

Behavioural-Spatial Diagnosis for the Revitalisation of Tanjung Raja Market

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Received: 2025-07-19

Reviewed: 2026-07-26

Revised: 2026-08-30

Accepted: 2026-08-30

ABSTRACT. Traditional market revitalisation is often judged by visible physical change: a new roof, a tidier façade, or more permanent stalls. Yet spatial improvement depends on how those changes interact with everyday trading routines. This study develops a structured qualitative approach for tracing relationships among use routines, spatial conditions, and trader needs at Tanjung Raja Market, Ogan Ilir Regency, Indonesia. The exploratory case study analyses a 2023 field archive comprising a physical inventory, route-based observations, photographs, and 12 trader-interview summaries representing 12 commodity groups. Analysis combines meaning-unit construction, 1/0/missing coding, evidence-source tagging, case matrices, co-occurrence analysis, and checks against alternative explanations. The inventory records 97 shophouses, 506 kiosks, and 300 open stalls and street-vendor pitches; documented daily use ranges from 5 to 12 hours. Stall suitability does not emerge as a fixed property of one spatial type. Instead, it depends on the relationship among permanence, circulation exposure, environmental openness, and commodity-specific operational needs. Nine cases remain unclassified because spatial evidence is insufficient, while three support only partial diagnoses. The procedure therefore creates an audit trail from field evidence to inference boundaries, preliminary design hypotheses, and validation needs. Broader claims about flexibility remain provisional and require technical measurement and participatory design.

Keywords: behavioural architecture; market revitalisation; periodic market; spatial diagnosis; traditional market

ABSTRAK. Revitalisasi pasar tradisional sering dimulai dari perubahan fisik yang terlihat. Namun, hubungan antara perilaku dan keputusan ruang tidak selalu dijelaskan dengan cara yang dapat ditelusuri. Penelitian ini menyusun pendekatan kualitatif terstruktur untuk membaca hubungan antara pola penggunaan, kondisi spasial, dan kebutuhan pedagang di Pasar Tanjung Raja, Kabupaten Ogan Ilir. Studi kasus eksploratif ini menganalisis arsip lapangan tahun 2023 yang terdiri atas inventarisasi fisik, observasi berbasis rute, foto, serta 12 ringkasan wawancara pedagang dari 12 kelompok komoditas. Analisis mencakup konstruksi unit makna, pengodean 1/0/data hilang, penandaan sumber bukti, matriks kasus, analisis kemunculan bersama, dan pemeriksaan terhadap penjelasan alternatif. Inventarisasi mencatat 97 ruko, 506 kios, serta 300 los terbuka dan ruang pedagang kaki lima; durasi penggunaan kasus berkisar 5-12 jam per hari. Hasil menunjukkan bahwa kesesuaian lapak bukan sifat tetap dari satu tipe ruang. Kesesuaian muncul dari hubungan antara aspek permanensi, keterpaparan sirkulasi, keterbukaan lingkungan, dan kebutuhan operasional komoditas. Sembilan kasus tidak dapat diklasifikasikan karena bukti spasial belum memadai, sedangkan tiga kasus hanya mendukung diagnosis parsial. Pendekatan ini membentuk jejak audit antara bukti lapangan, batas inferensi, hipotesis desain awal, dan kebutuhan validasi. Temuan ini mendukung pemahaman relasional mengenai kesesuaian lapak, namun klaim yang lebih luas mengenai fleksibilitas masih bersifat sementara serta memerlukan pengukuran teknis dan desain partisipatif.

Kata kunci: arsitektur perilaku; diagnosis spasial; pasar kalangan; pasar tradisional; revitalisasi

INTRODUCTION

Traditional market infrastructures offer many functions beyond the trading of goods. For many

households, particularly vulnerable consumers, these markets provide access to affordable, good-quality fresh food (Newing et al., 2023). They also support sustained social interaction, economic

inclusion, and forms of community resilience, particularly during disruption (Morales, 2021). In Indonesia, this continuity is associated with participatory-democratic management, local culture and wisdom, and the social environment of trade (Wibawa et al., 2024). A spatial assessment will therefore not just be about how many market units have been built. Frontage, visibility, storage, shading, ventilation, services, and access to transport will also define trading activities.

