



Sensing Tunjungan: A Multisensory Take on Everyday Urban Life

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Abstract. This study examines how multisensory experience shapes placemaking and place attachment along Jl. Tunjungan, a historic urban corridor in Surabaya, Indonesia. As a sensory-rich public space in the Global South, Jl. Tunjungan presents layered stimuli—visual cues, soundscapes, food aromas, textures, and microclimatic variations—that influence how people perceive comfort, attractiveness, and spatial identity. Using a mixed-method approach that combines structured sensory observations across four timeframes with a public perception survey of 71 respondents, the study identifies key sensory modalities and evaluates their contribution to the corridor’s experiential character. Findings indicate that multisensory conditions shift notably between weekday and weekend, and between daytime and nighttime, producing distinct temporal atmospheres. The results also reveal an evolutionary pattern in sensory perception: occasional and moderate visitors (1–5 visits) report heightened multisensory awareness, while frequent visitors (>5 visits) display slightly lower—but still strong—scores. This suggests that multisensory cues become embedded into routine familiarity, supporting everyday placemaking and a sense of belonging rather than diminishing sensory experience. The study highlights the need to design heritage corridors not only for visual coherence but for balanced, culturally resonant multisensory environments. By demonstrating how sensory perception matures through repeated engagement, the research offers insights for more inclusive and experiential urban design strategies in Southeast Asian cities.

Keywords: Multisensory urbanism, placemaking, place attachment, Jl. Tunjungan, sensory perception

1 Introduction

In many cities of the Global South, public spaces are experienced not through detached visual appraisal but through a dense layering of sensory cues: the sound of traffic and chatter, the aroma of street food, the heat absorbed by pavement, and the texture of surfaces underfoot. Everyday mobility in these contexts unfolds through embodied and multisensory engagements that shape how people move, linger, evaluate comfort, and

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form emotional ties to urban places. Yet despite this, dominant planning and architectural paradigms continue to privilege the visual dimension of urban form. As Pallasmaa notes, the hegemony of vision produces cities that are seen more than felt, often overlooking the aural, haptic, olfactory, and thermal registers that influence how people actually inhabit urban space [1].

Recent studies highlight that multisensory experience—including smell, sound, touch, and thermal comfort—plays a crucial role in shaping how people engage with, remember, and return to urban places [2], [3]. These sensory dimensions influence behavioral intention, emotional connection, and the formation of place identity. In this sense, placemaking is as much about atmosphere as it is about infrastructure [4]. Within this discourse, the Restorative Cities framework offers a compelling lens for thinking beyond access and aesthetics. Roe and McCay argue that cities should be designed to reduce stress, support wellbeing, and promote inclusion through environments that are calm, legible, sensorially balanced, and socially responsive [5]. Among its seven pillars, the Sensory City emphasizes designing for the body's full sensory range to foster healthier and more human-scaled public spaces.

Despite the growing scholarship on multisensory urbanism, several gaps remain—particularly in the context of Southeast Asia. Existing studies have rarely examined how multisensory experience unfolds in heritage corridors where informal social life, street food culture, shifting microclimates, and layered sensory atmospheres shape everyday urban engagement. Moreover, empirical links between sensory perception and place attachment remain limited, especially in mixed-method studies that combine sensory mapping with public perception. This becomes increasingly urgent as revitalization projects in Indonesian cities, including Surabaya, tend to prioritize visual coherence and façade improvement while paying less attention to sensory qualities that contribute to comfort, sociability, and experiential richness in public space.

Jl. Tunjungan, a historic corridor known for its colonial architecture, commercial activity, and cultural significance, provides a relevant case for exploring these questions. While revitalization has improved the street's façade aesthetics and pedestrian environment [6], less is known about how its sensory character—the warmth of lighting at dusk, the texture of paving, the smell of fried snacks, or the soundscape of street performances—contributes to placemaking potential and emotional connection. Addressing this gap, the present study investigates which sensory modalities (visual, auditory, olfactory, tactile/thermal, and taste-related) are most salient in shaping people's perception of comfort, attractiveness, and identity in Jl. Tunjungan. It further examines how sensory perception varies across different visit frequencies, asking whether repeated exposure strengthens sensory awareness and supports place attachment. Through this inquiry, the study aims to contribute a nuanced understanding of multisensory placemaking in Southeast Asian urban heritage corridors and to offer insights for designing more inclusive and experientially grounded public spaces.

