



Wayfinding Patterns in Informal Traditional Market at Night

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Abstract. Shopping in informal traditional markets at night poses challenges for visitors in locating traders due to dynamic spatial arrangements and limited visibility. Moreover, the lack of lighting also increases the perception of potential sexual crimes, particularly among female visitors. In this situation, wayfinding, or navigational ability becomes essential for selecting effective routes to reach destinations. This paper aims to observe visitors' wayfinding behaviors and strategies, along with the environmental elements within the market that interact with them during nighttime shopping. Data were collected using a qualitative approach through the author's observation, observation with participants, and pre- and post-shopping interviews. The findings indicate that wayfinding patterns are shaped by the interaction between visitors' individual traits and the condition of environmental elements, resulting in subjective wayfinding behavior. Nevertheless, similarities were observed across participants, including the use of route strategies, experiences of disorientation, and a tendency to choose paths or stalls based on lighting intensity. These findings also emphasize the importance of consistent and easily recognizable visual elements along the informal traditional market paths to support the process of spatial cognition. Furthermore, visual contrast must be carefully considered to ensure that the environmental image remains legible both during the day and at night.

Keywords: Informal Traditional Market, Nighttime, Wayfinding Behaviors, Wayfinding Strategies, Wayfinding Performance

1 Introduction

Traditional markets facilitate direct transactions between traders and buyers, offering an interactive shopping experience [1]. Their role in providing affordable fresh produce [2] has positioned traditional markets as gendered spaces, as shopping activities are often associated with women's domestic responsibilities [3]. However, economic constraints and weak regulations have led to the emergence of informal traditional markets, trading activities beyond formal stalls [4,5]. These activities often occur in unofficial and interchangeable spaces, resulting in a constantly shifting market image [4]. This dynamic encourages cyclical spatial transformations, which operate continuously for 24 hours in response to buyers' evolving needs [6].

The presence of informal traditional markets at night positions them as part of the Night Time Economy (NTE) [7]. This condition creates challenges for visitors, particularly women, in locating traders due to the constantly changing spatial layout [8], limited visibility [15], and the potential for sexual crimes [9]. Under such circumstances, wayfinding, or navigational ability becomes essential for selecting effective routes to reach intended destinations [10]. This ability is shaped by user factors, such as spatial cognition and behavioral patterns, as well as environmental factors, including physical elements that either support or hinder visitors' spatial understanding [8].

Lawton classifies wayfinding strategies into route strategies, which rely on specific cues such as turns and landmarks, and orientation strategies, which use global reference points such as cardinal directions or the sun's position [11]. However, existing studies often associate wayfinding with formal environments, such as buildings, and primarily focus on daytime settings. This creates a research gap, particularly in the context of informal traditional markets, where spatial arrangements are dynamic and visibility is limited at night.

Moreover, women, as primary shoppers in traditional markets, are often assumed to face greater navigational challenges in informal spaces due to their reliance on landmarks and heightened susceptibility to spatial anxiety [12]. Consequently, user experiences in unstructured environments at night remain underexplored. To address this

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gap, this paper focuses on understanding the wayfinding patterns of visitors in informal traditional markets at night and how they strategize to find the traders.

2 Methods

This study uses a qualitative approach consisting of three main stages: author’s observation, observation with participants, and interviews. Author observations were conducted to examine the transformation of physical elements in the informal traditional market under night time conditions. These observations took place at four distinct periods: night (21:00), early morning (01:00), morning (05:00), and midday (11:00) as a comparative reference.

Observation with participants involved three female participants during their shopping activities at the market. Participants were purposively selected based on women’s role as primary shoppers and their level of familiarity with the market. Two participants (B and C) were unfamiliar with the area, while one participant (A), who was more familiar, served as a comparative reference. Each participant was observed from a different starting point and at a different time: Participant A at night (21:00) from the Ramayana area; Participant B at late night (01:00) from Pasar Minggu Terminal; and Participant C in the early morning (05:00) from the Ramayana area. Each participant was observed throughout their shopping journey, from disembarking from their vehicle to returning to it. The observation focused on route selection, moments of hesitation, navigation strategies, and interactions with the surrounding environment.

This process was supported by pre- and post-shopping interviews to gain a deeper understanding of the participants’ perceptions. Data were collected through video and audio recordings, and a simplified floor plan of the market area was used to trace the participants’ movement patterns. Observational data and interview transcripts were analyzed thematically to identify behavioral patterns, wayfinding strategies, and navigational performance in the nighttime informal market setting.

