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Research Article

Analyzing Indian cafes through social media: Spatial attributes and user perceptions of third places

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Abstract
In the evolving landscape of urban public places, cafes have emerged as significant third places, providing social, cultural, and functional value to users. They are the places where people socialize, relax, and engage in various activities, making them critical to understanding urban life. This research analyses Indian urban cafes through social media platforms, particularly Instagram, as a primary research tool. It aims to analyze how spatial qualities—such as design, layout, and ambiance—impact user experiences and interactions. By analyzing images, posts, and comments related to 100 cafes across India, the key spatial attributes that influence user engagement and satisfaction as well as shape their perceptions. The research employs a quantitative approach that allows for structured and data-driven insights, providing statistical validation to the outcome. By analyzing the collected data, the spatial attributes that resonate most with users and understand how these interactions reflect broader trends in urban design and social behavior in Indian metropolitan cities. This study highlights the importance of these key attributes in creating places that meet the changing preferences of a digitally connected society and gives readers a better understanding of their geographical and cultural context.

Keywords: Indian cafes, Third place, Spatial attributes, User perceptions, Instagram

Extended Abstract

Introduction: In the evolving landscape of contemporary urban environments, third places—informal public gathering places outside of home and work—have garnered renewed attention for their social, cultural, and economic relevance. Among these, urban cafes have emerged as prominent nodes of social interaction, informal community-building, and everyday leisure. Especially in Indian metropolitan cities, cafes serve not just as spaces to consume food and beverages but also as arenas for social bonding, creative expression, co-working, and digital engagement. In a country experiencing rapid urbanization, digital transformation, and demographic shifts, the role of such Places in shaping public life is increasingly critical. This study explores urban cafes in India as third places, focusing on their spatial attributes and user perceptions through the lens of social media analysis. By utilizing Instagram—a platform that has become a cultural touchstone and visual diary for users—the research identifies and analyzes user-generated content to understand how spatial qualities such as design, layout, and ambiance influence user engagement, perception, and satisfaction. The investigation is grounded in urban theory, spatial analysis, and behavioral studies, drawing upon the works of scholars such as Ray Oldenburg, Henri Lefebvre, and William H. Whyte to frame the significance of third places in the urban fabric.

Purpose and scope: The purpose of this research is to evaluate how the spatial design of urban cafes in Indian cities contributes to their effectiveness as third places and how such places are perceived by users in the digital realm. The study responds to the growing importance of hybrid physical-digital experiences, particularly in post-pandemic urban societies where social media often mediates how people discover, use, and remember urban places. The scope of the study is limited to 100 urban cafes across diverse metropolitan contexts in India, including cities like Delhi, Mumbai, Bengaluru, Kolkata, Hyderabad, Pune, and Ahmedabad. The selected cafes are situated in urban pockets of cities, although they vary

in scale, design language, clientele, and urban context. The study draws conclusions that reflect broader trends in Indian urban life, design culture, and social behavior. The key research questions include:

- What spatial attributes are most frequently associated with user satisfaction and engagement in urban cafes?
- How do design and ambiance features impact the way people perceive and interact within these spaces?
- What do digital traces—such as Instagram posts, images, hashtags, and comments—reveal about user behavior, preferences, and spatial values?

Method: This research employs a quantitative content analysis approach, leveraging publicly available data from Instagram posts, images, captions, hashtags, and user comments related to 100 urban cafes. The method involves collecting and coding visual and textual data based on pre-defined spatial attributes. Six spatial dimensions—physical, perceptual, functional, social, temporal, and visual—serve as the analytical framework, each broken down into sub-attributes such as accessibility, seating layout, lighting, visual aesthetics, and sensory experience, to name a few. To ensure objectivity and rigor, the study utilizes frequency analysis, Pearson's correlation, and ANOVA tests to explore relationships between spatial features and user responses. User engagement metrics—such as likes, shares, and comment sentiment—are analyzed alongside visual indicators like seating arrangements and indoor-outdoor transitions. The methodology was chosen for its ability to handle large-scale visual and textual data systematically and for its relevance in analyzing the digital footprints of spatial experience—a relatively underexplored yet increasingly significant area of urban studies and architectural research.

Findings and conclusion: The analysis reveals that spatial attributes have a great influence on the way people perceive, interact with, and experience urban cafes. Key findings include: physical and functional dimensions are of paramount importance in user perceptions. Accessibility, furniture design, and spatial layout are consistently associated with improved participation and fulfillment. Café with easy access from a transit stop or urban street is more likely to generate repeated visits, along with digital photography as memories. Functional factors such as reliable Wi-Fi, charging stations, and multi-functional seating arrangements are substantially connected to positive Instagram mentions, indicating that utility and comfort go hand in hand with ambiance. Flexible spatial layouts that include movable furniture, hybrid indoor-outdoor spaces emerge as key contributors to user satisfaction. Informal, adaptable seating allows a variety of activities such as solo study sessions, group meetups, creative workshops, and even informal business meetings. Café that offers such diversity is celebrated as a versatile and user–friendly place, Oldenburg's principle of accessibility and neutrality. Perceptual cues such as lighting design, material palette, and greenery are often highlighted by users as "cozy corners' or "Instagram-worthy" backdrops, underscoring the important linkage between perceptual design elements and affective user engagement. The conclusion affirms that the café that balances practical needs such as accessibility and flexible layout, along with perceptual richness through atmosphere, aesthetics, and sensory qualities, is the most successful in fostering satisfaction, inclusivity, and prolonged engagement. It informs practitioners of the importance of incorporating spatial quality attributes into the design process. At a broader level, this study adds to the discourse of urban studies and architectural design by emphasizing the interrelationship between spatial qualities and user perceptions in a rapidly urbanizing society.

Keywords: Indian cafes, Third place, Spatial attributes, User perceptions, Instagram

INTRODUCTION

In the digital age, social media has profoundly transformed how individuals perceive and engage with public places. Platforms like Instagram, Facebook, Twitter, and others have become integral to the way people share experiences, express opinions, and form collective understandings of the environments they inhabit. Unlike traditional media, social media offers a dynamic and participatory platform where users contribute to the ongoing narrative of public places through photos, videos, comments, and reviews. This user-generated content provides real-time insights into how places are used, perceived, and valued, offering a rich source of data for understanding public experiences. As Ioannou et al. (2021) mention, the way the physical place is shaped by urban design and planning may be impacted by priorities, attitudes, and expectations centered around "connectivity" as the fundamental value of digital culture. The influence of social media on public places is multifaceted. It not only shapes individual perceptions but also influences broader public opinion, often driving trends in urban design, architecture, and public policy. Moreover, social media allows for a democratization of voices in the discourse surrounding urban third places. Individuals from diverse backgrounds can share their experiences, bringing attention to aspects of third places that might otherwise be overlooked by traditional evaluation methods. As social media continues to evolve and allows for the collection of organic, spontaneous

expressions of sentiment from a wide audience, its role in shaping the perceptions and experiences of public places is likely to grow, offering new opportunities for feedback, innovation, and community engagement in the creation and maintenance of our urban environments. This shift has significant implications for the design and management of these places, as it provides a more inclusive understanding of what makes urban third places successful, comfortable, and engaging for all users. Consequently, both human and non-human entities collaboratively generate, disseminate, and redefine the content of digital platforms, thereby transforming conventional urban places (Handlykken, 2012).

