

BEHAVIOURAL APPROACH AS THE BASIS OF TRADITIONAL MARKET REDEVELOPMENT STRATEGIES

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Abstract

This design study focuses on the redevelopment of the Kebayoran Lama traditional market using a behavioural approach. Traditional markets hold an important role in the social, economic, and cultural life of urban communities, functioning not only as centres of trade but also as spaces for interaction that shape the city's character. However, rapid urban development often creates challenges for traditional markets, reducing their competitiveness against modern shopping centres.

The study began with direct observation and behavioural mapping activities at the Kebayoran Lama traditional market to understand how traders and visitors interact with the space. Findings show the current layout does not support user needs due to irregular commodity placement, limited circulation, inactive stalls, and trading activities spilling outside the building. This research proposes strategies to restructure the market into a more adaptive, inclusive, and sustainable space. The design sought to reprogram the spatial boundaries to identify a setting for particular behaviour, improve wayfinding to create clearer spatial cognition, and develop sensorial experience to enhance environmental perception. These redevelopment strategies demonstrate an integrated framework of behaviour approach to functionally efficient, cognitively legible, and socially engaging spaces, strengthening the market's role as a vital centre of economic and social activities for the community.

Keywords: *behavioural architecture, spatial cognition, environmental perception, traditional markets*

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Introduction

This design study focuses on the redevelopment of the Kebayoran Lama traditional market using a behavioural approach in architecture. Traditional markets in Indonesia play a vital role in shaping both the economy and the cultural identity of cities. Beyond serving as centres of trade, they function as public spaces that facilitate social interaction and reflect the everyday dynamics of urban communities (Prakoso & Rolalisasi, 2025). Current government policy highlights that the role of markets is not merely a commercial environment but also a cultural and social arena that fosters community life (Indonesian Ministry of Trade, 2007, 2021).

In the face of rapid urban growth and insufficient spatial planning, many traditional markets have deteriorated in both physical and social quality. They are often perceived as disorganised, unhygienic, and unsafe, leading to a decline in their competitiveness compared to modern retail spaces. Despite their essential role, traditional markets struggle to meet users' growing expectations for cleanliness, comfort, and safety (Arifin, 2021). According to data from the Central Statistics Agency (BPS), 46% of traditional markets in DKI Jakarta have been operating for more than 30 years and now face challenges related to infrastructure, management, and modernisation (Badan Pusat Statistik Provinsi DKI Jakarta, 2020). Many of these markets show low stall occupancy and poor environmental conditions (Badan Pusat Statistik Provinsi DKI Jakarta, 2021).

This study argues that the deteriorating condition of traditional markets calls for a spatial restructuring strategy that responds not only to physical issues but also to current patterns of users' behaviour shaped by the market environment, thereby improving how people perceive, navigate, and interact within the market. This paper starts with a theoretical discussion of the behavioural approach in architecture, followed by an exploration of the context and a discussion of the design process. This research seeks to demonstrate how behavioural architecture can support the transformation of traditional markets into efficient, legible, and socially engaging spaces that remain vital within the evolving urban context.

Behavioural approach as the basis for architectural design

The behavioural approach in architecture emphasises the reciprocal relationship between human behaviour and the spatial environments people inhabit. Architecture, in this sense, is not merely a physical container but an active system that shapes and is shaped by patterns of human interaction (Haryadi & Setiawan, 2022). Understanding user behaviour thus forms the foundation for creating adaptive and responsive spaces.

Behavioural architecture rests on three interrelated concepts: behavioural setting, spatial cognition, and environmental perception. Behavioural setting refers to the recurring association between activity and place (Haryadi & Setiawan, 2022), while environmental perception concerns how users interpret and evaluate their surroundings (Haryadi & Setiawan,

2022). Spatial cognition explains how individuals perceive, organise, and process spatial information such as distance, direction, and location (Laurens, 2004).

Bomfim and Cruz (2023) discuss how spatial cognition and legibility clarify how users comprehend visual differences, access points, and layout complexity to support orientation and navigation. They also reaffirm that users' cognitive processing of spatial organisation strongly shapes wayfinding and overall spatial experience. Wayfinding thus becomes a key manifestation of spatial cognition. Users observe, define, and interpret spatial boundaries and routes to navigate through space (Handayani, 2021).

Behavioural patterns emphasise that humans are thinking beings whose perceptions and decisions are shaped through continuous interaction with their environment (Haryadi & Setiawan, 2022). This process is closely tied to environmental perception and the use of intuitive directional elements that guide movement and orientation (Hantari & Ikaputra, 2020). Likewise, the user's perception of its environment involves how places are understood, felt, and evaluated through visual, emotional and symbolic experiences (Laurens, 2004, as cited in Destianti et al., 2021).

Previous studies have shown how user-oriented design enhances spatial experience and performance. Angkasawati and Milasari (2021) highlight that improving visual quality and comfort in market spaces could attract more visitors, while Datuela and Heryati (2024) and Kinanti and Lisa (2024) demonstrate that integrating behavioural setting, spatial cognition, and environmental perception increases both functional and experiential quality. It can be understood that the form of space should be based on the observed human behaviour rather than visual form alone.