3 Results

3.1 Informality in Pasar Minggu

Observations were conducted in the informal area of Pasar Minggu Traditional Market, from Pasar Minggu Terminal to Ragunan Road near the Ramayana Building. Located in the Pasar Minggu District of South Jakarta, the market is situated at the intersection of two major roads: Ragunan Road and Pasar Minggu Road. As one of the largest traditional markets in Jakarta, it is well-integrated with public transportation networks, including the Commuter Line and Transjakarta. This connectivity contributes to its strategic position within the urban fabric. Additionally, the market is bordered by roadside commercial zones, public facilities, residential neighborhoods, and educational institutions as shown in Figure 1.



Fig. 1. Context of Pasar Minggu’s Location

The informal area of Pasar Minggu Traditional Market operates continuously for 24 hours. The spatial arrangement of traders changes daily in a cyclical manner and becomes more dynamic during religious holidays. These spatial shifts also affect other environmental elements of the market, including trader density, crowds, sensory stimuli, and lighting configurations. Moreover, the temporary appropriation of surrounding spaces, such

as the Pasar Minggu Terminal and the central lane of Ragunan Road, illustrates the adaptive and transformative capacity of urban public spaces as shown in Figure 2.

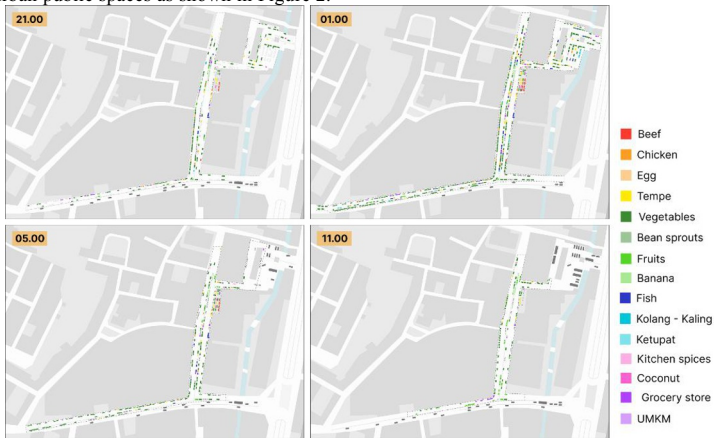


Fig. 2. Changes in the Spatial Arrangement of Traders

The dynamics of the market environment cause the environmental image of the Pasar Minggu Informal Traditional Market to shift between daytime and nighttime as shown in Figure 3. This shift is reflected in the legibility of visual elements, such as boundaries, buildings, and landmarks, which become less distinguishable at night due to low light levels and the high density of market activity.

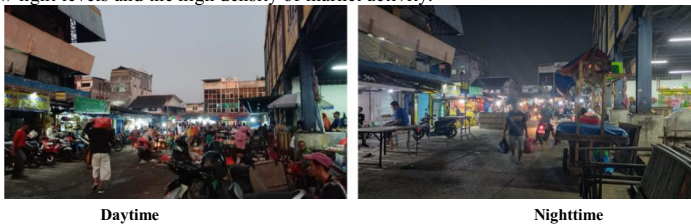


Fig. 3. Differences in Environmental Image Between Daytime and Nighttime

3.2 Wayfinding Experience

3.2.1 Shopping Journey

Differences in background, experience, and familiarity with the market led the three participants to exhibit varied wayfinding styles, such as following a pre-planned shopping route, exploring the market area directly, or navigating the surrounding area before returning. Each participant carried a distinct shopping list and objective, resulting in the selection of different routes. These variations produced subjective responses in their interactions with the market's environmental elements as shown in table 1. Ultimately, only Participant B was able to purchase all intended items, while Participants A and C did not complete their shopping lists.