Instagram, with its visual focus and global reach, has become a powerful medium for sharing and experiencing urban spaces. Users document places through photos, stories, and comments, shaping a collective narrative that influences how others perceive and engage with locations like cafes and parks. This instant sharing highlights the growing importance of aesthetic appeal and functional design in public and semi-public spaces. Thus, social media is an interactive environment that focuses on human interaction and can enhance the overall experience design. This is achieved by utilizing the content provided by actual users that pertains to local experiences (Gon, 2021). In this context, Instagram is not merely a platform for social interaction but a crucial tool for understanding contemporary urban life and the evolving dynamics of public places. It significantly influences individuals' daily lives across various dimensions—socially, culturally, economically, and politically—creating an ideal environment for studies in academia (Caliandro & Graham, 2020).

As urban third places, cafes offer accessible, flexible, and culturally resonant places that foster social interaction and community attachment. Their adaptability to changing work patterns, communication styles, and urban dynamics makes them vital to contemporary city life. As Lukito and Xenia (2018) claim, conversation remains the primary activity, but many individuals use their digital devices in addition to face-to-face conversations. Third places also provide the opportunity to interact with others and allow others to observe you, both physically and virtually. With the rise of freelance work, digital nomadism, and the increasing need for informal, adaptable workplaces, cafes have become key urban nodes where professional and personal life intersect. As a result, some cafes have become the critical infrastructure of new urban culture (Zukin & Kosta, 2004) and a conspicuous indicator of gentrification in particular neighborhoods (Zukin et al., 2009).

Problem Statement, Research Gap, and Objectives

Traditional methods of evaluating public places often rely on surveys and in-person observations, which may not fully capture the dynamic and diverse interactions that occur within these environments. In this scenario, Instagram serves as a rich source of user-generated content, offering deeper insights into the patrons' use and value of cafes. Social media data is increasingly being used in urban environment quality studies to analyze social activities and individual behaviors from the users' perspective (Li et al., 2021). However, the potential of this new form of data for analyzing spatial attributes and user perceptions with the help of a quantitative approach in an Indian context remains underexplored. To address this gap, the study examines Instagram data to determine the relationship between spatial attributes and user preferences in Indian urban cafes. The study aims to:

To determine the potential impact of spatial attributes on user preferences.

To identify the prominent spatial attributes that users of cafes associate the most with across India.

To analyze the association between spatial attributes and user preferences.

LITERATURE REVIEW

Social Media in Urban Studies

Social media has significantly influenced how urban environments are researched, interpreted, and experienced in contemporary society. This transformation is being observed, particularly at the individual level, with digital platforms like Instagram becoming integral to daily life. As Wang (2024) claims, the attributes of urban environments have a strong connection to individual-level perceptions and user-generated data, enabling

researchers to integrate subjective viewpoints with objective measurements for a thorough spatial assessment. Another important component that social media addresses is new forms of connectivity. It ranges from global reach and instant communication, building and maintaining relationships, personal expression and identity formation, access to diverse perspectives and information, to enhanced networking opportunities. As Either (2016) asserts, the emergence of digital media is significantly responsible for these new urban practices. As a result, urban culture is highly influenced by these new urban practices, shaping urban places in the context of contemporary needs. It demarcates the need for the inclusion of social media data in urban studies that may reflect the complexities of urban life, offering real-time data, diverse perspectives, and new avenues for public engagement.

As digital platforms have significantly established their presence in everyday urban life, researchers have also started to investigate how user-generated data on social media impacts the perception, use, and value of public and semi-public places. Instagram, in particular, plays a multi-faceted role: it not only gathers user preferences, but it also shapes spatial practices by encouraging visual, aesthetic, and social cues. Researchers like Wagiri et al. (2024) explore how Instagram's features, such as geo-tagging, filters, and hashtags, enhance users' sensory and temporal engagement with architecture. Their phenomenological study shows that Instagram does more than just reflect architectural space; the platform's visual logic determines which spatial features are recognized, shared, or valued. Wang (2024) has conducted another recent study on user perceptions at Kampong Glam and Haji Lane, integrating Instagram posts and street view photographs to analyze how people perceive urban places. The findings suggest that combining perceptual data (from user posts) with physical data (from built form and street views) provides greater insights into the characteristics that users value, such as walkability, visual amenity, façade design, and vegetation.

However, in India, research related to social media content, spatial design, and user behavior is still in its early stages. Gupta et al. (2023), for example, have studied the impact of social media platforms on tourists' perceptions of food outlets in Delhi (NCR), India. Their research reveals that visual content and user reviews on digital platforms have an immense effect on perceptions and preferences, particularly in the food and leisure setting. While not specifically addressing the café as a third place, the study demonstrates how digital traces shape spatial decision-making in the Indian urban milieu. These insights highlight a growing acknowledgment of social media as a methodological tool and a cultural force in urban research.

In the context of this study, Instagram is given prominence as its characteristics are strongly related to the objectives of exploring spatial attributes, user perceptions, and experiences of café as an urban third place. Unlike a text-based platform, Instagram is predominantly visual, allowing for the documentation of architectural and interior characteristics such as spatial layout, lighting, furniture, textures, and mood. As a result, users are inclined to highlight aesthetically pleasing and socially engaging features in their posts. Instagram encourages user engagement by offering engagement mechanisms such as likes, comments, shares, and saves. They serve as behavioral indicators of user preference and satisfaction, generating measurable data for quantitative analysis (Wibowo et al., 2024). The platform's geotagging and hashtag functions include geographical metadata, helping users to connect their content to specific places. This feature enables researchers to map spatial preferences across geographic contexts, supporting for detailed investigation of where and how people interact with particular surroundings. Instagram's features, such as filters, visual framing, algorithmic feeds, and story formats, shape the way places are represented and shared. These features are frequently used to curate the built environment and urban place, amplifying their symbolic and aesthetic appeal (Shuyu & Gong, 2025). Thus, Instagram offers real-time, large-scale, identity-based data. Posts are created in high volumes, reflect current social trends, making them useful for documenting evolving perceptions of urban life. Furthermore, it plays an important role in lifestyle and identity formation; users intentionally curate their experiences in the café and public place as part of their own identity, making the platform particularly valuable for understanding the social and cultural dimensions of third place (Masciantonio & Bourguignon, 2023). Together, these features make Instagram particularly adapted to gather both objective spatial attributes (by visual evidence) and subjective user perceptions (via interaction, descriptions, and hashtags). Therefore, its integration of visual representation, interactivity, and spatial metadata offers a methodological advantage over other platforms, justifying its selection for the study.