2 Theoretical Framework

2.1 Multisensory Urban Experience

Urban space is fundamentally multisensory. Cities are not only seen—they are heard, smelled, touched, and thermally felt. Pallasmaa [1] critiques the dominance of vision in modern design, arguing that the suppression of other senses leads to emotionally flat and physically disengaging spaces. Pink [2] emphasizes that sensory engagement emerges through routine practices—walking, touching surfaces, noticing smells and sounds—which shape people’s spatial understanding through habit rather than passive observation.

Empirical studies further demonstrate how multisensory conditions shape emotional response and spatial perception. Liu et al. [3] show that glare, noise, scent, and texture significantly influence mood, comfort, and behavioral intention. Similarly, Bhikha et al. [7] find that plant aromas, surface comfort, and background noise affect stay duration and overall space evaluation in public parks. In Indonesian contexts, sensory interventions such as shading, tactile paths, and food-related olfactory stimuli have improved perceived safety and comfort in kampung upgrading initiatives [9]. Together, these studies affirm that urban experience is shaped not only by visual form but by the atmospheric interplay of multiple senses that constitute the affective quality of place.

2.2 Placemaking and Sensory Attachment

Placemaking extends beyond physical infrastructure to encompass the emotional, sociocultural, and sensory dimensions through which people develop attachments to specific environments. Carmona et al. [4] highlight that placemaking fosters sociability, comfort, memory, and meaning—qualities strongly influenced by sensory cues. Research in Petaling Street, Kuala Lumpur, demonstrates how sensory layering—street music, food aromas, lighting, and thermal comfort—contributes to environmental memorability and encourages people to linger [10]. In Alun-Alun Bandung, sensory design elements such as cool lighting, shade, tactile play elements, and food scents shaped civic engagement and strengthened place identity [9].

Across various cultural settings, repeated sensory exposure has been linked to emotional bonding and spatial familiarity [2], [8]. Olfactory cues, aural rhythms, textures, and thermal comfort act as sensory anchors that reinforce collective memory and create a sense of belonging. These findings suggest that sensory perception is inseparable from placemaking, especially in public spaces where informal social life intensifies multisensory encounters.

2.3 Synthesis: Multisensory Placemaking in Urban Public Space

The convergence of multisensory experience and placemaking provides a comprehensive framework for understanding how people perceive, evaluate, and attach to urban public spaces. Rather than viewing perception as a passive visual act, scholars emphasize the “full-body” encounter with place—an affective field constituted through sound, smell, texture, and thermal variations that continuously shape comfort, engagement,

and memory [1], [2]. These sensory cues operate as urban affordances: they invite lingering, social interaction, or avoidance depending on how they are experienced.

Multisensory atmospheres are particularly pronounced in the Global South, where public spaces are animated by informal economies, street performances, food vendors, and fluctuating microclimates. Examples from Petaling Street [10], Alun-Alun Bandung [9], and Jakarta's kampung neighborhoods [9] show how sensory layering—not just physical design—drives meaningful placemaking and strengthens spatial identity.

Within this framework, Jl. Tunjungan offers a context where sensory environments intersect with heritage, commercial flows, and everyday social practices. Understanding how visual, auditory, olfactory, tactile/thermal, and taste-related cues contribute to perception and attachment provides a basis for multisensory placemaking strategies that move beyond visual improvement toward holistic experiential quality. This theoretical foundation directly informs the research aim: to identify which sensory modalities shape comfort, attractiveness, and identity in Jl. Tunjungan, and how these perceptions relate to visit frequency as an indicator of place attachment.