When assessing revitalisation, a focus on permanent kiosks, new roofs, orderly market frontages, and commodity diversification can obscure these markets' broader roles. Even after physical upgrades, revitalisation can fail if traders lose visibility or established market routines are disrupted. Market renewal therefore needs to reconcile spatial, social, and functional performance with economic sustainability (Hergül & Göker, 2021; Borucka et al., 2022), including in the Indonesian context. Policy-driven market modernisation can create spaces that are incongruent with actual market use (Prabandari et al., 2024) and reshape everyday practices and local cultural values that sustain the market (Dewi et al., 2024).

Tanjung Raja market makes this tension especially visible. The area is designated as a Local Activity Centre within Ogan Ilir Regency's trade-and-service network (BAPPEDA Ogan Ilir, 2021), and the market operates every day, with additional periodic trading on Wednesdays and Sundays. Two-storey shophouses, enclosed kiosks, open stalls, temporary pitches, parking, public transport, and loading areas occupy the same site. Several of these activities converge at common arrival points. What follows is practical rather than abstract: visibility, pedestrian access, vehicle movement, commodity handling, environmental comfort, storage, and service access all compete for limited space.

Three complementary behavioural-architecture lenses are used to interpret these conditions. Behaviour setting links recurring activities and users to particular spatial arrangements; spatial cognition draws attention to orientation, visibility, and route choice; and environmental perception focuses on enclosure, openness, light, ventilation, and comfort. Mangunwijaya (1988) places such

relationships within the cultural meaning of built form. From there, the analysis connects to related concepts. Affordance theory helps explain what space enables or constrains (Stevens et al., 2024), behavioural mapping links activity to location (Shilon & Eizenberg, 2024), and spatial-configuration research helps interpret access and retail interaction (Arslan & Ergener, 2023; Lima et al., 2024). Strategic-visibility research informs the reading of wayfinding (Gath-Morad et al., 2024), while preference studies add insight into spatial choice and market-user decisions (Jens & Gregg, 2021; Abid et al., 2026; Widiyanti et al., 2025).

Together, these studies offer useful conceptual tools, but they do not fully resolve the practical step that comes before design. Existing market research has examined behavioural approaches to redevelopment, accessibility and demand, and the formalisation of street vending (Assyifa et al., 2025; Clement & Zhou, 2026; Liu et al., 2025). The narrower problem here is different: how should field evidence be organised before it is translated into a preliminary spatial intervention? This article does not claim a new qualitative method. Its contribution is procedural and deliberately modest. Established qualitative techniques are arranged in an explicit, auditable sequence that connects evidence provenance, case matrices, competing explanations, inference boundaries, and a pre-intervention validation checklist.

This study establishes how market configuration evidence, trader routines, and spatial preferences can be synthesized into a diagnosis of behavioral-spatial type for the case study of Tanjung Raja Market. One main empirical hypothesis focuses on fit and proposes that fit is contextual and relational, not an intrinsic property of a particular stall type. A second hypothesis is construed more circumspectly and states that the spatial flexibility of circulation, climate, governance, and the operations of commodities restricts spatial flexibility. Both hypotheses are accompanied by a procedure. Each preliminary design recommendation must specify which evidence is relevant, consider other possible explanations, and articulate what is still to be determined. This procedure delineates the analysis; it is not reported as a finding of the empirical research.

RESEARCH METHODS

Research Design and Case Selection

This study employs an exploratory, qualitative, case study, and is archival based. Tanjung Raja Market was chosen because trading spaces of varying permanence, which include permanent, semi-permanent and temporary trading spaces, co-exist on the same site. Furthermore, on a daily basis there is trading activity overlapping with periodic market activity. The trading area is located on a main road and is provided with parking, space for both public and private transport and loading spaces. Trading is done every day with the most active trading occurring between 7:00 AM and 12:00 PM, though many of the traders stay active beyond this time.