Without sufficient attention to its user behaviour, market revitalisation projects in Indonesia face numerous challenges. The redesign of Sarijadi Market in Bandung, for example, improved its infrastructure but failed to consider flows of movement, resulting in unresolved circulation issues (Wicaksono et al., 2024). The behavioural setting approach was unable to effectively map trading activities, resulting in limited kiosk operations and reduced social interaction. The spatial cognition aspect was also underperformed, as the circulation patterns remained unclear and unintuitive for both trades and visitors. Likewise, the environmental perception dimensions failed to align with local users' visual and symbolic expectations.

Likewise, the Banyumas Market project enhanced comfort but did not fully integrate spatial cognition, leaving orientation and legibility problems unaddressed (Destianti et al., 2021). These cases show that while behavioural approaches have been recognised, their implementation tends to focus on visual and functional outcomes rather than cognitive and experiential aspects. These challenges suggest that successful market redesign requires a deeper understanding of behavioural patterns and their corresponding development strategies.

Methodology

This study adopts a behavioural architecture approach, proposing a design framework that interprets user behaviour as key input for spatial planning. The study starts by conducting the behavioural analysis in architecture through three main stages, which are (1) mapping spatial changes that occur in the trading activity area; (2) mapping user circulation in the building, and (3) mapping the visual image of buildings around the market area. It is then followed by the development of design strategies based on three interrelated behaviour architecture principles: behavioural setting, spatial cognition, and environmental perception.

Kebayoran Lama Market was selected for its distinctive characteristics as a traditional market embedded in a dense urban context, where intense daily activities generate complex spatial patterns. Kebayoran Lama Market occupies 19,900 m² of land near the Kebayoran commuter station and is surrounded by various residential and commercial activities (Martin et al., 2020). Despite such strategic potential, its existing spatial layout fails to support how traders and visitors move, interact, and occupy space. The result is inefficient circulation, overlapping zoning, and a lack of areas that facilitate social exchange.

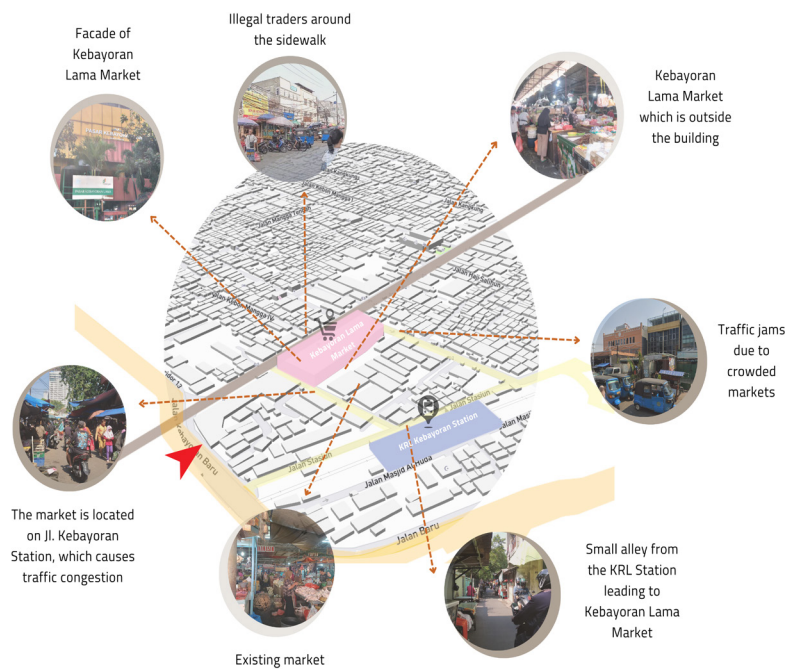


Figure 1. Case study location: Kebayoran Lama Market (Image by authors)

Figure 1 shows how the market occupies a strategic position that connects several layers of urban functions, including transportation, commerce, and residential areas. This integration allows for intense interaction between the market and its surroundings, but simultaneously contributes to congestion and informal trading along its periphery. Street vendors often extend their activities into sidewalks and circulation areas, blurring the physical and social boundaries between formal and informal space. This situation demonstrates how spatial behaviour in traditional markets often emerges from adaptive use rather than planned zoning. In behavioural terms, this dynamic reflects a

fluid relationship between activity and setting, in which users modify spatial boundaries to meet their immediate needs. Recognising this behavioural pattern is essential to redefining the market's layout to align with users' lived realities rather than static functional diagrams.

Mapping users' behaviour in Kebayoran Lama market spaces

Kebayoran Lama Market faces issues of spatial irregularity, limited comfort, and low functional efficiency. It is argued that these issues reflect some imbalance between its physical configuration and users' behavioural patterns. These conditions make it an appropriate case for examining behavioural architecture principles to identify spatial needs in a more contextual and human-centred manner. The following paragraphs map existing Kebayoran Lama market spaces and the occupational behaviour of its users. Analysis was conducted using people-centred mapping, which focuses on individual and group behaviours in utilising the market space. This method directly observes movement, social interactions, and specific user activities such as purchasing, hawking, waiting, or viewing items.