Table 1. Literature Synthesis

Dimension	Variable	Indicator	Source
Multisensory Urban Experience	Visual	Lighting (natural/artificial)	Pallasma (2012) [1]; Liu et al. (2021) [3]
		Building façade	
		Signage legibility	
		Visual clutter	
	Auditory (Sound)	Traffic noise	Pink (2015) [2]; Bhika al. (2023) [7]
		Street music	
		Chatter	
		Quiet zones	
	Olfactory (Smell)	Food aroma	Spence (2020) [8]; Liu (2021) [3]
		Exhaust fumes	
		Greenery	
		Unpleasant odor	
Tactile/Thermal (Touch)	Surface texture (street furniture)	Pallasmaa (2012) [1]; Bhikha et al. (2023) [7]	
	Shade vs heat		
	Grip in wet conditions		
Taste-related (Food)	Food diversity	Carmona et al. (2010) [4]; Mohamad (2023) [10]	
	Seating/resting areas		
Placemaking & Attachment	Sensory-based Uniqueness	Whether these sensory elements are perceived as distinct or memorable	Liu et al. (2021) [3]; Tan & Kong (2021) [10]
	Place Attachment	Frequency of visit (in last 3 months), emotional connection, reason to return	Pink (2015) [2]; Spence (2020) [8]

3 Methodology

3.1 Research Approach

This study employs a mixed-method approach to investigate the relationship between multisensory experience, placemaking, and place attachment in Jl. Tunjungan, Surabaya. Grounded in contemporary discourse on multisensory urbanism and everyday urbanism, the research positions the body and the senses as central instruments for understanding space—especially in Global South contexts where public life is shaped by informal, sensory-rich, and socially embedded practices. In contrast to visual-centric planning paradigms, Southeast Asian urban spaces are commonly experienced through heat, noise, aromas, tactile surfaces, and crowd density, all of which influence comfort, memory, and emotional connection.

To capture these dimensions, the study integrates structured sensory observation, walkthrough analysis, and a public perception survey. This combination allows the study to bridge expert-driven spatial reading with user-reported experience and to derive a more comprehensive understanding of multisensory perception in situ. The mixed-method design is intended not only to map the sensory field of Jl. Tunjungan but also to explore whether and how these sensory cues shape its identity as a meaningful and memorable public space.

3.2 Data Collection Method

Data collection consisted of two main components: (1) direct sensory observation through walkthrough analysis, and (2) a structured questionnaire survey.

The walkthrough analysis captured sensory conditions across four timeframes to account for diurnal and weekly variations:

- Weekday morning – midday
- Weekday evening – night
- Weekday morning – midday (including Car Free Day)
- Weekend evening – night

During each timeframe, researchers conducted slow, repeated walkthroughs along the corridor, documenting sensory stimuli across five modalities (visual, auditory, olfactory, tactile/thermal, and taste-related). Observed elements included façade lighting, noise levels, crowd activity, food aromas, microclimate variations, pavement textures, and the presence of vendors or performances. These observations provided an initial inventory of sensory cues that would later be validated through user perception.

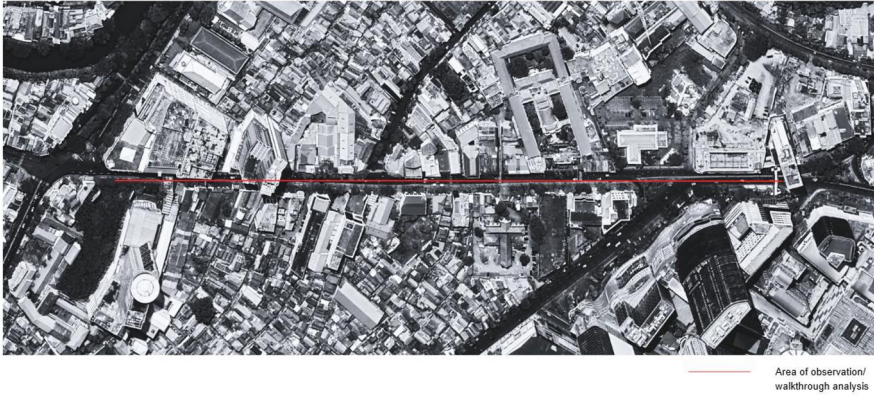


Fig. 1. Area of Observation and Walkthrough Analysis (Source: Google Earth, 2025)

After the initial inventory of sensory cues are developed, a structured questionnaire was distributed to 100 visitors, of which 71 valid responses were received and analyzed. The inclusion criterion was that respondents had visited Jl. Tunjungan at least once. Purposive sampling was used to ensure representation across different visiting periods (weekday, weekend, daytime, nighttime).

