.

According to Hutton & Richardson [29], a service organization's image is largely shaped by the physical attractiveness of its employees, or "a pleasing physical demeanour through clean, colourful uniforms and proper personal grooming." In their study, Vilnai-Yavetz & Gilboa [24] discovered a favourable correlation between the customers' perceptions of the waiter's appearance and their feelings of trust and friendliness. Customers' initial perception of a restaurant and its offerings is shaped by its physical space. As a result, the restaurant's layout, architecture, appearance, furnishings, and personnel all play a significant role in how guests perceive it right away; the restaurant servicescape is significant for customer experiences [30]. Consumers evaluate the restaurant's physical layout, external and interior features, and surroundings, all of which have an impact on patron satisfaction and enjoyment [8]. When clients evaluate the quality of a restaurant and the eating experience, the servicescape may also generate cognitive or perceptual emotions (service quality, disconfirmation, value) in them [31, 32].

According to Reimer & Kuehn [33], servicescapes have an impact on how long patrons want to stay at a restaurant and if they plan to return, which in turn affects how well they perceive the overall quality of the establishment. Customers may encounter a variety of cues in a service setting that could influence their behaviour, purchases, and level of

satisfaction with the experience. Studies on how consumers react to servicescapes demonstrate that they serve as indicators for assessing the quality of services provided [1]. Customers' purchasing decisions are influenced by the atmosphere, which includes things like music, temperature, lighting, colours, and aromas [34]. A cosy vibe at a restaurant boosts happy emotions because the surroundings shape moods. When people feel positive, they tend to enjoy the experience more – leading to higher satisfaction. Happy customers stick around longer, which means their behaviour shows more loyalty over time. Happy customers tend to come back, plus they're apt to tell friends, visit more often, recommend the place, and spend extra. Mood and vibe—the look, the items on display, the space design, and the lighting—affect how much guests feel it's worth it, say Han & Ryu [35]. What people think is worth it links directly to whether they're pleased, found Patterson & Spreng [36], who studied reactions in service spots. Looking at eateries, Harris & Sachau [22] noticed five things that really swayed loyalty plans – how clean it feels, staff appearance, furniture quality, focus on guest needs, and visual charm or subtle cues. Way back in 1981, Booms and Bitner came up with the term 'servicescape' to mean all parts of the tangible setup behind service delivery.

Objectives of the Study

1. To analyse the individual impact of lighting, music, temperature, and scent on customer satisfaction using the Wilcoxon Signed-Rank method.
2. To assess whether ambient sensory changes significantly alter consumer perceptions within urban dining contexts [37].

Theoretical Framework

A paradigm change has occurred in the hospitality business, especially in the restaurant sector, where customer happiness is increasingly impacted by the physical and sensory aspects of the service environment in addition to the quality of the food and service. In this setting, Bitner's Servicescape Model [1] serves as a core framework. According to the approach, the physical environment has a big impact on how employees and customers behave. The three dimensions of the servicescape include ambient circumstances, physical arrangement and functionality, and signs, symbols, and artefacts. The ambient conditions—such as lighting, aroma, temperature, and music—are the focus of this study since they are thought to be the most direct and significant sensory signals in influencing patrons' perceptions and emotional reactions in dining environments.

Ambient conditions, as conceptualised in the servicescape model, form the atmospheric backdrop that impacts customers at both conscious and subconscious levels. These sensory elements are particularly relevant in urban Indian restaurants, where intense competition has led establishments to invest heavily in experiential differentiation. A well-designed servicescape enhances aesthetic appeal and affects how customers interpret service quality, comfort, and emotional well-being. However, the extent to which these ambient conditions meet or fall short of customer expectations has not been widely measured in empirical studies, especially in the Indian context. This research thus seeks to bridge this gap by comparing customer expectations and perceptions of these ambient features to evaluate their influence on satisfaction outcomes.