From another perspective, on an epistemological background, a key issue in using Instagram data is the disparity between what users post and what they experience. The two may not always align. When sharing pictures, individuals often highlight selective, or idealized, aspects of the café, while overlooking less attractive or common features. Similarly, captions, hashtags, or comments may not be objective reflections of the user experience. Instead, they might be performative acts in which users portray themselves and the café in ways that reflect social trends, peer expectations, or personal identity. This means Instagram content reflects not only individuals' perception of the cafe, but also how they wish to be perceived by others. However, these selective and performative acts are purposeful rather than restrictive. The act of curating and exhibiting certain features of a café reflects what users value as memorable, shareable, and associated with their personal and social identity. What is chosen to be highlighted frequently indicates which spatial features, such as ambiance, layout, lighting, or aesthetic details, are considered more memorable, desirable, and socially valuable. In this way, even idealized or filtered content serves as an indirect measure of spatial preference, uncovering the symbolic and experiential components of the cafe environment. It provides an insight into what is collectively celebrated and shared. When combined with other empirical methods such as surveys and case studies, the analysis of Instagram may become an effective tool for analyzing both spatial perception and the social meaning, along with the cultural practice embedded in it.

Cafes as urban third places

Cafes as urban third places play a significant role in the socio-cultural life of cities. The concept of a "third place" was popularized by sociologist Ray Oldenburg in his book, *The Great Good Place,* where he described third places as informal public gathering spaces that are neither home (the first place) nor work (the second place). As Oldenburg (1989) mentions, third place is a generic term for a vast range of public venues hosting the regular, voluntary, casual, pleasantly expected meetings of people outside of the boundaries of home and business. It is simply an informal urban gathering place that promotes "inclusive sociability". It refers to a human-centric urban approach. As a result, it becomes vital to construct a third place that not only enables but also responds to the social demands of occupants while also providing a sensible "human" element to the setting. Cities stand out for their diversity (Jacobs, 1961), which is nurtured by café culture and a more lively street life (Montgomery, 1997).

Cafés in cities provide a wide range of functions. They serve as gathering places for social interactions, workspaces for individuals and organizations, places for cultural or artistic events, and informal networking areas. The attraction of these venues stems from their versatility, as they cater to various user demands throughout the day, creating an inclusive atmosphere for people of all ages, backgrounds, and interests. Cafes, with their unique blend of public and private traits, exemplify the balance of interaction with others and personal privacy, making them excellent urban third places. A café's inclusive approach to all aspects of life, combined with technological advancements, makes it even more vital in the twenty-first century. It has been one of the first places to seamlessly integrate technology into people's lives, encouraging all kinds and channels of contact to meet users' basic communication and socialization needs. The formation and sustainability of these third places are deeply influenced by spatial dimensions. Understanding how these spatial dimensions interact and contribute to the creation and maintenance of urban third places is essential for urban designers and planners. As Waxman (2006) states, every person has a different experience of a place, which is closely tied to their life experiences. Mapping and analyzing these subjective experiences towards cafes can reflect the most crucial associations and perceptions of users that address the relevance of urban third places in a contemporary urban setting.

Edward Soja, an influential urban theorist, proposes the concept of "third space" (1996), which is particularly useful in understanding the cultural and experiential role of third places like cafés. It extends beyond the distinction between first space (physical, material space that can be empirically measured) and second space (an imagined, representational space). He contends that urban life is also influenced by a third space: a lived, hybrid, and dynamic space in which material form, social activity, and cultural meaning intersect. This perspective emphasizes that a café is a lived space where people negotiate identity, belonging, and community. He underscores the characteristics of third space, such as fluidity, multiplicity, and inclusivity, which also resonate with Oldenburg's perspective of third place.

Spatial attributes of urban third places

Urban third places are characterized by the physical, social, cultural, emotional, and psychological experiences they facilitate. Individuals present in these places serve as the principal source of these varied exposures. Users may derive enjoyment from the sheer presence of others, whether through direct interaction or indirectly by witnessing their behaviors, conversations, and activities. The efficacy of urban third places predominantly rely on the interplay between individuals and places. As Yuen & Johnson (2017) claimed, diversity is the most relevant feature when considering third places as a medium for community participation because the people participating and the experience they provide are the main factors that drive and enhance one's encounter. As a result, these places allow cities to flourish as hubs of human-centric design and collective urban experience.

This urban experience includes not only the external form, aesthetic qualities, and surface-level appearances of third places but also a spatial understanding of places, enabling us to consider the physical qualities of the environment, such as how it is organized, how people move through it, how it accommodates different functions, and how it responds to human needs. This approach is supported by Ali Madanipour in his book, *Design of Urban Spaces*, where he states that if the awareness of users is restricted to a visual perspective, their focus solely remains on forms. However, if users transcend mere appearances, they can initiate a spatial comprehension along with a three-dimensional experience, enabling them to inhabit the place rather than just observing it. They do not fabricate superficial appearances but rather create places that can be utilized for various purposes (Madanipour & Madani, 1996).

Spatial design is multifaceted and encompasses various dimensions, elements, and considerations that come together to create meaningful places. It ranges from physical form and functionality to emotional impact and cultural relevance. These factors play a critical role in how these urban third places are experienced and perceived by their users. A spatial design involves a multi-sensory experience that creates a holistic understanding of the environment. In the context of cafes, for example, it is not just about the visual appeal of interior design but the combination of aroma, warmth, sound, and comfort that prompts you to perceive a café as relaxing, welcoming, and stimulating. Thus, it is important to note that our perception of place is typically derived from a synthesis of multiple senses (Shaftoe & International Institute for Environment and Development, 2008).

Therefore, it is apparent that a comprehensive analysis of the spatial attributes of urban third places necessitate an integrated approach. It is made to analyze through the lenses of Matthew Carmona in his book, *Public Places—Urban Spaces—The Dimensions of Urban Design*, where he categorizes them into six dimensions: physical, perceptual, social, visual, functional, and temporal, respectively, as mentioned in Figure 1. While asserting that urban design is holistic only when all dimensions are concurrently explored, he also clarifies that this categorization is only for the sake of clarity in interpretation and analysis. Carmona also states that it is crucial to recognize that urban design is a process that occurs at and across a variety of spatial dimensions rather than at any one specific scale (Carmona et al., 2021). Although considering the nature of these dimensions related to daily life, spatial understanding in this research is conducted at the human scale.

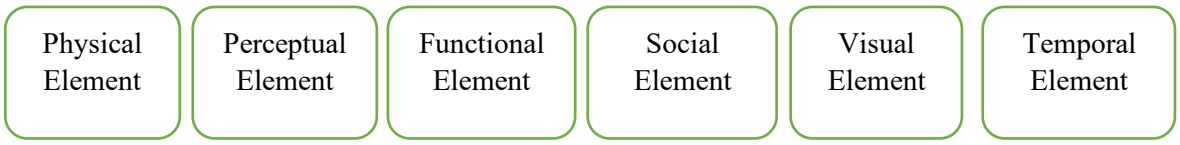


Figure 1. Framework of spatial attributes

METHOD

Data Collection

This study analyses one hundred cafes throughout India, evenly distributed among the four principal geographic regions: North, South, West, and East. This division is for statistical convenience. The cafes chosen are located in the urban pockets of the metropolitan cities, where café culture is thriving due to the concentration of social activities and higher footfall. These are popular establishments known for their social

atmosphere, design, and role as community gathering places with a notable presence on Instagram. Twenty-five cafes from every region ensure equal representation across different cultural and spatial contexts in India, allowing the capture of diverse spatial attributes and user perceptions from different parts of the country. Data is gathered from Instagram posts geotagged to each of the hundred cafes using relevant hashtags that include images, captions, and comments. This form of real-time data is being utilized more frequently to map spatial activities in urban areas, underscoring the importance of social media data in urban studies (Lin & Geertman, 2019).