The questionnaire consisted of three sections:

1. **Sensory perception check** – respondents indicated whether they had experienced specific sensory elements identified through observation.
2. **Evaluation of sensory influence** – Likert scale ratings (1 = strongly disagree to 5 = strongly agree) assessed the perceived contribution of each sensory modality to Jl. Tunjungan’s comfort, attractiveness, and uniqueness.
3. **Place attachment indicator** – visit frequency was recorded as a proxy for place familiarity and emotional connection, categorized as 1-2 visits, 3-5 visits, and > 5 visits.

Respondents were also able to add unlisted sensory elements, allowing the dataset to capture emergent or personalized cues beyond the observational inventory.

3.3 Data Analysis

Analysis involved both descriptive and interpretive components. For each sensory modality, frequency counts were used to determine how many respondents perceived the elements identified during the walkthrough. Mean Likert scores were calculated to assess perceived contribution to placemaking value. These results were then interpreted against the literature synthesis in Table 1 to examine alignment between theoretical indicators of multisensory placemaking and users’ lived perceptions.

To explore the relationship between sensory perception and place attachment, mean sensory scores were compared across the three visit frequency groups (1–2, 3–5, and >5 visits). While the analysis does not claim causal relationships, it provides an

interpretive understanding of how repeated exposure may relate to heightened sensory awareness and emotional resonance with the corridor.

This analytical strategy aligns with the study's aim: to identify the sensory modalities that most shape perception and to explore how these modalities relate to spatial attachment in an urban heritage corridor..

4 Results and Discussion

4.1 Sensing the Street: Temporal Patterns of Urban Atmosphere at Jl. Tunjungan

As has been explained in data collection method (Chapter 3.2), the walkthrough analysis done in four time-frame: weekday-day, weekday-night, weekend-day, and weekend-night. So, in this part, the results and discussion will also be discussed consecutively.

During weekday mornings and afternoons, Jl. Tunjungan presents a dynamic and functionally oriented sensory environment (Fig. 2). The visual field is defined by building façades, signage, and scattered vegetation that provides intermittent shade—an important element given the strong thermal exposure characteristic of tropical urban streets. Art murals further enhance the visual atmosphere and contribute to cultural identity.

The auditory landscape is dominated by traffic noise and mechanical sounds, punctuated by pelican-cross signals playing local songs such as Semanggi Surabaya or Rek Ayo Rek. Human chatter and vendor interactions create an additional layer of liveliness, producing what Pink describes as “routine sensory rhythms” embedded in daily urban life [2].

The olfactory environment is shaped by food aromas from street vendors but occasionally disrupted by waste-related smells in less maintained areas. Tactile and thermal conditions—particularly heat radiating from pavement—affect comfort levels, with shaded pockets offering brief relief. While taste is less continuously present, visible food stalls prime visitors for culinary engagement.

In line with findings from Liu et al. [3], this multisensory layering reveals a weekday daytime environment that is lively yet thermally intense, encouraging transit and short pauses rather than prolonged social occupation.