Table 1 Wayfinding Journey

3.2.2

| Aspect | Participant A | Participant B | Participant C |
|---|--|---|--|
| Start of Journey | | | |
| Shopping time | 21.00 | 01.00 | 05.00 |
| Transportation | Jaklingko | Motorcycle | Jaklingko |
| Starting point | Ramayana | Pasar Minggu Terminal | Ramayana |
| Items to buy | Vegetables, cooking spices, and grated coconut | Opor ingredients such as chicken, galangal, ginger, candlenut, and onions | Potatoes and broccoli |
| Preparation made | Planned the route | None | None |
| During the Journey | | | |
| Walking pattern | Straight, keeping to the left | Straight, keeping to the left | Zigzag |
| Eye direction | Looking down | Looking left and right | Looking down |
| Lighting preference | Bright areas | Bright areas | Bright areas |
| Crowd preference | Quiet areas with many vendors | Quiet areas with many vendors | Quiet areas with few vehicles |
| Response to motorcycles from the diff direction | Continued walking and slightly moved aside | Continued walking and slightly moved aside | Continued walking and slightly moved aside |
| Response to motorcycles from the same direction | Stopped and turned | Stopped and turned | Continued walking and slightly moved aside |
| Response to smell | Avoided fishy smells | Avoided fishy smells | Distracted but remained passive |
| Response to sound | Not disturbed | Not disturbed | Disturbed by vehicle horns |
| Response to road conditions | Avoided muddy roads | Avoided muddy roads | Avoided muddy roads |
| Unexpected event | Encountered a group of men | None | Hear loud male voice |
| End of journey | | | |
| Transportation | Jaklingko | Motorcycle | Transjakarta |
| Ending point | Pasar Minggu Terminal | Pasar Minggu Terminal | Robinson |
| Items purchased | Vegetables and grated coconut | All items purchased | Potatoes |
| Reason | There is no desired item found | - | Didn't find any broccoli vendors |

Referencing points

The three participants used landmarks or route strategies while navigating at the Pasar Minggu Informal Traditional Market. However, the landmarks in this context were not architectural buildings, but elements of imageability as defined by Lynch [10], including paths, nodes, edges, districts, and landmarks. One of the reference points used by the three participants was the main road or a large path. For Participant B, choosing the large path was a strategy to make it easier to return to the spot where she parked her motorbike. Additionally, edges—such as road dividers—was also used by Participant C as a reference point in her wayfinding strategy because its uniform, continuous shape and contrasting yellow color made them easy to recognize and remember. However, Participant C only noticed this divider along Jalan Raya Ragunan because in the informal market area, it was covered by vendor stalls, and its gray color made it inconspicuous as a reference point as shown in Figure 4.



Fig. 4. Road Divider at Pasar Minggu Informal Traditional Market

In figure 5, the low recognizability of visual elements in the night market is often caused by the use of dark colors that blend into the night sky. Visibility is also disrupted by glare from the trader’s lights. This was experienced by Participant B, who failed to notice the yellow-green building near the terminal because her view was obstructed by bright lights, making the typically striking yellow color appear muted. Nevertheless, lighting can also enhance the visual memory of an object. Participant B’s experience shows that the bright, white lighting on the terminal building helped her recognize and remember the location where she parked.

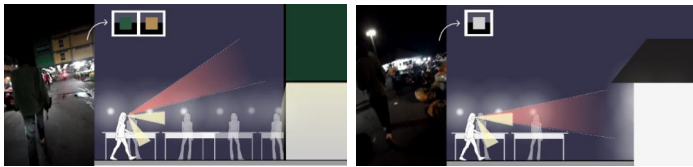


Fig. 5. Color and Height of the buildings

3.2.3 Disorientation and Emotion

Participants who were unfamiliar with the market area tended to experience disorientation and frequently paused to assess their surroundings. However, disorientation was also experienced by participants who were familiar with the market. For example, Participant A felt confused when she was unable to locate a trader who usually occupied a specific area. This occurred due to the constantly shifting spatial arrangement, which responds to temporal dynamics, needs, and movement. Meanwhile, the disorientation experienced by Participants B and C was primarily from their unfamiliarity with the environment, particularly when navigating dark, muddy, and narrow pathways. In such situations, they tended to slow down, stop, or look around in multiple directions to ensure the safety of the route ahead.