The hospitality industry has undergone a paradigm shift, particularly in the restaurant industry, where customer satisfaction is increasingly influenced by the physical and sensory elements of the service environment in addition to the calibre of the food and services. Bitner's Servicescape Model [1] provides a fundamental paradigm in this context. The idea holds that the physical surroundings have a significant influence on the behaviour of both consumers and staff. The three dimensions of the servicescape include ambient conditions, physical layout and operation, and signs, symbols, and artefacts. The primary emphasis of this study is the ambient circumstances, which include lighting, scent, temperature, and music, since they are believed to be the most direct and important sensory signals in affecting patrons' perceptions and emotional responses in dining situations.

This two-part method gives a way to look at how dining spaces shape customer feelings, using structure plus mindset. The servicescape side shows which features matter in a space, whereas the S-O-R part digs into why those details shift actions. Merging them builds a clear picture of how layout connects to guest reactions. Here, contentment acts as the

result (R), shaped by inner responses (moods/thoughts) sparked through sensory inputs (like lighting or noise). The gap between what people expect and what they feel acts like a stand-in for how they think and react emotionally, tying the approach to solid existing theory. What sets this research apart is using the Wilcoxon Signed-Rank Test to check statistical differences in expectations versus experiences across four environmental factors. Instead of standard regression methods – which rely on evenly spaced, normal data – Wilcoxon works without those assumptions and fits better with ranked answers from survey scales. Because it handles matched pairs, it suits comparing one person's predicted experience with their real one, matching up with the S-O-R model's logic. Finding out if each sensory factor shows a meaningful difference helps turn abstract ideas about environment and response into something measurable and tested.

The overall theory behind this study appears in Table 1 shown here. In the S-O-R setup, surrounding factors like light, smell, heat, or sound act as triggers – also treated as main parts of the environment in the servicescape idea. How customers feel and what they notice comes from comparing what they expected versus what they experienced, making up the internal response part. Finally, satisfaction is treated as the behavioural response demonstrating the combined influence of physical environment and psychological processing. This framework not only validates the relevance of sensory design in service environments but also provides a quantitative pathway for assessing its real-world impact.

Table 1: Tabular Representation of Theoretical Framework

Model	Component	Operational Variable	Application in Study
Servicescape Model	Ambient Conditions	Lighting, Scent, Temperature, Music	Independent variables measured via expectation and perception ratings
	Spatial Layout & Functionality	Not included	Outside study scope
	Signs, Symbols, Artifacts	Not included	Outside study scope
S-O-R Model	Stimulus (S)	Ambient sensory inputs	External environmental cues that influence customers
	Organism (O)	Emotional & cognitive states (via perception gaps)	Mediating variables inferred from expectation-perception differences
	Response (R)	Customer satisfaction	Final behavioural outcome

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Analytical Framework

The atmosphere of a restaurant – what guests see, smell, and hear – affects how happy they are. In Indian cities, where many restaurants try to give customers better experiences, it's very important to know the difference between what they expect and what they actually get. Instead of using standard tests, the authors picked the Wilcoxon Signed-Rank Test because it works well when matching two responses from the same person—like the expected vibe versus the real experience. Our goal was to check if differences in lighting, scent, heat, or background tunes were just random – or truly noticeable. Currently, findings only cover places serving food in Kolkata.

Methodology

A group of 250 people answered questions, giving their views on four background factors using a 5-level rating system for what they expected versus what they felt. Because the answers are ranked rather than measured and might not follow a bell curve, researchers picked the Wilcoxon test instead of ones like the paired t-test. This method checks if the middle value of gaps between expectations and real experiences is clearly non-zero (refer to Table 2 below).

The variables under investigation include-

Lighting: Visual atmosphere, brightness, and comfort.

Scent: Ambient fragrance or aroma associated with the dining space.

Temperature: Thermal comfort of the environment.

Music: Background sound and its congruence with the dining theme.

Hypotheses

H_{01}: Customers' expectations and perceptions of lighting in urban eateries differ significantly.
H_{02}: There is a large disparity between customers' expectations and perceptions of fragrance in urban eateries.
H_{03}: Customers' expectations and perceptions of the temperature in urban eateries varied significantly.
H_{04}: There is a considerable discrepancy in customers' expectations and perceptions of music in urban eateries.