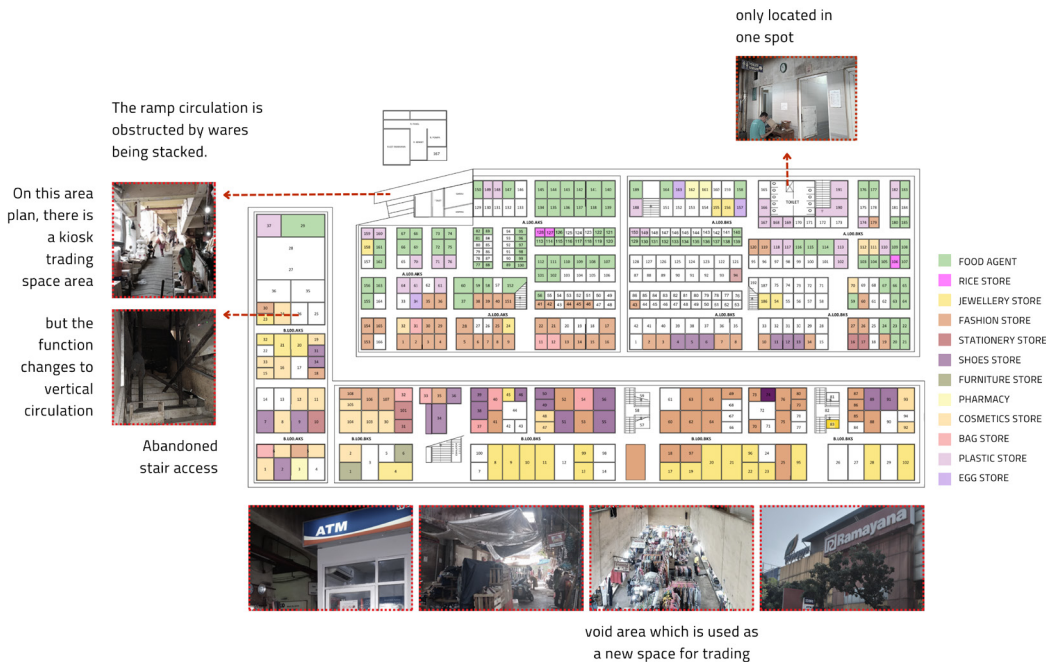


Figure 2. Existing zoning of the Kebayoran Market ground floor plan (Image by authors)

Figure 2 shows that the ground floor is primarily occupied by non-food items such as clothing, accessories, and household goods; however, the absence of systematic vendor grouping results in disorganised stall distribution and inefficient spatial use. Several uncoloured stalls indicate vacant units, reflecting low occupancy and declining spatial productivity. Circulation routes are narrow and irregular, often causing congestion during peak hours, while the limited provision of public facilities—such as only one restroom and no resting area—reduces user comfort. In addition, the lack of a dedicated logistics zone leads to overlap between goods delivery and visitor circulation, further disrupting spatial flow and market efficiency.

The condition of the laundry room looks poorly maintained, with poor hygiene and an unpleasant odor.

The meat and vegetable stall area is in poor physical condition, with suboptimal cleanliness and a blocked gutter flow.

The poultry slaughterhouse is in a humid and unhygienic environment.

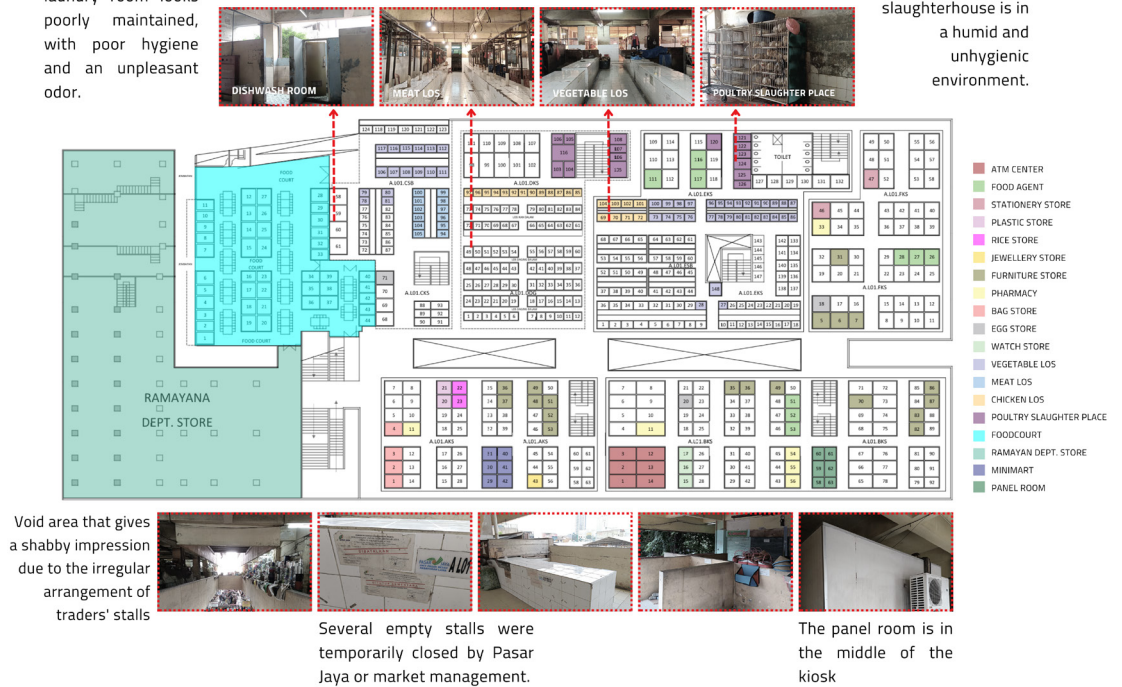


Figure 3 shows the first-floor zoning, combining wet and dry trading zones, a food court, and the Ramayana store. Although functionally diverse, many wet-area kiosks remain inactive, creating dark, unsafe environments. The vertical placement of wet commodities complicates goods delivery and sanitation, while the absence of commodity grouping blurs wayfinding and reduces efficiency. Both floors, therefore, exhibit similar challenges: unintegrated zoning, limited supporting facilities, and the lack of a dedicated logistics area, indicating the need for spatial reorganisation to improve functionality and safety.