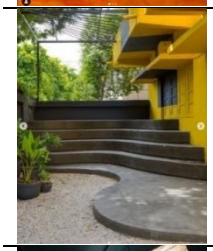
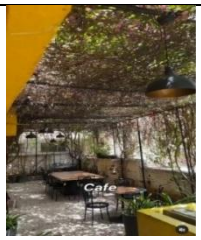
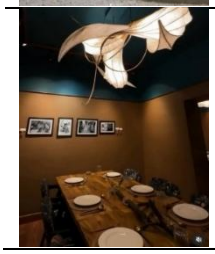
	Furniture design, placement, & orientation Mixed use seating (solo, study, work)		Convenient access with shorter distance Visual appeal through exterior décor, café branding, local materiality
	Sensory experience through colour, textture, materiality, light Integration of art elements		Visual connection between Inside & Outside
	Spatial layout & organization; Opportunity for social gathering & community events Planning at human scale Multi-functional use		Well-proportionate transition zone Spatial layout Furniture arrangement Planning at human scale Visual connection between inside & outside
	Sensory pleasure and experience through lighting design Community tables		Well-proportionate transition zone Spatial layout Furniture arrangement Planning at human scale

Figure 2. Observed spatial design elements (Example for "The Project Café"- Ahmedabad, India)

Data analysis

The data analysis consists of a frequency distribution of user responses across India, as shown in Table 1. It helps to summarize the data region-wise, as mentioned earlier. It is obtained by using NVivo as qualitative data analysis software. A chi-square test is employed to explore if spatial attributes have a measurable impact on how users perceive and prefer cafes. A single-factor ANOVA deepens the knowledge and informs us about the most preferred attributes among users across India. It reveals that not all attributes are equally valued, implying that some spatial aspects have a greater influence on creating user experience. Tukey's HSD post hoc test investigates whether these most preferred attributes vary in influencing user preferences in all regions. In other words, it assesses if user preferences are consistent nationwide or differ based on location. As part of the next step, Pearson's correlation analysis explores the extent to which spatial attributes and user preferences are interdependent. This multi-layered analysis offers insights into the design elements that are most essential in optimizing cafes as a third place, improving user experience, and ensuring that spatial design is in accordance with user expectations.

Table 1. Frequency distribution table of user responses

Spatial Attributes/ User Responses (In Count)	West	North	East	South
Physical element	**343**	**515**	**658**	**673**
Convenient access with shorter distance	10	36	81	78
Furniture design, placement & orientation	158	225	251	228
Spatial organization & layout	134	161	232	234
Well-proportioned transition areas	41	93	94	133
Perceptual element	**346**	**570**	**612**	**511**
Feeling of comfort & security	147	218	265	147
Sensory experience promoting well-being	199	352	347	364
Functional elements	**371**	**433**	**397**	**730**
Opportunities for seeing, hearing, and conversing	123	155	152	245
Pedestrian and age-friendly design	65	64	72	122
Diverse mix of urban activities	183	214	173	363
Social element	**300**	**372**	**289**	**615**
Spaces for self-expression and identity	81	107	81	220
Platforms for social interaction & engagement	124	161	143	235
Fostering a sense of community	95	104	65	160
Temporal element	**278**	**332**	**307**	**529**
Adaptability to changes in the built environment	160	146	155	299
Opportunity for social gatherings and celebrations	118	186	151	230
Visual element	**200**	**324**	**343**	**300**
Human scale physical planning	111	195	197	176
Clear visual connectivity between indoor and outdoor	89	129	146	124

Data analysis is conducted in three stages as per the mentioned objectives. All three stages are utilized as parts of a single analytical approach.

Stage 1: To determine the potential impact of spatial attributes on user preferences.

The Chi-square Test of Independence is a statistical instrument for determining whether both category variables are significantly interrelated. It does not inform how closely these variables are associated (Rana & Singhal, 2015). It is an appropriate method to determine the possibility of a significant association so that spatial attributes contribute to shaping user experiences in cafes. In this test, two hypotheses are defined.

Null Hypothesis (H_0)- Spatial attributes do not have a significant effect on user preferences. Alternative Hypothesis (H_1): Spatial attributes have a significant effect on user preferences.

Chi-square is measured by: $X^2 = \sum (O-E)^2 / E$…where, O- represents the observed frequency & E- represents the expected Frequency.

Degrees of Freedom- (d.f) = n-1…where n= No. of items, Significance of level (α=0.05), Critical value is obtained from chi-square distribution table.

A chi-square test is represented in Table 2. It is performed across the west, north, east, and south regions of India. If the value of X^2 is greater than the critical value, an association can be considered significant. If the value of X^2 is less than the critical value, it will be considered insignificant.

Table 2. Chi-square test of independence

West Region						
Elements	Spatial Attributes	Observed frequency	Expected frequency	Difference between observed and expected frequency	Squared difference between observed and expected frequency	Squared difference divided by expected frequency
Physical	Convenient access with shorter distance	10	85.75	-75.75	5738.06	66.91

	Furniture design, placement & orientation	158	85.75	72.25	5220.06	60.87
	Spatial organization & layout	134	85.75	48.25	2328.06	27.14
	Well-proportioned transition areas	41	85.75	-44.25	2002.56	23.35
	X^2 =78.27 > Threshold value = 7.815					
Visual	Human scale physical planning	111	100	11	121	1.21
	Clear visual connectivity between indoor and outdoor	100	100	-11	121	1.21
	X^2 = 2.42 < Threshold value = 3.841					
Perceptual	Feeling of comfort and security	147	173	-26	676	3.90
	Sensory experience promoting well-being	199	173	-26	676	3.90
	X^2 = 7.8 > Threshold value=3.841					
Functional	Opportunity for seeing, hearing & conversing	123	123.66	-0.66	0.43	0.003
	Pedestrian & age-friendly design	65	123.66	58.66	3440.99	27.82
	Diverse mix of urban activities	183	123.66	59.34	3521.23	28.47
	X^2 = 56.29 > Threshold value = 5.991					
Social	Spaces for self-expression & identity	81	100	-19	361	3.61
	Platforms for social interaction & engagement	124	100	24	576	5.76
	Fostering a sense of community	95	100	-5	25	0.25
	X^2 = 9.62 > Threshold value = 5.991					
Temporal	Adaptability to changes in the built environment	160	139	21	441	3.17
	Opportunity for social gatherings and celebrations	118	139	-21	441	3.17
	X^2 = 6.34 > Threshold value = 3.841					