Table 2: Demographic Profile

Demographic Variable	Category	Frequency (n)	Percentage (%)
Gender	Male	138	55.20%
	Female	110	44.00%
	Other	2	0.80%
Age Group	18–25 years	70	28.00%
	26–35 years	85	34.00%
	36–45 years	55	22.00%
	46–55 years	30	12.00%
	56 years & above	10	4.00%
Educational Level	Secondary	30	12.00%
	Higher Secondary	45	18.00%
	Graduate	100	40.00%
	Postgraduate	65	26.00%
	Others	10	4.00%
Occupation	Student	55	22.00%
	Service (Private)	90	36.00%
	Service (Government)	45	18.00%
	Business	40	16.00%
	Others	20	8.00%
Monthly Income	Less than ₹20,000	60	24.00%
	₹20,001–₹40,000	80	32.00%
	₹40,001–₹60,000	55	22.00%
	₹60,001–₹80,000	35	14.00%
	Above ₹80,000	20	8.00%

Source: Designed and Developed by the Authors

Table 3: Results of the Wilcoxon Signed-Rank Test

Variable	Mean Expectation	Mean Perception	Z-Statistic	p-Value	Significance
Lighting	3.648	3.836	427.5	0.000	Significant
Scent	3.568	3.940	240.0	0.000	Significant
Temperature	4.032	3.672	525.0	0.000	Significant
Music	3.716	4.024	528.0	0.000	Significant

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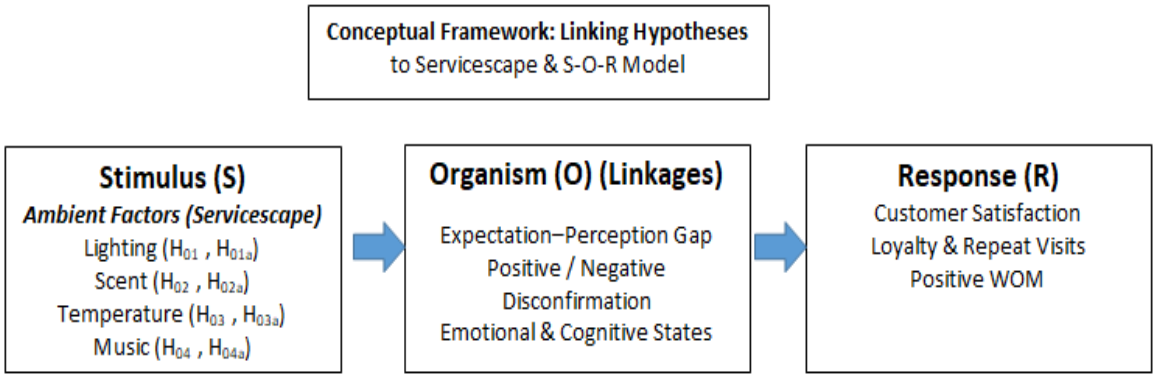
Based on observed GAPs in Table 3 following outcomes of Hypotheses are:
H_{1a}: Customers' perceptions of **lighting** are significantly higher than their expectations.
H_{2a}: Customers' perceptions of **scent** are significantly higher than their expectations.
H_{3a}: Customers' perceptions of **temperature** are significantly lower than their expectations.
H_{4a}: Customers' perceptions of **music** are significantly higher than their expectations.

Theoretical Linkages to Servicescape & S-O-R

Figure 1: Linkages to Servicescape & S-O-R



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This is particularly relevant in the context of the servicescape. It is depicted that ambient conditions are core drivers of evaluative judgements in hospitality environments. The heterogeneity of gaps suggests that we should treat ambient conditions as distinct levers, not as a monolithic entity, each with different thresholds for guest satisfaction. S-O-R (Stimulus–Organism–Response). Ambient stimuli (S) shape internal affective/cognitive states (O) that drive satisfaction and downstream behaviour (R). Positive gaps in scent/music/lighting imply positive arousal and congruence, while the negative gap in temperature suggests aversive arousal that can suppress overall satisfaction even when other cues perform well.