Figure 3. Existing zoning of the Kebayoran Market's 1st floor plan (Image by authors)

Figure 4. Existing market conditions and number of traders (Image by authors)



Figure 4 highlights the gap between physical capacity and active use. Of 1,061 stalls, only 446 (41%) are occupied,

leaving 59% vacant. This imbalance diminishes the market's vibrancy and economic performance. Field photographs show closed kiosks, cluttered corridors, and circulation blocked by merchandise, revealing spatial misuse and weak management. These findings suggest that improved spatial allocation and zoning policies are essential to reactivate underutilised areas and enhance the user experience.

Visitors with family relationships consisting of mothers, fathers, and children interact with the market environment based on their perceptions and habits (Figure 5). This visualisation consists of three main elements: location context, trader composition, and user movement patterns. Figure 6, top left, shows the site context focusing on the southern area, while the bottom-left diagram presents trader distribution of vegetables (47.1%), chicken (27.9%), fish (13.2%), meat (5.4%), and furniture (5.4%). The main section is a linear map of the market path showing tent distribution and user activities.



Figure 5. Mapping user cognitive patterns in the market spaces (Image by authors)

In Figure 6, colours indicate commodity zones, while symbols and lines represent activities such as buying, browsing, serving, and waiting. The mapping results show that most activity is concentrated in the vegetable and chicken areas, with the highest intensity in the central market lane, which serves as the main circulation route. Mothers' movements appear the most dominant and evenly distributed. This mapping reveals how users interact with and respond to market spaces, forming the basis for more contextual spatial planning aligned with user habits. This people-centred mapping provides a more detailed picture of space needs and actual user movement patterns, which is an essential basis for designing a market layout that is more responsive and aligned with actual user behaviour.

Based on such current occupations, the typology of market users and the variety of activities they perform within the market environment can be concluded (Figure 6). On the left, users are categorised by activity groups, including distributors, managers, traders, buyers, students, workers, and the general

new design reflects how behavioural insight can holistically inform spatial solutions that balance functionality, cognitive clarity, and user comfort. The market focuses on a more adaptive and inclusive space that strengthens social and economic interactions by recognising circulation, clarifying visual hierarchy, and optimising stall distribution.

No.	Type of Sales	Existing Data				New Design			
		1st Floor	2nd Floor	St. Kebayoran Street	Amount	1st Floor (New)	2nd Floor (New)	3rd Floor (New)	Amount
1	Food Agent	43	9	-	52	-	18	-	18
2	Rice Store	3	2	-	5	-	5	-	5
3	Jewellery Store	29	1	-	30	-	13	-	13
4	Fashion Store	50	-	-	50	-	35	-	35
5	Stationery Store	21	2	-	23	-	7	-	7
6	Shoes Store	23	-	-	23	-	21	-	21
7	Furniture Store	2	19	4	25	-	9	-	9
8	Pharmacy	2	3	-	5	-	5	-	5
9	Cosmetics Store	24	-	-	24	-	10	-	10
10	Bag Store	10	-	-	10	-	10	-	10
11	Plastic Store	27	2	-	29	-	6	-	6
12	Watch Store	2	3	-	5	-	3	-	3
13	Egg Store	3	3	-	6	-	5	-	5
14	Minimart	-	1	-	1	-	1	-	1
15	Empty Kiosk	249	181	-	430	-	-	-	-
16	Chicken	-	21	19	40	12	-	-	12
17	Meat	-	12	4	16	12	-	-	12
18	Fish	-	-	9	9	12	-	-	12
19	Frozen Food	-	-	-	-	12	-	-	12
20	Non-Halal Meat	-	-	-	-	11	-	-	11
21	Vegetable	-	30	32	62	157	-	-	157
22	Empty Los	-	169	-	169	-	-	-	-
23	Poultry Slaughter House	-	16	-	16	-	-	-	-
24	Street Food Trades	-	-	-	-	27	-	-	27
25	Foodcourt	-	30	-	30	36	-	-	36
26	Ramayana Dept. Store	-	1	-	1	-	-	1	1
27	Café	-	-	-	-	-	-	1	1
Number of Traders					446				0
Number of Empty Los/Kiosks					615				429
TOTAL					1,061				429