North Region						
Elements	Spatial Attributes	Observed frequency	Expected frequency	Difference between observed and expected frequency	Squared difference between observed and expected frequency	Squared difference divided by expected frequency
Physical	Convenient access with shorter distance	36	128.75	-92.75	8602.56	66.81
	Furniture design, placement & orientation	225	128.75	96.25	9264.06	71.95
	Spatial organization & layout	161	128.75	32.25	1040.06	8.07
	Well-proportioned transition areas	93	128.75	-35.75	1278.06	9.92
	X^2 = 156.75 > Threshold value = 7.815					
Visual	Human scale physical planning	195	162	33	1089	6.72
	Clear visual connectivity between indoor and outdoor	129	162	-33	1089	6.72
	X^2 = 13.44 > Threshold value= 3.841					
Perceptual	Feeling of comfort and security	218	285	-67	4489	15.75
	Sensory experience promoting well-being	352	285	67	4489	15.75
	X^2 = 31.50 > Threshold value= 3.841					
Functional	Opportunity for seeing, hearing & conversing	155	144.33	10.67	113.84	0.78
	Pedestrian & age-friendly design	64	144.33	-80.33	6452.90	44.70

	Diverse mix of urban activities	214	144.33	69.67	4853.90	33.63
	X^2 = > Threshold value= 5.991					
Social	Spaces for self-expression & identity	107	124	-17	289	2.33
	Platforms for social interaction & engagement	161	124	37	1369	11.84
	Fostering a sense of community	104	124	-20	400	3.22
	X^2 = 16.59 > Threshold value= 5.991					
Temporal	Adaptability to changes in the built environment	146	166	-20	400	2.40
	Opportunity for social gatherings and celebrations	186	166	20	400	2.40
	X^2 = 4.80 > Threshold value= 3.841					

East Region

Elements	Spatial Attributes	Observed frequency	Expected frequency	Difference between observed and expected frequency	Squared difference between observed and expected frequency	Squared difference divided by expected frequency
Physical	Convenient access with shorter distance	81	164.5	-83.5	6972.25	42.38
	Furniture design, placement & orientation	251	164.5	86.5	7482.25	45.48
	Spatial organization & layout	232	164.5	67.5	4556.25	27.69
	Well-proportioned transition areas	94	164.5	-70.5	4970.25	30.21
	X^2 = 145.76 > Threshold value= 7.815					
Visual	Human scale physical planning	197	171.5	25.5	650.25	3.79
	Clear visual connectivity between indoor and outdoor	146	171.5	-25.5	650.25	3.79
	X^2 = 7.58 > Threshold value = 3.841					
Perceptual	Feeling of comfort and security	265	306	-41	1681	5.49
	Sensory experience promoting well-being	347	306	41	1681	5.49
	X^2 = 10.98 > Threshold value= 3.841					
Functional	Opportunity for seeing, hearing & conversing	152	132.33	19.67	386.90	2.92
	Pedestrian & age-friendly design	72	132.33	-60.33	3639.70	27.50
	Diverse mix of urban activities	173	132.33	40.67	1654.04	12.49
	X^2 = 42.91> Threshold value= 5.991					
Social	Spaces for self-expression & identity	81	96.33	-15.33	235	2.43
	Platforms for social interaction & engagement	143	96.33	46.67	2178.08	22.61
	Fostering a sense of community	65	96.33	-31.33	981.56	10.18
	X^2 = 35.22 > Threshold value= 5.991					
Temporal	Adaptability to changes in the built environment	197	171.5	25.5	650.25	3.79
	Opportunity for social gatherings and celebrations	146	171.5	-25.5	650.25	3.79
	X^2 = 7.58 > Threshold value= 3.841					

South Region

Elements	Spatial Attributes	Observed frequency	Expected frequency	Difference between observed and	Squared difference between	Squared difference divided by

				expected frequency	observed and expected frequency	expected frequency
Physical	Convenient access with shorter distance	78	168.25	-90.25	8145.06	48.41
	Furniture design, placement & orientation	228	168.25	59.75	3570.06	21.21
	Spatial organization & layout	234	168.25	65.75	4323.06	25.69
	Well-proportioned transition areas	133	168.25	-35.25	1242.56	7.38
	X^2 = 102.69 > Threshold value= 7.815					
Visual	Human scale physical planning	176	150	26	676	4.50
	Clear visual connectivity between indoor and outdoor	124	150	-26	676	4.50
	X^2 = 9.0 > Threshold value= 3.841					
Perceptual	Feeling of comfort and security	147	255.5	-108.5	11772.25	46.0
	Sensory experience promoting well-being	364	255.5	108.5	11772.25	46.0
	X^2 = 92 > Threshold value= 3.841					
Functional	Opportunity for seeing, hearing & conversing	245	243.33	1.67	2.78	0.01
	Pedestrian & age-friendly design	122	243.33	-121.3	14720.96	60.49
	Diverse mix of urban activities	363	243.33	119.67	14320.90	58.85
	X^2 = 119.35 > Threshold value= 5.991					
Social	Spaces for self-expression & identity	220	205	15	225	1.09
	Platforms for social interaction & engagement	235	205	30	900	4.39
	Fostering a sense of community	160	205	-45	2025	9.87
	X^2=15.35 > Threshold value = 5.991					
Temporal	Adaptability to changes in the built environment	299	264.5	34.5	1190.25	4.5
	Opportunity for social gatherings and celebrations	230	264.5	-34.5	1190.25	4.5
	X^2=9 > Threshold value= 3.841					

From the chi-square test, it is observed that the value of X^2 is greater than critical value in the case of all spatial attributes, i.e., (physical, visual, perceptual, functional, social and temporal) across all regions of India. Visual dimension in the West region is an exception to this result as the value of X^2 is less than the critical value. It rejects the null hypothesis, reflecting that spatial attributes have a statistically significant impact on user preferences, showing strong regional consistency.

Stage-2: To identify the prominent spatial attributes that users of cafes associate the most across India. The chi-square test reveals that spatial attributes significantly influence user preferences in all regions of India. Although there might be a possibility that not all attributes are valued equally, to put it another way, there might be the most preferred attributes that users highly anticipate from a café as a third place. One-way ANOVA is a well-known parametric statistical test to determine whether user preferences for different spatial attributes vary significantly. It assesses data variability in order to identify the difference between means of the responses (Ostertagová & Ostertag, 2013). For this analysis, again, two hypotheses are defined.

Null Hypothesis (H0)- There is no significant difference in user preferences across all spatial attributes. Alternative Hypothesis (H1)- There is a significant difference in user preferences for at least one spatial attribute. This test is performed in the Microsoft Excel software. Table 3 represents one-way ANOVA. If the P-value is less than the significance level (α), which is considered 0.05 in this research, this means users prefer certain spatial attributes over others.