Expectation–Disconfirmation. Results exemplify positive disconfirmation (delight) for enhancement cues and negative disconfirmation (dissatisfaction) for temperature. Consistent with loss-gain asymmetry, shortfalls in comfort often weigh more heavily than equivalent exceedance in aesthetics [refer to Figure 1]. Methodological contribution. The Wilcoxon approach is appropriate for paired ordinal data, avoids normality assumptions, and centres interpretation on the median difference, a robust choice for Likert measures.

Table 4: Detailed Interpretation of Expectation–Perception Gaps in Ambient Factors

Ambient Factor	Mean Expectation	Mean Perception	Gap Direction & Magnitude	Wilcoxon Result (Z, *p*)	Interpretation
Lighting	3.648	3.836	+0.188 (Perception > Expectation)	Z = 427.5, *p* = 0.000	Perception exceeding expectations suggests that restaurants have invested effectively in lighting design. This could be due to the adoption of adjustable illumination, thematic décor integration, and warm lighting schemes that enhance ambience. Lighting is a primary visual cue influencing cleanliness perception, mood, and comfort, aligning with Bitner's Servicescape theory where visual ambience strongly shapes the service image.
Scent	3.568	3.940	+0.372 (Perception > Expectation)	Z = 240.0, *p* = 0.000	The higher-than-expected perception reflects an underappreciated strength in olfactory branding. Restaurants that leverage mild, cuisine-relevant aromas may create subconscious emotional connections, stimulating appetite and recall. Scent directly engages the limbic system, influencing mood and memory, consistent with the Stimulus–Organism–Response (S-O-R) model. This

					demonstrates a strategic advantage, as scent marketing remains less saturated in Indian urban dining, providing differentiation potential.
Temperature	4.032	3.672	–0.360 (Perception < Expectation)	Z = 525.0, p = 0.000	The negative gap indicates a shortfall in thermal comfort delivery. Customers expect optimal climate control, but perceptions suggest variability in temperature regulation, possibly due to inadequate HVAC (Heating, Ventilation, and Air Conditioning) calibration or seasonal inefficiencies. As physical comfort is a prerequisite for extended stays and positive evaluations, this gap signals a latent dissatisfaction driver that may reduce dwell time and repeat patronage.
Music	3.716	4.024	+0.308 (Perception > Expectation)	Z = 528.0, p = 0.000	Positive perception scores indicate successful integration of music into the dining experience. Music congruence matching genre, tempo, and volume with dining themes can regulate customer mood, influence eating pace, and foster brand identity. The relatively small but significant improvement suggests that restaurants are achieving a subtle yet effective alignment of auditory cues with customer expectations.

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Based on Table 4, the Wilcoxon signed-Rank analysis reveals a nuanced interplay between **customer expectations and sensory experiences** in Indian urban restaurants, with divergent patterns emerging across ambient factors.

Lighting emerged as a notable over-performer, with perceptions surpassing expectations by +0.188 points on a 5-point scale. This indicates that contemporary restaurants are succeeding in crafting visually appealing atmospheres, possibly through adaptive lighting schemes, use of warm tones, and integration with thematic décor. Within the **Servicescape Model**, lighting is recognized as a dominant environmental cue influencing affective and cognitive evaluations. A well-lit environment not only enhances aesthetic appeal but also contributes to perceptions of hygiene, service promptness, and overall ambience. **Scent** recorded a perception gain (+0.372), marking it as the most improved dimension relative to expectations. Olfactory stimuli operate at a subconscious level, triggering emotional and mnemonic associations that can significantly enhance the dining experience. As postulated in the S-O-R paradigm, fragrance acts as a potent external stimulus that modifies interior emotional states, leading to desirable behavioural consequences such as increased dwell duration and repeat visiting.