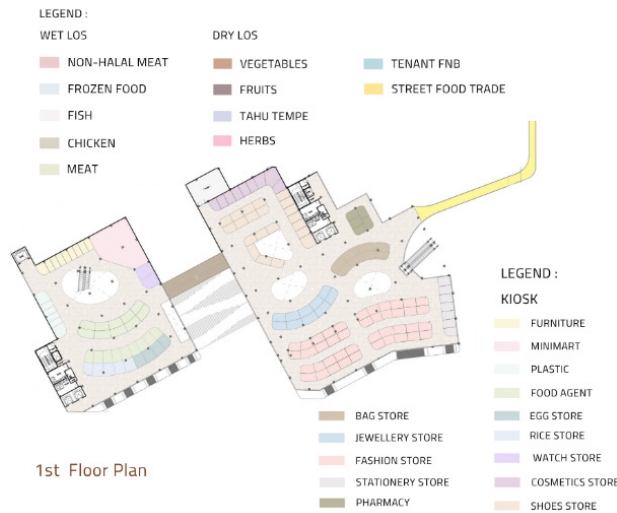
The stalls are arranged in an orderly manner to separate vegetable and meat products, maintaining cleanliness and shopping comfort

The kiosk are arranged in rows with open facades

Vegetable sales with a layout that extends on both sides



Ground Floor Plan



1st Floor Plan

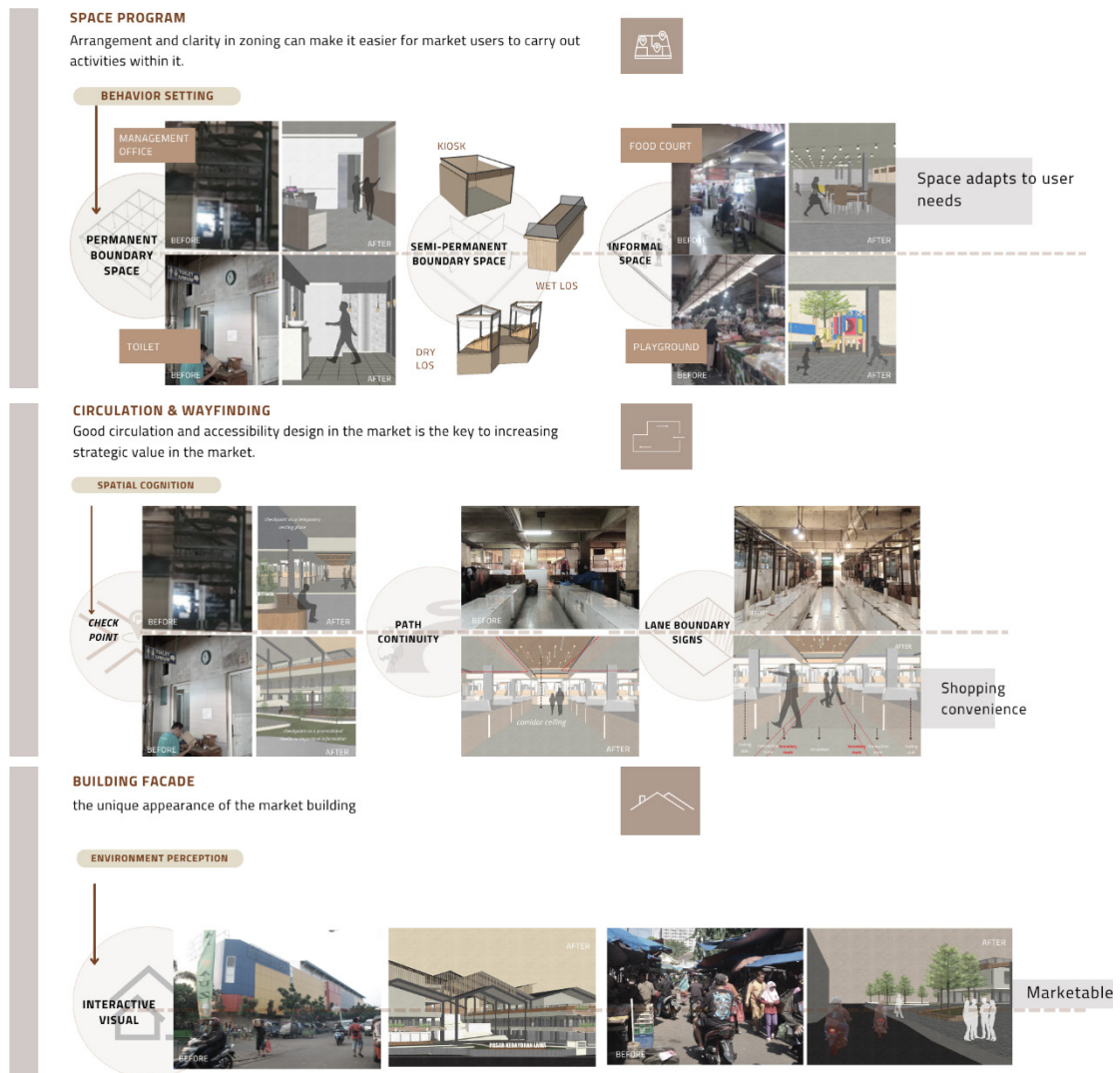
The vegetable and meat areas are arranged along wide, continuous corridors, ensuring clean circulation. This organisation not only enhances hygiene but also aligns with users' cognitive mapping, making routes and commodity zones easier to identify. Clothing and non-food stalls are placed in rows with open facades that encourage visibility and interaction. The open-front design supports traders' engagement with customers, creating a transparent and approachable atmosphere consistent with traditional market dynamics.