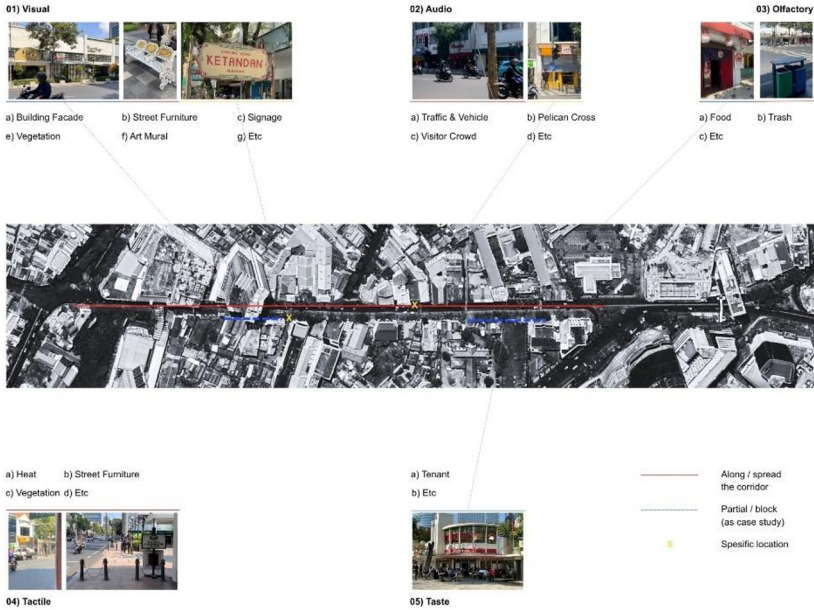


Fig. 2. Multisensory Urban Experience Mapping on Weekday-day

At night, the corridor transitions into a more inviting atmosphere (Fig. 3). Artificial lighting enhances building façades, increases legibility, and contributes to a sense of safety and vibrancy. Street vendors become visually prominent as illuminated stalls draw attention and activity.

The soundscape shifts from functional to social: chatter, shop music, and occasional informal performances dominate, while traffic noise remains a strong presence due to evening peak-hour congestion. This aligns with findings by Bhikha et al. [7], who note that evening auditory conditions often shape social perception more strongly than daytime noise.

The olfactory layer intensifies as food aromas become more distinct in cooler night air, reinforcing place identity through smell—a mechanism highlighted by Spence [8]. Tactile comfort improves as temperatures drop, making walking more pleasant. Street furniture supports lingering and sociability, contributing to what Carmona et al. [4] identify as the experiential dimension of placemaking.

Overall, weekday evenings create a hybrid atmosphere of movement and leisure, encouraging longer stays compared to daytime.

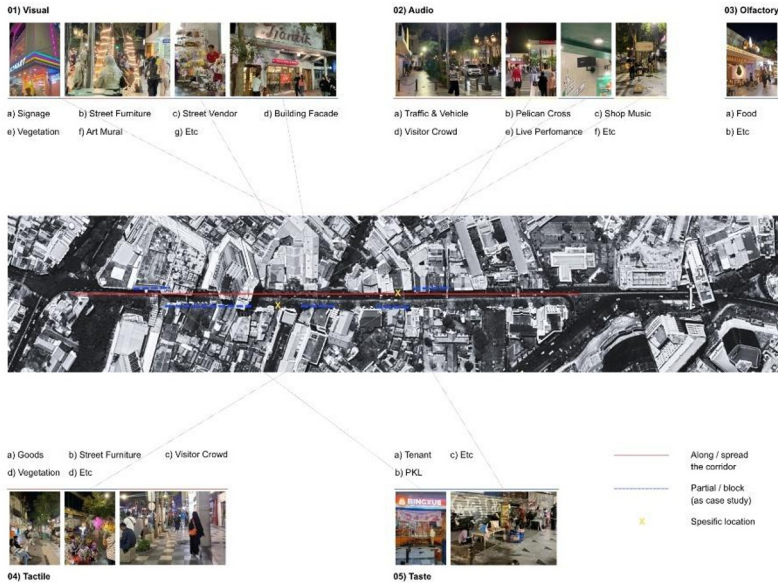


Fig. 3. Multisensory Urban Experience Mapping on Weekday-night

On weekend mornings—particularly during Car Free Day—Jl. Tunjungan becomes a relaxed yet vibrant pedestrian-oriented environment (Fig. 4). Without vehicular traffic, the auditory environment is dominated by human activities: walking, chatting, children playing, and occasional music from portable speakers. The relative quiet allows for clearer social interactions, aligning with Roe and McCay’s notion of restorative sensory conditions [5].

Visual elements, including façades, vegetation, and street furniture, become more noticeable due to slower walking speed and reduced spatial congestion. The olfactory atmosphere is enriched by an increased number of food vendors catering to weekend crowds.

Tactile conditions, however, remain influenced by midday heat, though shaded areas and street furniture mitigate discomfort. Weekend daytime thus supports a more exploratory mode of engagement, consistent with Pink’s argument that sensory perception intensifies during leisurely, non-urgent movement [2].