Table 3. One-way ANOVA

Physical element						
Source of Variation	SS	df	MS	F	P- Value	F- Crit
Between Groups	74145.1875	3	24715.0625	14.61042896	0.000261099	3.490294819
Within Groups	20299.25	12	1691.604167			
Total	94444.44	15				
Perceptual element						
Source of Variation	SS	df	MS	F	P- Value	F-Crit
Between Groups	29403.125	1	29403.125	6.237459672	0.046686472	5.987377607
Within Groups	28283.75	6	4713.958333			
Total	57686.88	7				
Functional element						
Source of Variation	SS	df	MS	F	P-Value	F-Crit
Between Groups	46880.66667	2	23440.33333	6.196729257	0.020315466	4.256494729
Within Groups	34044.25	9	3782.694444			
Total	80924.92	11				
Social element						
Source of Variation	SS	df	MS	F	P-Value	F-Crit
Between Groups	7635.166667	2	3817.583333	1.374797431	0.301292471	4.256494729
Within Groups	24991.5	9	2776.833333			
Total	32626.67	11				
Temporal element						
Source of Variation	SS	df	MS	F	P-Value	F-Crit
Between Groups	703.125	1	703.125	0.184573485	0.682471956	5.987377607
Within Groups	22856.75	6	3809.458333			
Total	23559.88	7				
Visual element						
Source of Variation	SS	df	MS	F	P-Value	F-Crit
Between Groups	4560.125	1	4560.125	4.152646557	0.08771067	5.987377607
Within Groups	6588.75	6	1098.125			
Total	11148.88	7				

Table 3 shows that the p-value is less than the significance level of 0.05 for three spatial attributes: physical, perceptual, and functional, respectively. It validates the acceptance of the alternative hypothesis, demarcating a significant difference in user preferences for spatial attributes across India.

As ANOVA highlights crucial attributes, Tukey's HSD post hoc test is a statistical method that is used to find out whether or not the association between pairs of group means is statistically significant (Nanda et al., 2021). In this study, these pairs of group means are the responses in mentioned regions of India. If there is a significant difference, it shows that users of one region prefer particular spatial attributes over the preferences of users of another region.

The Tukey's criterion (T) is defined by $T = Q_{\alpha}(c, n\text{-}c) \sqrt{(MSE / n_i)}$

…where, α- Level of significance (Here, α- 0.05), c- No. of columns, n- Total sample size, Q- Critical value of studentized range distribution, MSE- Mean square error from ANOVA, n_i- Sample size for each group (assumed equal for all groups)

From the studentized range distribution table,

$Q_{0.05}(4, 96) = 3.698$

Mean Square Error (MSE) from ANOVA

Physical element= 1691.60

Perceptual element= 4713.95

Functional element= 3782.69

Tukey's HSD calculations:

For physical element (T)= 3.698 √ (1691.60/ 25) = 3.698 x 8.22 = 30.39

For perceptual element (T)= 3.698 √ (4713.95/ 25) = 3.698 x 13.73 = 50.77

For Functional element (T)= 3.698 √ (3782.69/ 25) = 3.698 x 12.30 = 45.48

Thus, if the mean difference value of a particular pair of regions is greater than the identified Tukey's HSD value, the difference can be considered statistically significant. If the mean value is less than Tukey's HSD value, the difference is insignificant for the pair.

By considering, X_1 = Mean of responses of the west region

X_2 = Mean of responses of the north region

X_3 = Mean of responses of the east region

X_4 = Mean of responses of the south region

Table 4. Mean of the responses- Region-wise

Sr. No.	Region/Mean of responses	Physical element	Perceptual element	Functional element
1	West Region (X1)	85.75	173	123.66
2	North Region (X2)	128.75	285	144.33
3	East Region (X3)	164.50	306	132.33
4	South Region (X4)	168.25	255.5	243.33

Table 5. Mean difference between pairs of responses- Region-wise

Sr. No.	Tukey's HSD calculation for physical element = 30.39
1	$X_1 - X_2 = 85.75 - 128.75 = -43 < 30.39$
2	$X_2 - X_3 = 128.75 - 164.50 = -35.75 < 30.39$
3	$X_3 - X_4 = 164.50 - 168.25 = -3.75 < 30.39$
4	$X_1 - X_4 = 85.75 - 168.25 = -82.5 < 30.39$
5	$X_1 - X_3 = 85.75 - 164.50 = -78.75 < 30.39$
6	$X_2 - X_4 = 128.75 - 168.25 = -39.5 < 30.39$

Sr. No.	Tukey's HSD calculation for perceptual element = 50.77
1	$X_1 - X_2 = 173 - 285 = -112 < 50.77$
2	$X_2 - X_3 = 285 - 306 = -21 < 50.77$
3	$X_3 - X_4 = 306 - 255.5 = 50.45 < 50.77$
4	$X_1 - X_4 = 173 - 255.5 = -82.55 < 50.77$
5	$X_1 - X_3 = 173 - 306 = -133 < 50.77$
6	$X_2 - X_4 = 285 - 255.5 = -29.45 < 50.77$

Sr. No.	Tukey's HSD calculation for functional element = 45.48
1	$X_1 - X_2 = 123.66 - 144.33 = -20.67 < 45.48$
2	$X_2 - X_3 = 144.33 - 132.33 = 12 < 45.48$
3	$X_3 - X_4 = 132.33 - 243.33 = -111 < 45.48$
4	$X_1 - X_4 = 123.66 - 243.33 = -119.67 < 45.48$
5	$X_1 - X_3 = 123.66 - 132.33 = -8.67 < 45.48$
6	$X_2 - X_4 = 144.33 - 243.33 = -99 < 45.48$

Table 5 illustrates that there is no particular pair of mean differences of responses region-wise that are statistically different from each other. Users across all regions have the same preferences for the most preferred spatial attributes. In short, these attributes are valued equally across India.

Stage 3: To analyze the association between spatial attributes and user preferences.

Pearson's correlation analysis is useful to measure the strength and direction of the linear relationship between two variables. In this study, the two variables are the spatial along user preferences across regions. It reveals the extent to which they are interdependent.

Table 6. Pearson's r correlation coefficient

Physical element	Convenient access with shorter distance	Furniture design, placement & orientation	Spatial organization & layout	Well-proportioned transition areas
Convenient access with shorter distance	1			
Furniture design, placement & orientation	0.877043749	1		
Spatial organization & layout	0.994161398	0.820185507	1	
Well-proportioned transition areas	0.834730974	0.777244089	0.82337713	1
Perceptual element	Feeling of comfort & security	Sensory experience promoting well-being		
Feeling of comfort & security	1			
Sensory experience promoting well-being	0.46617963	1		
Functional element	Opportunity for seeing, hearing & conversing	Pedestrian & age-friendly design	Diverse mix of urban activities	
Opportunity for seeing, hearing & conversing	1			
Pedestrian & age-friendly design	0.965182414	1		
Diverse mix of urban activities	0.962643549	0.952654446	1	
Social element	Spaces for self-expression & identity	Platforms for social interaction & engagement	Fostering a sense of community	
Spaces for self-expression & identity	1			
Platforms for social interaction & engagement	0.983361997	1		
Fostering a sense of community	0.944477578	0.889214069	1	
Temporal element	Adaptability to changes the built environment	Opportunity for social gatherings and celebrations		
Adaptability to changes in the built environment	1			
Opportunity for social gatherings and celebrations	0.76776671	1		
Visual element	Human scale physical planning	Clear visual connectivity between indoor & outdoor		
Human scale physical planning	1			
Clear visual connectivity between indoor & outdoor	0.961717738	1		

Pearson's correlation coefficient (r) ranges from -1 to +1, with the following interpretations as mentioned in Table 6.