The vegetable trading zone adopts a longitudinal layout along both sides of the main aisle, allowing smoother customer movement and reducing cross-traffic. These linear arrangements correspond to users' habitual navigation patterns identified in the cognitive mapping phase. Furthermore, the total number of stalls has been optimised from 1,061 to 429 active units, eliminating vacant kiosks and improving space utilisation. This reorganisation not only

Figure 7. The new development of Kebayoran Lama Market (Image by authors)

revitalises the market's economic activity but also reinforces legibility and spatial coherence, key elements of user-centred design based on spatial cognition.

The classification of market users and their spatial behaviours provides a foundation for formulating design strategies that respond to actual patterns of use, creating a spatial system that supports users' cognitive and social needs. Building on these findings, the design applies the principles of behavioural architecture, comprising spatial reprogramming of the setting for different behaviours, clearer spatial cognition through improved circulation and wayfinding, and enhanced environmental perception through the creation of sensorial experiences. The following paragraph expands more on each of these strategies and their application within the design.



The space reprogramming adopts the behavioural setting approach to develop flexible zones for trade and social interaction. These include permanent, semi-permanent, and informal boundary spaces that accommodate both structured and spontaneous activities. In improving spatial cognition, the design emphasises intuitive, easy-to-understand circulation

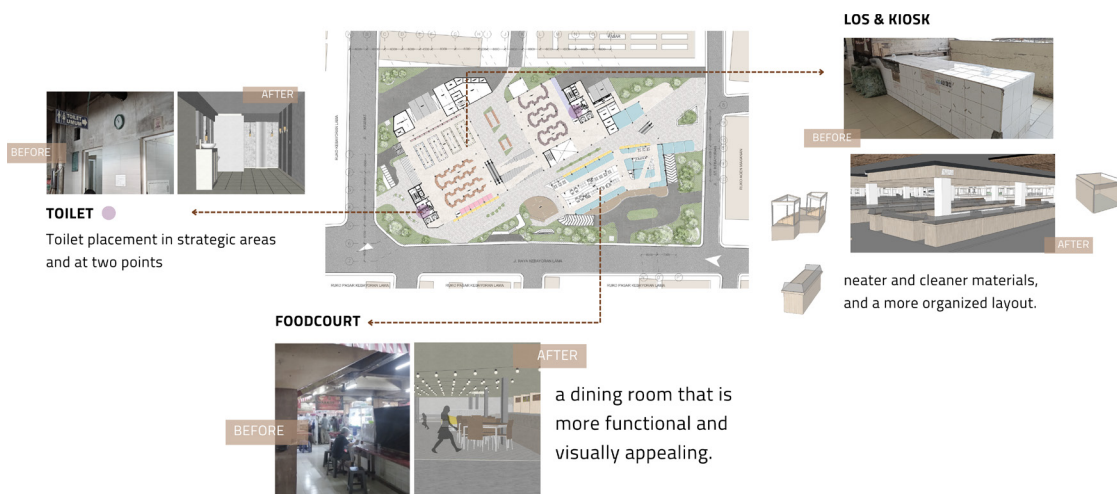
Figure 8. Behaviour-based design strategies
(Image by authors)

and orientation of spaces. Elements such as checkpoints, path continuity, and lane boundary signs are integrated to help users form clear mental maps of the market environment. These features support wayfinding, reduce congestion, and enhance overall user comfort.

The environmental perception aspect is addressed through the design of the building's envelope, which promotes visibility, natural lighting, and cross-ventilation. A clear, inviting exterior appearance strengthens the market's visual identity and enhances users' sensory experience. Together, these strategies translate behavioural insights into spatial solutions, ensuring that the redesigned Kebayoran Lama Market becomes not only more efficient and legible but also inclusive and adaptive to the behaviour of its everyday users.

Reprogramming spatial boundaries of the market in response to users' activities patterns