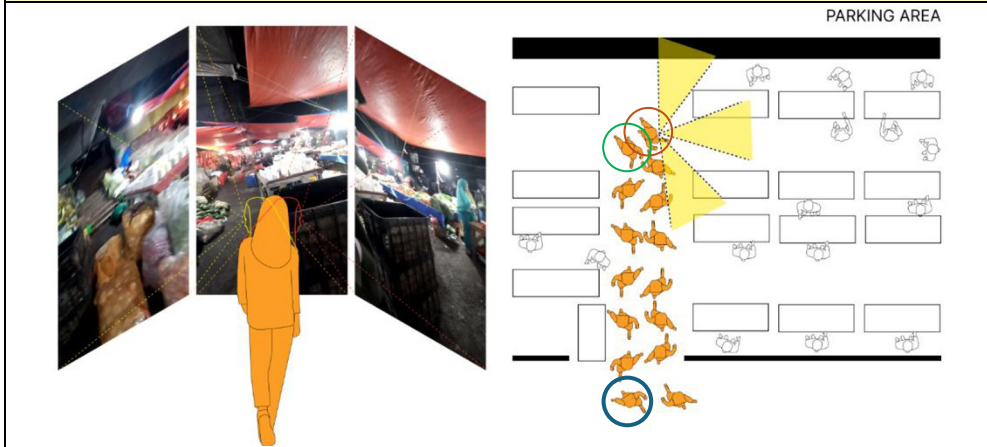
Table 2 Wayfinding process during disorientation

| <i>Cognitive process (Cp)</i> | <i>Decision Making (DM)</i> | <i>Implementation (Im)</i> | <i>Information Processing (Ip)</i> | <i>Emotion</i> |
|-------------------------------|-----------------------------|----------------------------|------------------------------------|----------------|
| Participat A – 21.00 | | | | |



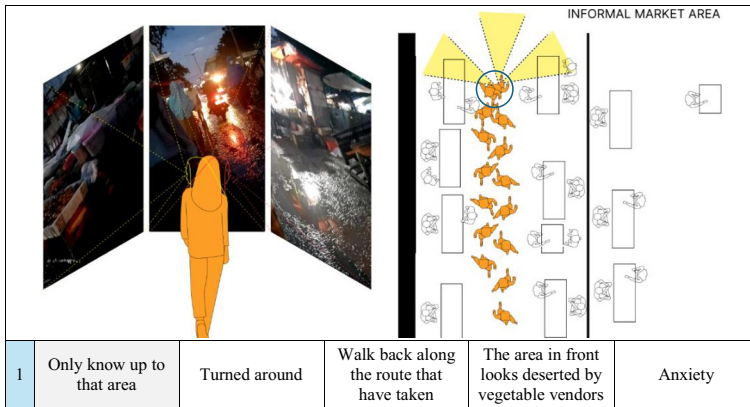
| | | | | | |
|---|--|---------------------------|---------------------------------|--|----------|
| 1 | Remembered kitchen spices stalls at terminal | Searched for a wider area | Walked toward a spacious area | Not many traders yet and the area was dark | Confused |
| 2 | Not many traders yet and the area was dark | Stopped | Stopped and looked around | No kitchen spices | Confused |
| 3 | No kitchen spices | Went home | Walked to public transport area | Vendors had not started selling | Neutral |

Participant B – 01.00



| | | | | | |
|---|-----------------------------------|-----------------------|-----------------------------------|-------------------------------|----------|
| 1 | Area ahead was dark and empty | Turned around | Turned around and entered parking | No vendors ahead | Confused |
| 2 | Dead end and crowded with traders | Stopped | Stopped and looked around | Targeted trader not present | Confused |
| 3 | Targeted trader not present | Returned to main path | Walked back to main street | Found a different vendor area | Confused |

Participant C – 05.00



3.2.4 Trader Setting

The goal in traditional markets is not to reach fixed locations but to find intended traders. However, the abundance of options and the constantly changing spatial layout make the search process ambiguous and require continuous directional adjustments. Trader selection depends on individual preferences, but generally, participants tend to choose stalls with better lighting, organized displays, and relatively quieter surroundings. These preferences are closely related to cognitive processes, in which prominent visual elements enhance recognition efficiency.