Table 7. Interpretation of correlation analysis

Size of correlation	**Interpretation**
0.90 to 1.00	Very high positive correlation
0.70 to 0.90	High positive correlation
0.50 to 0.70	Moderate positive correlation
0.30 to 0.50	Low positive correlation
0.00 to 0.30	Negligible correlation

Table 8. Patterns of correlation

Physical element	Correlation coefficient	Correlation
Convenient access with shorter distance to furniture design, placement & orientation	0.877043749	High positive
Convenient access with shorter distance to spatial organization and layout	0.994161398	Very high positive
Convenient access with shorter distance to Well-proportioned transition areas	0.834730974	High positive
Furniture design, placement & orientation to Spatial organization and layout	0.820185507	High positive
Furniture design, placement & orientation to Well-proportioned transition areas	0.777244089	High positive
Spatial organization and layout to Well-proportioned transition areas	0.82337713	High positive
Perceptual element		
Feeling of comfort & security to Sensory experience promoting well-being	0.46617963	Low positive
Functional element		
Opportunity for seeing, hearing & conversing to Pedestrian & age-friendly design	0.965182414	Very high positive
Opportunity for seeing, hearing & conversing to Diverse mix of urban activities	0.962643549	Very high positive
Pedestrian & age-friendly design to diverse mix of urban activities	0.952654446	Very high positive
Social element		
Spaces for self-expression & identity to Platforms for social interaction & engagement	0.983361997	Very high positive
Spaces for self-expression & identity to Fostering a sense of community	0.944477578	Very high positive
Platforms for social interaction & engagement to Fostering a sense of community	0.889214069	High positive
Temporal element		
Adaptability to changes in built environment to Opportunity for social gatherings and celebration	0.76776671	High positive
Visual element		
Human scale physical planning to Clear visual connectivity between indoor and outdoor	0.961717738	Very high positive

From Tables 6, 7 & 8, the strength and direction of the association between spatial attributes and user preferences can be quantified. A strong positive correlation suggests that enhancing spatial attributes leads to higher user preferences, whereas a low or moderate correlation exhibits lower interdependence. To put it simply, understanding this association helps in determining whether improving spatial attributes will directly impact user expectations and preferences.

FINDINGS

As mentioned earlier, Instagram is being employed as a primary research tool to analyze images, posts, and comments from 100 cafes across India that provide valuable insights into how spatial attributes influence user experiences and interactions. By examining visual and textual data, key spatial attributes emerge as significant factors that shape user engagement and satisfaction. A quantitative approach is adopted along with inferential statistical tests to achieve the required objectives.

The results from the chi-square test indicate that spatial attributes significantly influence user preferences across all regions of India, with the exception of the visual element in the western region. Since the chi-square value (X^2) is greater than the threshold value for most attributes, the null hypothesis is rejected, suggesting that physical, visual, perceptual, functional, social, and temporal elements collectively impact how users perceive and select cafes. In the same manner, Bitner (1992), supports the role of physical surroundings to influence user experiences and behavior. Additionally, the strong statistical significance across all spatial attributes confirms that users respond to a combination of tangible and intangible factors when engaging with third places. The results show a consistent trend across different regions, meaning that these attributes are

universally relevant to user preferences in cafes across India. This highlights that despite cultural and geographical variations; spatial attributes remain fundamental in influencing user preferences.

The results from the ANOVA test indicate that among all spatial attributes, users of cafes across India are most strongly associated with the physical, perceptual, and functional elements. Since the p-value is less than 0.05 for these three attributes, the null hypothesis is rejected, confirming that user preferences for spatial attributes are not random but rather shaped by distinct spatial attributes. Users value tangible aspects such as furniture design & arrangement and spatial layout that contribute to comfort, accessibility, and the overall ambiance of cafes. The way users interpret and experience a third place also depends on the atmosphere, aesthetics, and sensory perception that strongly influence their engagement with a cafe. This highlights the importance of spatial elements that evoke emotions, nostalgia, or cultural familiarity. Waxman (2006) also demarcates the prominence of these aspects through the concept of place attachment. Additionally, the opportunity for seeing, hearing, and conversing with others across all age groups, combined with a diverse mix of urban activities, significantly impacts users' perceptions, reflecting that cafes are viewed not just as social places but also as multi-functional places that cater to work, study, and relaxation. Thus, these three attributes emerge as the most crucial determinants of user engagement with cafes in India. The results of Tukey's HSD post hoc test reveal that there is no statistically significant difference in the preference for spatial attributes among users across different regions of India. This further validates that the most preferred spatial attributes—physical, perceptual, and functional—are valued equally across all regions, reinforcing the idea that user expectations and spatial experiences in cafes remain consistent throughout the country.

As the final stage of the analysis, Pearson's correlation analysis between spatial attributes and user preferences indicates varying degrees of association. The strength and direction of these correlations provide key insights into how much improving spatial attributes can influence user preferences. Some spatial attributes, such as spatial layout, a diverse mix of urban activities, opportunity for seeing, hearing & conversing, a platform for social interaction & engagement, and human-scale physical planning, exhibit a very strong positive correlation with user preferences, indicating that enhancing these attributes directly leads to higher user satisfaction. In other words, the stronger the correlation, the more critical these attributes are in shaping preferences. Some attributes, such as feeling of comfort and sensory experience, may have a lower or moderate correlation, indicating a weaker interdependence between the attribute and user preferences. In such cases, improving these spatial elements may not necessarily lead to a significant shift in user engagement. This suggests that while these attributes contribute to the overall experience, they may not be primary determinants of user choices. Thus, general inferences can be made regarding the study. These inferences are presented in the form of a summary table (Table 9) and a regional comparison chart (Table 10), providing better clarity and coherence in the interpretation of results.

Table 9. Summary table of statistical results

Spatial attribute	Chi-Square Significance ($p<0.05$)	ANOVA Significance ($p<0.05$)	Correlation strength (r)	Interpretation
Physical	Significant	Significant	0.82 (Very high)	Highly influences comfort and ambiance
Visual	Not significant (West region only)	Not Significant	0.60 (Moderate)	Region-specific influence
Perceptual	Significant	Significant	0.79 (High)	Shapes atmosphere and emotional attachment
Functional	Significant	Significant	0.85 (Very High)	Major determinant of usability and satisfaction
Social	Significant	Not Significant	0.73 (High)	Enables interaction and belonging.
Temporal	Significant	Not Significant	0.68 (Moderate)	Enhances diversity of activities.

A table consolidates the results of the Chi-square test, ANOVA, and correlation analysis for comparing the significance and relative strength of each spatial attribute.