The results imply that select urban Indian restaurants are effectively employing scent management either intentionally through aroma diffusion or indirectly through open-kitchen concepts thus achieving a competitive edge.

In the context of temperature presented a negative gap (–0.360), signifying that thermal comfort is a persistent operational challenge. Given India's climatic diversity, this finding underscores the importance of adaptive climate control strategies. Even marginal deviations from the thermal comfort zone can detract from perceived service quality, as physical discomfort often overrides other positive sensory inputs. This supports Bitner's assertion that ambient conditions serve as baseline qualifiers in the servicescape; when these are unsatisfactory, they can disproportionately impact overall evaluations.

M**usic** showed a moderate positive shift (+0.308), suggesting that auditory ambience is being leveraged effectively to enhance dining experiences. While music tends to be less consciously evaluated compared to visual or tactile elements, its role in shaping mood, regulating pace of service, and reinforcing brand identity is well established in hospitality literature. The statistically significant improvement in perceptions suggests that restaurants are increasingly curating playlists that align with their thematic positioning and customer demographics, thus enhancing experiential coherence. Based on the discussion above, the research confirms that surroundings have a significant impact on customer satisfaction, with temperature management emerging as an area that requires immediate operational attention, scent and music exceeding expectations, and lighting consistently performing well. These findings not only validate the integrative use of the **Servicescape** and **S-O-R** models in hospitality research but also provide actionable insights for practitioners aiming to refine sensory strategies for competitive advantage.

Theoretical Implications

This study pushes knowledge forward in service marketing, green psychology, and hotel operations – using real data to show how Bitner's Servicescape idea from 1992 works together with Mehrabian and Russell's S-O-R model of 1974, specifically in city eateries across India. First, the findings reinforce the core tenet of the Servicescape Model that ambient conditions are not peripheral but central determinants of customer evaluations. The statistically significant differences between expectation and perception for all four sensory dimensions (lighting, scent, temperature, and music) confirm that customers are highly sensitive to the physical and atmospheric environment, even in the presence of other service quality indicators, such as food taste and staff behaviour. The magnitude and direction of these gaps underscore that different ambient factors influence satisfaction in distinct ways, with scent and music often exceeding expectations, lighting performing reliably, and temperature lagging. This heterogeneity suggests the need to refine the Servicescape Model to incorporate dimension-specific performance thresholds rather than treat ambient conditions as a homogeneous construct.

Second, the study provides empirical groundwork for the S-O-R model's sequential pathway from external stimuli to internal emotional states to behavioural outcomes. The expectation–perception gap functions here as a proxy for organismic emotional and cognitive states, capturing the dissonance (negative gap) or positive disconfirmation (positive gap) experienced by customers. The positive gaps observed in fragrance and music indicate that positive sensory surprises can enhance affective states and elevate satisfaction, whereas the negative gap in temperature illustrates how sensory discomfort can undermine overall evaluations even when other conditions are favourable. This supports the argument that ambient cues operate through dual channels, both as independent contributors to satisfaction and as moderators of the perceived quality of other service attributes.

Third, the application of the Wilcoxon Signed-Rank Test, a non-parametric method, contributes to methodological discourse in hospitality research by demonstrating that ordinal-scale sensory data should be analysed using distribution-free statistical techniques. This methodological choice overcomes the shortcomings of parametric tests in analysing Likert-scale responses and underscores the necessity of aligning analytical tools with the measurement characteristics of the data, thereby strengthening the rigour of environmental psychology research.

Fourth, the results suggest an experiential asymmetry consistent with prospect theory whereby negative sensory disconfirmation (temperature discomfort) carries a stronger potential to diminish satisfaction than positive disconfirmation (pleasant scent or music) has to enhance it. This aligns with behavioural economics perspectives that losses loom larger than gains in shaping subjective evaluations. Integrating this principle into the Servicescape and S-O-R frameworks could refine their predictive capacity by recognising that sensory deficits may disproportionately influence overall service evaluations.