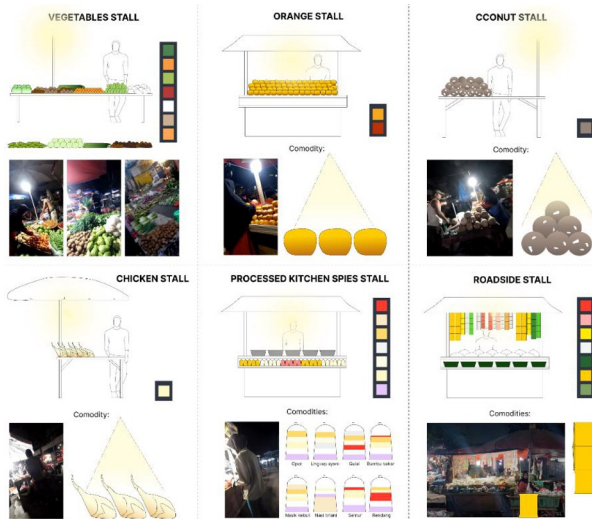


Fig. 6. Characteristics of Traders

4 Discussion

The quality of paths, ways of displaying, and crowd movement in the Pasar Minggu Informal Traditional Market shape participants' wayfinding behavior through walking patterns and bodily gestures as Erkan said [10]. These elements act as dominant stimuli that hinder comprehensive spatial cognition. Interaction with sensory elements, crowds, and fear triggers is subjective and depends on the individual's perspective. As a result, participants' responses vary depending on their personality and affect, which are influenced by factors such as gender [14]. Beyond environmental interactions, participants also consider the characteristics of traders when choosing a place to shop. This includes aspects such as product arrangement, variety of goods, crowd density, and lighting intensity. In the dark nighttime setting, participants rely on available lighting. This is evident in their tendency to walk and head toward brighter market areas.

Table 3 Wayfinding behavior patterns

| No. | Aspect | Detail | Conclusion |
|-----|-----------------|-------------------------------------|--|
| 1. | Preparation | Preparation made | Conducted based on individual habits, affect, and the visitor's level of familiarity. |
| 2. | Walking pattern | Walking pattern during the journey | Participants tended to form walking patterns that felt safe and comfortable. |
| 3. | Head movement | Eye direction while walking | Gaze was directed at merchandise and the ground, making area awareness more limited. |
| 4. | Lighting | Preference for lighting | Walking in well-lit areas and turning toward brighter spots helped improve visibility. |
| 5. | Density | Preference for crowd density | Quiet areas were preferred, although participants still approached areas with vendors for better item visibility. |
| | | Response to oncoming motorcycles | Participants generally continued walking while slightly moving aside when encountering oncoming motorcycles. |
| | | Response to motorcycles from behind | Participants tended to stop and look back to identify approaching motorcycles and adjust their steps accordingly. |
| 6. | Sensory | Response to smell | Subjective responses depending on personal sensitivity and awareness levels. |
| | | Response to sound | Subjective responses depending on personal sensitivity and awareness levels. |
| 7. | Fear triggers | Unpleasant or unexpected events | Subjective responses depending on personal sensitivity and awareness levels. |
| 8. | Traders | Attractive trader elements | Subjective preferences, but generally included good lighting, neat product arrangement, and relatively quiet location. |

The darkness of nighttime conditions also reduces environmental legibility and diminishes visual details such as color contrast. This occurs due to limited lighting and low contrast, which make it difficult to recognize key elements, as objects tend to blend into their background [15]. Moreover, participants often direct their gaze downward, narrowing their visual focus to objects that are aligned with or below their line of sight. In such situations, participants tend to rely on nearby and visible reference points, such as road dividers, main pathways, or other objects that strongly contrast with their surroundings. This discussion extends Lynch's [13] concept of imageability by illustrating that, in the context of nighttime informal markets, imageability has limitations due to the ever-changing spatial conditions and poor lighting. As a result, wayfinding cues tend to consist of objects that are visually distinct, easily recognizable within the participant's visual range, and consistently present over time. This aligns with Lee et al. [15], who suggest that high-contrast colors can enhance visual attention.

Table 4 Wayfinding strategies patterns

| No. | Aspect | Conclusion |
|-----|---|---|
| 1. | Type of strategy | Participants tend to use the route strategy |
| 2. | Reference points in dynamic environments | Continuous environmental objects that are visually recognizable |
| 3. | Reference points under nighttime conditions | Object with light color or high contrast |
| 4. | Reference to signage | Not used as reference points due to their elevated position and lack of contrast with the background. |
| 5. | Reference to lighting | When the lighting contrasts with the surrounding conditions. |

The constantly shifting layout of stalls at Pasar Minggu often leads to disorientation, even among familiar users. Therefore, Prestopnik and Roskos-Ewoldsen's [16] statement that the more familiar a person is with an area, the more precise, efficient, and confident their ability to navigate becomes is not entirely applicable in informal contexts such as markets. Furthermore, navigation performance is also related to emotional control [14], where high spatial anxiety can reduce women's confidence in interacting with the physical environment [12]. This is reflected in women's tendency to explore more cautiously, return to previously visited locations more frequently, and stop more frequently while navigating [17].