Table 10. Regional comparison chart

Region	Physical	Visual	Perceptual	Functional	Social	Temporal
North	✓	✓	✓	✓	✓	✓
South	✓	✓	✓	✓	✓	✓
East	✓	✓	✓	✓	✓	✓
West	✓	×	✓	✓	✓	✓

✓: Indicates significant result ($p < 0.05$), ×: Indicates non-significant result

The table compares the significance level by region.

In order to bridge the gap between empirical analysis and practical application, the findings are compiled into strategic design recommendations for each spatial attribute. These recommendations are framed through a user-centric perspective, providing insights to architects, urban designers, and café owners on how to transform a café into an inclusive and lively urban third place. The synthesis focuses on how spatial attributes enhance user experience by providing a systematic reference for design decision-making. The summary table below simplifies the important insights into actionable recommendations, making the findings more accessible and relevant to both academic and professional readers.

Table 11. Summary table: Key strategic design recommendations

Spatial attribute	Key findings (Statistical evidence)	Strategic design recommendations
Physical	Strongest positive correlations (for spatial layout, furniture design and easy accessibility) Universally significant across all regions	Flexible, movable, and ergonomic furniture design, placement and orientation. Universally accessible, step-free layout and access for better orientation with spatial clarity Proportionate transition zones for smooth circulation and movement.
Perceptual	Highly significant (comfort, sensory experience, ambiance) P-value less than 0.05 across all regions	Enhancement in lighting design, acoustic finishes, and materiality Integration of sensory cues (color, texture, aroma) for sensory comfort and identity Culturally resonant design elements such as art work that creates ambiance and experience
Functional	Strong user association with multi-functional use (work, leisure, socializing). Significant correlation with user engagement	Provision of mixed-use seating (solo, group, co-working) Incorporation of power outlets, Wi-Fi, and flexible zoning that can be utilized for various functions at different timings and requirement.
Social	Strong correlation with social interaction and engagement opportunities	Availability of community tables, flexible seating clusters. Organization of creative events such as stand-up comedy shows, poetry sessions, music sessions, cultural / festive events Designing of spaces that encourage spontaneous encounters.
Temporal	Moderate significance; flexible patterns use	Adaptable layout that works across morning, afternoon, and evening crowd Adaptable lighting (day/night) Extension of operation hours where possible Support to long-duration stays with comfort-driven furniture
Visual	Weaker significance in the west region; moderate elsewhere	Utilization of café branding, art displays, and façade transparency to enhance visual character and recognition. Enhancement in exterior and interior décor, signage to strengthen visual appeal Emphasis on local materials for authenticity Curation of café identity with regional aesthetics

CONCLUSION

This study systematically investigates the impact of spatial attributes on user preferences in cafes across India, using a multi-layer statistical approach. The findings offer comprehensive insights into which spatial elements significantly influence user preferences, how these preferences vary across regions, and the strength of the association between spatial design and user engagement. The conclusions drawn from this study are as follows:

Spatial attributes have a statistically significant impact on user preferences. The study reinforces the need for urban designers, architects, and cafe owners to focus on a holistic spatial strategy that integrates physical,

perceptual, functional, and social attributes rather than relying solely on aesthetics. The regional consistency implies that strategic interventions in spatial design can be effectively applied across India, ensuring enhanced user satisfaction and engagement. It validates the importance of well-designed third places in urban settings.

Physical, perceptual, and functional attributes are the most crucial factors. Architects and designers can focus on optimizing spatial layout, comfort-driven furniture design, and experiential elements to enhance physical and perceptual spatial attributes. Café owners can emphasize promoting multiple urban activities where people from diverse backgrounds can come together and experience third places as per their subjective needs. The most preferred attributes remain consistent across India, allowing for standardized design strategies. The findings indicate that the most preferred spatial attributes (i.e., physical, perceptual, and functional) are effective and share common trends across India, as they are valued uniformly. It underpins that well-designed third places encompassing the three mentioned key attributes are fundamental to shaping user perceptions, transcending regional variations.

Enhancing high-impact spatial attributes can directly improve user engagement. Architects and designers can prioritize attributes with strong positive correlations and create spatial design strategies that focus on ensuring that third places are more engaging & comfortable. Thus, practical applications of the outcomes of this study suggest a user-centric design approach, improving user experience and contributing to the vibrancy of urban third places.

In addition, empirical findings of this study support and expand fundamental theoretical frameworks. Oldenburg's concept of "third place" is validated in the Indian setting, where the café is increasingly serving as a neutral, inclusive, and accessible place for social interaction, creativity, and identity formation. The emphasis on adaptability, comfort, and inclusivity is firmly aligned with his perspective on third place as an important aspect of urban life. Similarly, the results are consistent with Carmona's concept of "spatial dimensions", revealing that these dimensions are not only theoretical but also practical determinants of user engagement. By empirically establishing which dimensions have the most impact, this study contributes to our understanding of how spatial design translates into lived experience.

In terms of future implications of this study, researchers can expand beyond Instagram by including other social media platforms, such as Twitter for longer discussions and TikTok for experiential and performative content, allowing for a deepened understanding of how digital platforms can shape perceptions of urban third place. Furthermore, a longitudinal analysis can help explore how user preferences and perceptions of third place change over time, particularly in response to cultural shifts, urban development, or global events like a pandemic. Another implication might be with reference to the comparative study between café and other third places, such as library, co-working space, or public plaza, broadening the theoretical or practical applicability of third place.

Finally, the café as an urban third place in India demonstrates the interplay between spatial form and social function, with design decisions shaping cultural practices, user satisfaction, and community vibrancy. By bridging theory and practice, this study attempts to add both to scholarly discourse on third place and to practical strategies for architects, designers, and café owners aiming to build more meaningful and user-centric urban environments.

Authors' Contributions

The authors contributed equally to the study. Both authors were involved in the conceptualization, data collection, analysis, and manuscript preparation.

Competing Interests

The authors declare that there is no potential conflict of interest with respect to the research, authorship, and/or publication of this article.

Ethics Committee Declaration

This study did not involve human participants, clinical data, or animal subjects requiring ethics committee approval. Therefore, ethics approval was not applicable.

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Figure References

Figure 1: Adapted from Carmona, M., Heath, M., Oc, T., Tiesdell, S. (2021). Public places urban spaces- the dimensions of urban design (3rd Edition). Routledge. https://doi.org/10.4324/9781315158457

Figure 2: The Project Cafe Ahmedabad [@theprojectcafeahd]. (2024, March 26). *"Current Mood"* [Photograph]. Instagram. https://www.instagram.com/p/C4-duQOs1F2/

Table 7: Mukaka, M. M. (2012). Statistics corner: A guide to appropriate use of correlation coefficient in medical research. *Malawi Medical Journal, 24*(3), 69-71.

Authors' Biographies

Upendra Vinay Joshi received his B. Architecture from Shivaji University, Kolhapur in 2009. He received his master's specializing in Interior Architecture from University of Canberra, Australia in 2014. His research interests include architecture theory & philosophy, theory of space, theory of third place, socio-cultural anthropology, and urban sociology.

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