Discussion

The present study provides empirical evidence that ambient conditions play a decisive role in shaping customer satisfaction in Indian urban restaurants. By examining expectation–perception gaps across lighting, scent, temperature,

and music using the Wilcoxon Signed-Rank Test, the findings reaffirm that sensory elements of the servicescape are not peripheral but central to experiential evaluations. The statistically significant differences observed across all four dimensions support Bitner's [1] proposition that physical surroundings strongly influence customer responses in service environments.

Lighting emerged as a consistent positive contributor, with perceptions exceeding expectations. This suggests that urban restaurants have successfully leveraged visual ambience through warm illumination, thematic integration, and adaptive lighting strategies. Prior studies have linked lighting to emotional arousal, perceived cleanliness, and service quality judgments [4, 9]. Within the S-O-R framework, enhanced lighting functions as a positive stimulus that evokes favourable affective states, leading to higher satisfaction responses [38].

Scent recorded the highest positive disconfirmation among all ambient factors, indicating that olfactory cues are an underutilized yet powerful experiential lever in Indian dining contexts. Consistent with Morrin & Ratneshwar [12] and Hirsch [13], pleasant and congruent aromas can subconsciously influence mood, memory, and approach behaviour. The strong performance of scent highlights its capacity to create emotional resonance and brand recall, reinforcing the organismic response stage of the S-O-R model. This finding suggests that sensory branding through scent may offer a competitive advantage, particularly in densely populated urban markets.

In contrast, temperature exhibited a significant negative gap, indicating that customer expectations regarding thermal comfort are not being met. This result aligns with prior research suggesting that physical discomfort can overshadow positive aesthetic cues [11]. From an expectation–disconfirmation perspective, temperature operates as a hygiene factor: when expectations are unmet, dissatisfaction intensifies disproportionately. This supports Bitner's [1] assertion that ambient conditions act as baseline qualifiers; failure in these dimensions can suppress overall satisfaction regardless of strengths in other sensory areas.

Music also showed positive disconfirmation, reinforcing its role in mood regulation and experiential congruence. Earlier studies have demonstrated that appropriate music tempo and genre influence dwell time, spending behaviour, and emotional engagement [3, 6, 39]. The findings indicate that urban restaurants are increasingly curating background music that aligns with brand identity and customer expectations, thereby enhancing experiential coherence.

Methodologically, the application of the Wilcoxon Signed-Rank Test strengthens the study's contribution by demonstrating the suitability of non-parametric techniques for analysing paired ordinal data. This approach avoids the limitations of parametric assumptions and offers a robust means of capturing subtle perceptual differences in servicescape research [40].

Overall, the findings validate the integrative use of the Servicescape and S-O-R models in an Indian urban context, emphasizing that while aesthetic enhancements can delight customers, functional comfort—particularly temperature—remains critical. The results underscore the need for restaurant managers to adopt a balanced sensory strategy, prioritizing both experiential enrichment and fundamental comfort to achieve sustained customer satisfaction.

Conclusion

In conclusion, the Wilcoxon Signed-Rank Test provides strong empirical support for the argument that gaps between expectation and perception across sensory dimensions significantly affect satisfaction in Indian urban restaurants. This study not only quantifies the perceptual mismatch but also underscores the strategic importance of harmonizing the ambient environment to create holistic and satisfying customer experiences. Future research could incorporate demographic segmentation and emotion tracking technologies to further enrich the understanding of services cape dynamics. Finally, the study extends the cultural contextualization of services cape theory. Much of the existing literature is grounded in Western service environments, yet this research demonstrates that the foundational models remain relevant in an emerging market context like India, albeit with contextual nuances. For instance, the pronounced

temperature gap highlights the climatic variability and infrastructural challenges of Indian cities, suggesting that environmental comfort factors may require greater weighting in tropical and subtropical hospitality contexts than in temperate climates.

Conflict of Interest

The authors declare that they have no conflict of interest.

Acknowledgement

The authors are thankful to the institutional authority for completion of the work.

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