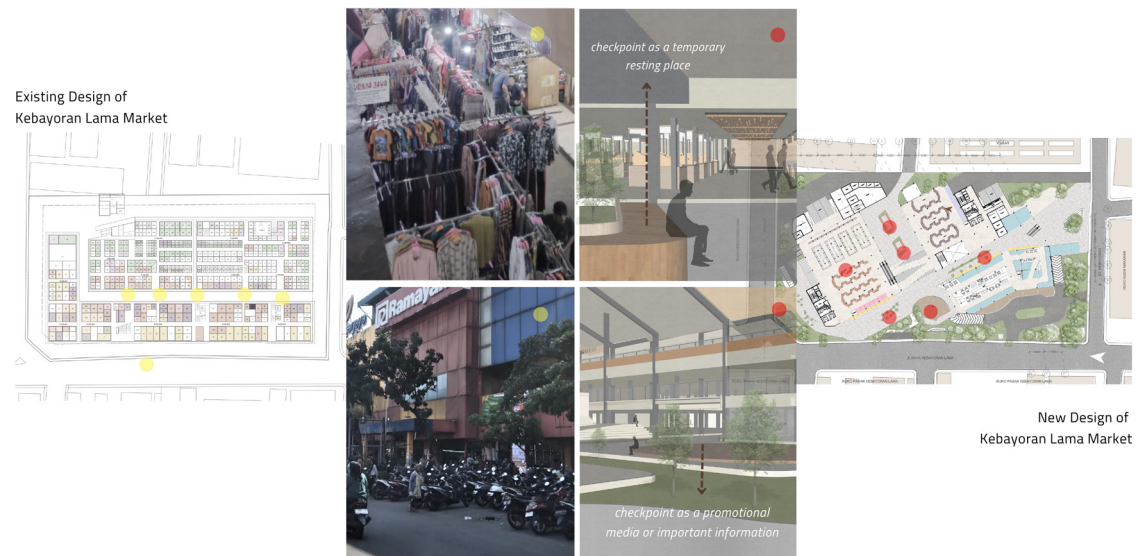
The application of behaviour-setting concepts aims to align spatial functions with users' actual activities, both traders and visitors. Each setting represents a spatial condition shaped by recurring behavioural patterns, allowing space to adapt to different user needs. The study defines three types of boundaries based on users' activity patterns: permanent, semi-permanent, and informal. Permanent boundary spaces are defined by fixed physical elements, such as walls or doors. These spaces provide stability, identity, and a sense of enclosure that support focused and predictable activities, such as formal trading and administrative functions. Semi-permanent boundary spaces use modular partitions that can be assembled or adjusted to meet user needs. This flexibility allows vendors to reorganise their kiosks or stalls based on demand, ensuring spatial adaptability without disrupting circulation.



Informal spaces are open and fluid areas without rigid physical boundaries. They accommodate spontaneous activities such as social interaction, waiting, and informal trade. These spaces foster community engagement and reflect the dynamic nature of traditional market behaviour. By integrating these

Figure 9. Application of the concept of behaviour setting (Image by authors)

three spatial boundary settings, the design creates a balanced composition between stability and flexibility. Each boundary type supports a specific range of behaviours, ensuring that spatial functions remain responsive to the social and economic rhythms of the market environment.



Creating clearer spatial cognition through improvements in wayfinding and circulation

Better spatial cognition is needed to enable users to perceive, understand, and navigate market spaces with clarity. Enhancing orientation, visual clarity, and circulation efficiency is done through the creation of design elements such as checkpoints, continuous paths, and signs of the boundary lanes in relation to different programs of the market.

Figure 10. Checkpoints as resting nodes in the market (Image by authors)

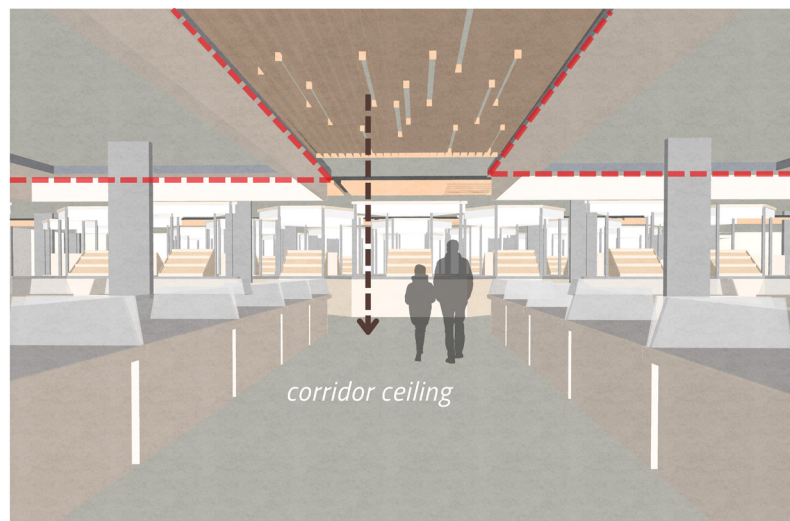


Figure 11. Continuous paths created through ceiling patterns (Image by authors)

Checkpoints are introduced as temporary resting nodes along the main circulation paths (Figure 10). These points provide visual anchors that help users recognise their position within the market. They also function as social micro-hubs places for short breaks, informal interactions, or promotional activities managed

by vendors or market staff. Furthermore, creating paths that are continuous strengthens spatial legibility, guiding the user's visual flow through consistent ceiling patterns, lighting rhythm, and directional signage (Figure 11). These elements help users form mental maps that support smooth navigation and minimise confusion, especially in areas with dense activity.

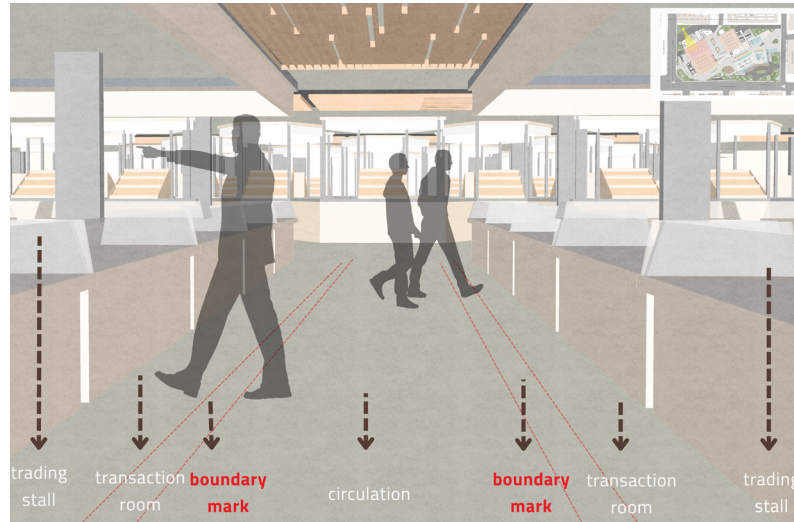


Figure 12. Lane boundary signs to assist users through the edges of different spaces in the market (Image by authors)