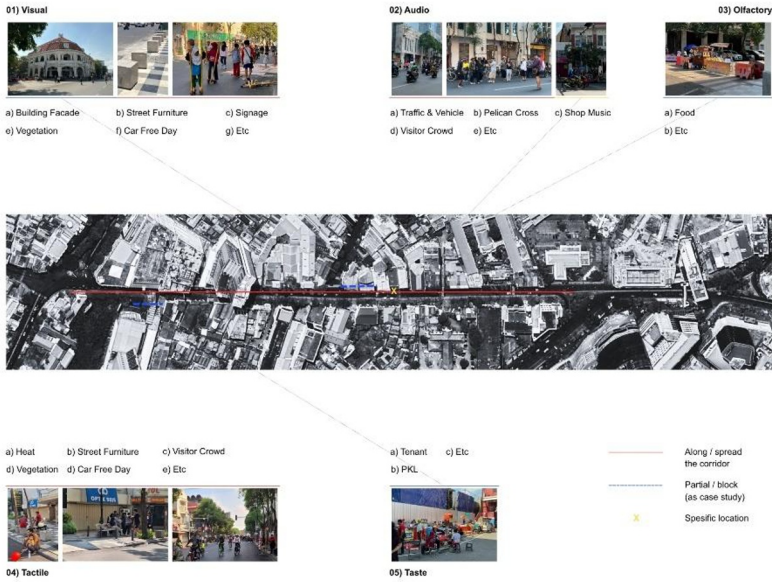


Fig. 4. Multisensory Urban Experience Mapping on Weekend-day

Weekend nights amplify the corridor’s sensory richness (Fig. 5). Lighting, crowd density, and street performances shape a festive visual and auditory environment. The illuminated vegetation produces contrasts that enhance spatial character.

The soundscape is dominated by social sounds—laughter, conversations, music, and the rhythmic pelican-cross signal—creating what Liu et al. [3] describe as an affective auditory field that reinforces urban atmosphere.

Olfactory cues from food stalls are strongest during this timeframe, becoming a sensory anchor around which people gather, consistent with Mohamad’s findings on food-related placemaking in Southeast Asia [10]. Thermal comfort improves compared to daytime, encouraging strolling and lingering.

This period exhibits the most intense multisensory layering, forming memorable experiences that contribute to spatial identity and emotional association.

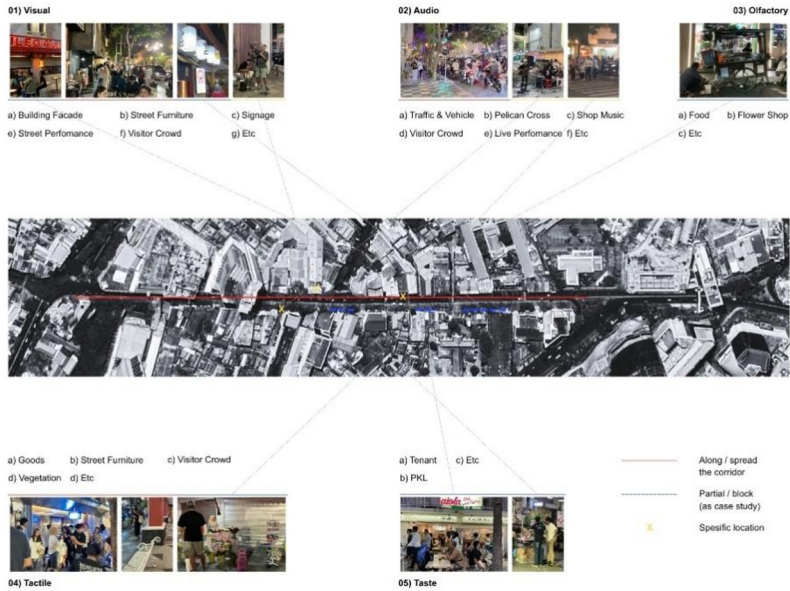


Fig. 5. Multisensory Urban Experience Mapping on Weekend-night

4.2 The Maturing of Multisensory Perception and Spatial Attachment

The relationship between visit frequency and sensory perception (Fig. 6) shows a nuanced pattern across the three visitor groups. Respondents who visited 1–2 times and 3–5 times generally reported high multisensory perception scores across all modalities. This suggests that occasional and moderately frequent visitors are actively seeking and noticing sensory cues during their visits—consistent with Pink’s argument that sensory awareness is heightened when individuals engage in exploratory or non-routine spatial encounters [2]. For these groups, Jl. Tunjungan functions as a destination where visual, auditory, olfactory, tactile, and taste-related stimuli contribute strongly to their overall experience.