Participant behavior patterns, wayfinding strategies, and navigational performance while shopping at the Pasar Minggu Informal Traditional Market vary according to subjective interactions and levels of familiarity with

environmental elements. This is evident in the differing navigation patterns illustrated in Figure 7. Nevertheless, there is a noticeable tendency among female visitors to rely on landmarks as reference points, which aligns with Lawton and Kallai's [12] claim that women tend to use landmarks in navigation.

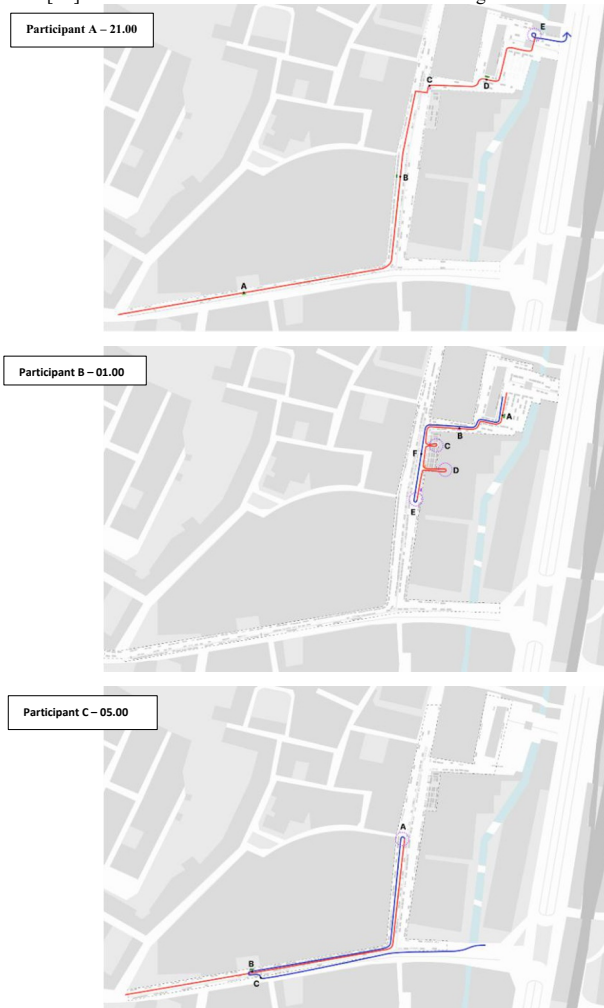


Fig. 7. Participants' wayfinding pattern

5 Conclusion

Wayfinding in informal traditional markets at night is affected by the constantly changing spatial arrangement of traders. These temporalities also influence other environmental elements, including lighting configurations, crowd density, and sensory quality. As a result, wayfinding patterns are shaped by the interaction between participants' individual traits and the condition of environmental elements, leading to subjective wayfinding behavior. Despite this subjectivity, similarities were observed among participants, particularly a tendency to choose paths or stalls based on lighting intensity.

Limited visibility due to low contrast and glare from traders' lighting reduce the legibility of the market's environmental image. In response, participants rely on reference points that are close, fixed, and have high contrast with their surroundings. This strategy aligns with women's tendency to navigate using visual elements such as

landmarks known as route strategy. Meanwhile, the dynamic spatial arrangement of traders also causes a tendency for disorientation regardless of familiarity with and emotional attachment to the environment.

Overall, the environmental elements that interact with participants at night include physical conditions, crowd dynamics, sensory elements, lighting, and external elements such as perceived fear. However, other elements also determine the direction and purpose of participants, including product arrangement, variety of goods, crowd intensity, and lighting quality.

Given this complexity, it becomes essential to provide consistent and recognizable visual cues along market pathways to aid spatial cognition in shifting environments. Designers should also consider color contrast to ensure that the environmental image remains consistent, both during the day and the night. As this study is based on a non-structured research approach, the results obtained are limited. Further research using structured methods is recommended to construct a more comprehensive synthesis of visitor behavior and wayfinding strategies.

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