On the other hand, signs of lane boundaries define the edges between circulation zones and trading areas through subtle changes in floor texture or material. These visual and tactile cues help users distinguish between movement routes and transaction spaces, ensuring safer, more organised circulation. Together, these spatial cognition elements transform the market's circulation into an intuitive experience. They allow users to easily orient themselves, identify key zones, and move through the market efficiently. This enhances both functional performance and cognitive comfort, aligning the market environment with natural human navigation patterns.

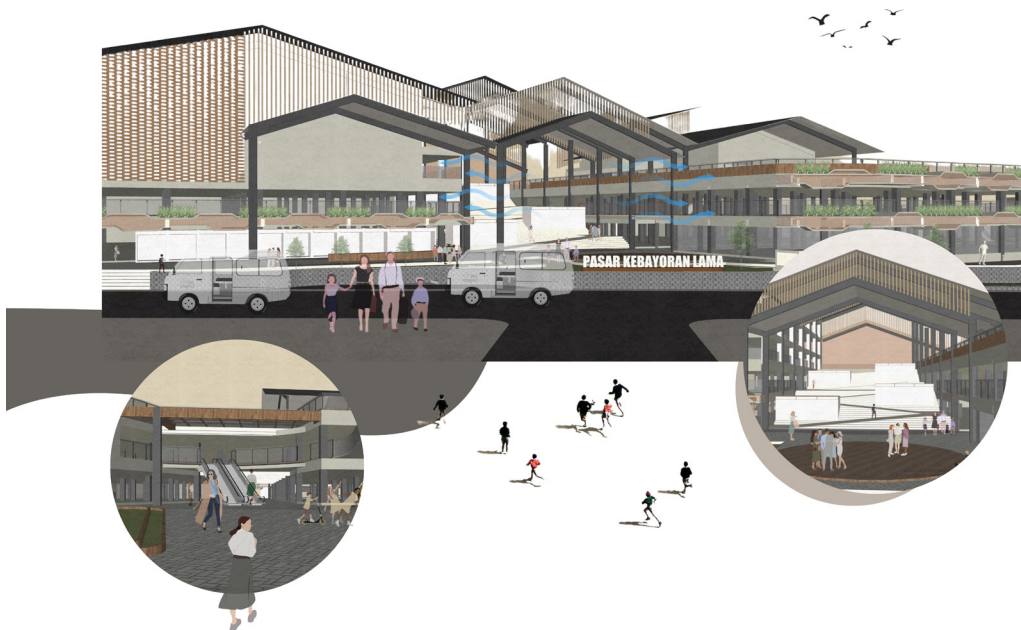


Figure 13. Environment perception of Kebayoran Lama Market (Image by authors)

Application of the concept of environmental perception in design plans

Figure 13 examines how users experience the market environment visually and sensorially. In the redesign process of Kebayoran Lama Market, this approach is applied to enhance comfort, visibility, and overall spatial identity through façade articulation and natural environmental strategies.

The façade design utilises large openings that allow natural airflow and daylight to enter the interior. Cross-ventilation reduces humidity and odours, while balanced natural lighting creates a bright, inviting atmosphere. These environmental qualities support both visual comfort and healthier activity conditions for traders and visitors.

In addition, visual hierarchy is emphasised through distinctive façade elements that highlight key access points such as entrances and circulation nodes. This not only strengthens spatial legibility but also establishes a recognisable architectural character for the market within its urban context. By integrating these principles, environmental perception transforms the market into a space that is not only functional but also psychologically engaging. The façade acts as both a climatic and perceptual interface, inviting users to interact while reinforcing the market's identity as a comfortable, open, and community-oriented environment.

Conclusion

The design study of the Kebayoran Lama market demonstrates how a behavioural architecture approach can effectively respond towards the spatial and functional challenges of a deteriorating traditional market. By interpreting how users perceive, navigate, and interact within the market, the design integrates three behavioural approaches to architecture, providing a framework for creating adaptive, human-centred spaces.

The behavioural design approach outlined in this study comprises three main strategies. The first is the reprogramming of market boundary settings based on users' behaviours, shaping the organisation of permanent, semi-permanent, and informal space, supporting booth-structured trading and spontaneous social activities. Improving spatial cognition can be achieved by developing a more intuitive circulation, creating spatial elements such as resting checkpoints, a path with clear continuity, and a lane boundary that indicates different uses. The last strategy includes improving environmental perception by designing building façades to create visual comfort, enhance ventilation, and define the overall building identity.

Together, these strategies translate user behaviour into spatial form, forming a holistic, integrated framework for creating spaces that are adaptive, inclusive, and responsive to human experience in public buildings. The study reaffirms that understanding users' behaviours is the key to redesigning traditional markets not merely as places of economic exchange, but as dynamic public spaces that reflect and sustain community life.

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