In contrast, visitors who reported more than five visits also demonstrated relatively high sensory perception, but their scores were slightly lower compared to the other groups. Rather than indicating reduced engagement, this pattern suggests that multisensory experience for frequent visitors has evolved into a normalized, everyday spatial condition. As familiarity increases, sensory cues become embedded in routine and no longer require active cognitive attention—what Spence describes as the transition from “noticing” to “inhabiting” multisensory environments [8]. In other words, for these frequent users, the sensory richness of Jl. Tunjungan is still present but has become part of the expected background of daily urban life.

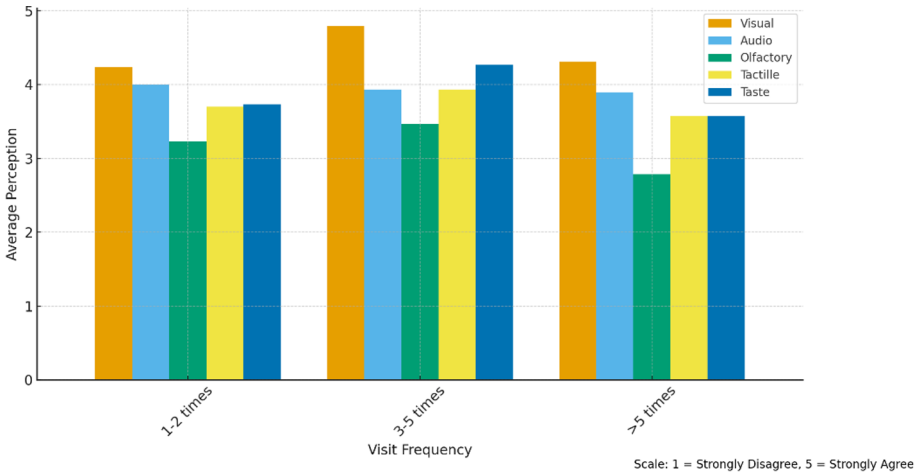


Fig. 6. Relationship between Visit Frequency and Multi-Sensory Perception that Shaped JI. Tunjungan

This shift reflects an evolutionary trajectory of place attachment. For newer visitors, multisensory stimuli serve as anchors for novelty, attraction, and memorability—aligning with Liu et al.’s findings that sensory attributes enhance first impressions and emotional resonance [3]. However, for long-term or habitual users, multisensory cues become integrated into everyday practice, contributing to a deeper form of attachment grounded not in momentary sensation but in routine familiarity, emotional comfort, and sense of belonging. This aligns with Carmona et al.’s framing of placemaking, where repeated bodily engagement with space supports identity formation and sustained place connection [4].

Thus, rather than interpreting the slightly lower perception scores of frequent visitors as diminished experience, the findings suggest that multisensory perception matures over time as shown in Fig.7.

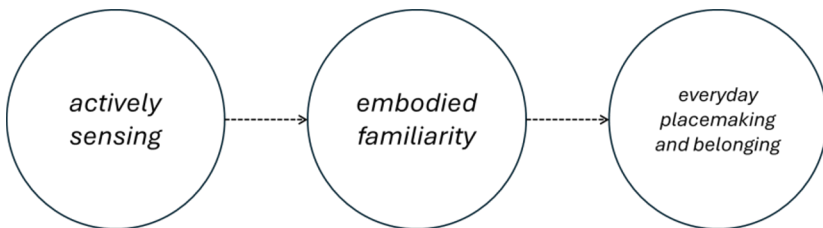


Fig. 7. Maturation of multisensory perception across visit frequency, illustrating the transition from sensory seeking to everyday immersion

This reinforces the idea that multisensory experience plays a foundational but evolving role in shaping place attachment, particularly in heritage corridors where sensory richness is intertwined with cultural and social rhythms.

4.3 Designing with the Senses: Lessons for Multisensory Placemaking

Building on the evolutionary pattern identified in sensory perception across visitor groups, the findings reveal that Jl. Tunjungan's sensory environment functions not simply as a collection of stimuli but as a temporal and experiential field through which place attachment is gradually produced. Rather than remaining static, multisensory perception matures over repeated exposure, shifting from conscious noticing to embodied routine. This dynamic aligns with Pink's argument that sensory experience becomes sedimented into habitual practice [2] and with Spence's view that multisensory cues eventually operate as background anchors of familiarity and comfort [8].

Three key implications emerge from this interpretation:

1. Multisensory environments support layered modes of engagement.

Occasional and moderate visitors engage with Jl. Tunjungan through heightened sensory attention—drawn to its visual, auditory, and olfactory cues as markers of novelty and cultural richness. In contrast, frequent visitors demonstrate a more routinized mode of engagement in which sensory cues contribute to everyday normalcy. This layered pattern suggests that Jl. Tunjungan successfully accommodates both experiential exploration and everyday belonging, reflecting the dual role of public spaces in the Global South

2. Informal sensory cues are foundational to placemaking.

Food aromas, crowd sounds, street performances, and thermal variations are not peripheral features; they are central to the street's experiential identity. As seen in other Southeast Asian contexts [9], [10], such informal sensory cues foster emotional resonance and support repeated use. Their presence helps explain why frequent visitors continue to form strong attachment even as sensory novelty diminishes—the sensory environment shifts from attracting visitors to anchoring their everyday rhythms.

3. Sensory balance, rather than sensory intensity, shapes long – term comfort and attachment.

While high-intensity sensory conditions may draw initial attention, sustained attachment depends on how well the sensory environment supports comfort, legibility, and social use over time. Challenges such as daytime heat or evening traffic noise highlight areas where sensory balance could be strengthened. Aligning with Restorative Cities principles [5], enhancing shade, managing noise, and improving microclimatic comfort would support both new and returning visitors, reinforcing the street's role as an inclusive urban corridor.

Taken together, these insights suggest that multisensory placemaking for heritage corridors should move beyond visual enhancement toward creating temporally responsive, culturally attuned, and experientially supportive environments. Jl. Tunjungan's success lies not only in its historical architecture but also in its sensory atmosphere—an atmosphere that enables visitors to transition from sensory discovery to habitual belonging. This layered experiential structure positions multisensory design as a crucial approach for sustaining vibrant and meaningful public spaces in Southeast Asian cities.

5 Conclusions

This study examined how multisensory experience shapes placemaking and place attachment in Jl. Tunjungan, a historic urban corridor in Surabaya. By integrating structured sensory observations with a public perception survey, the research demonstrates that urban experience in this context is not driven by visual form alone, but by the combined influence of auditory, olfactory, tactile/thermal, and taste-related cues. These multisensory layers contribute to the corridor's distinct atmosphere and play an essential role in how visitors perceive comfort, attractiveness, and identity.

Findings across multiple timeframes reveal that Jl. Tunjungan's sensory character is dynamic and temporally structured, with each period—weekday daytime, weekday nighttime, weekend daytime, and weekend nighttime—producing different sensory emphases. This temporal variation enhances the corridor's capacity to support diverse modes of engagement, from purposeful transit to leisurely exploration and social gathering.

The study also shows that sensory perception shifts with visit frequency. While occasional and moderate visitors report high sensory awareness as they actively seek and notice stimuli, frequent visitors (>5 visits) exhibit slightly lower—but still strong—scores. Rather than indicating diminished experience, this suggests that multisensory perception matures into a form of embodied familiarity. Through repeated exposure, sensory cues transition from novelty to routine, contributing to deeper forms of attachment and everyday belonging. This supports the argument that multisensory environments play both an initial and ongoing role in fostering place attachment.

In the context of Southeast Asian urban heritage corridors, these findings emphasize the need for placemaking strategies that consider sensory experience as a core design layer. Informal sensory cues such as food aromas, crowd sounds, and microclimatic patterns are not peripheral; they actively shape emotional connection and spatial identity. Enhancing sensory balance—especially regarding shade, thermal comfort, and noise—may further strengthen the street's ability to support inclusive and restorative public life.

Overall, the study contributes to multisensory urbanism by highlighting how sensory environments evolve through repeated engagement and how this evolution supports meaningful placemaking in the Global South. Future research could deepen these insights by incorporating longitudinal sensory mapping, physiological measurements, or comparative studies across other heritage corridors in Indonesia.

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