Using Tanjung Raja market makes it easier to analyze a well-known planning-versus-practice problem. Traders alter formal spatial arrangements by using customer preferences, characteristics of goods, storage, weather, and access. The archive contained twelve readable trader records and all twelve were analyzed. As such, the sample was determined by the archive rather than by saturation or statistical power. Findings will be presented within the scope of the case under analysis and will not be extended to traditional markets via a statistical approach.

Data Sources and Case Archive

The 2023 case archive contains several forms of evidence including an inventory, sightline-based observations, photographs, maps, and summaries of trader interviews. The inventory included shophouses, kiosks, stalls, street vending, parking, and trade support. Observation routes followed sightlines and trading areas, including open and enclosed spaces, service areas, transport and logistics zones, and active trading areas. The notes recorded activity locations and concentrations, together with obstructions and conflicts. They also documented access, enclosure, order, lighting, ventilation, storage and the handling of goods. Photographs documented the everyday trading activities.

Observation notes were treated as systematic sources of urban evidence (Byrne, 2021), and were not analyzed singly. Interview and observation materials were analyzed together to test the discrepancy between the stated conditions and the observed physical conditions. Each note kept a source tag: interview summaries were marked W; observations O; photographs F; and maps and inventories were marked P. This was meaningful: convergence across sources was considered corroborating evidence, while discrepancies were retained.

The 12 cases covered coffee, tofu and tempeh, smoked salted fish, fresh-cut chicken, vegetables, chicken and eggs, staple groceries, perfume, ready-to-eat food, household equipment, fresh fish, and fruit. Across the records, the archive contained information on location, stall form, commodity, trading duration, display and loading, openness, lighting, and storage. The archive was not complete. Verbatim transcripts, interview-duration records, full participant profiles, and formal ethics documentation were not retained. The present analysis therefore relies on paraphrased records, uses no direct quotations, and does not identify individual participants.

Coding and Analysis

Analysis was performed at the case level. Interview summaries were segmented into meaning units that described an existing condition, an operational constraint, or a suggested change. Each unit was retained with the case identifier, the commodity, the time recorded, the place recorded, the context of the statement, and the evidence source, if any. Some statements contained multiple operational constraints. In those instances, multiple codes were assigned.

Three states were defined. An issue was considered stated if it was present in an interview summary or was substantiated with physical evidence. This was recorded as state 1; state 0 was recorded if the issue was explicitly rejected or considered irrelevant. The archive provided no basis for classification, resulting in an unclassified entry. Since no independent recoding was recorded in the archive, the study reported no inter-coder agreement nor a Kappa score.

The coding framework was kept intentionally concise. Market conditions were captured under six categories: stall form, shophouse form, darkness, stall openness, stall location, and exposure to circulation. Four categories were used to capture stated preferences: (i) selling location, (ii) availability and completeness of a stall, (iii) selling area, and (iv) an open and bright environment. These categories are exploratory organising devices rather than psychometric instruments. Their frequencies should not be read as estimates of prevalence among the wider trader population.

The attribute of daily use duration was kept as a continuous case attribute. References to 5, 7–8, or 10–12 hours of use are provided only as a reading aid and do not define formal trader classes. Duration was also treated separately from causation and was not considered a cause of spatial preference, sales, or business performance. Thus, duration was positioned next to evidence coverage in Table 3 so that the strength of each case could be evaluated directly.

Condition-preference links were analysed at the meaning-unit level using a co-occurrence matrix. A pair was counted only when the same meaning unit contained both a market-condition code and a preference code. A single case could therefore contribute multiple pairs, so Figure 4 reports raw code-pair frequencies rather than respondent percentages. A zero means only that no such pair was found in the reviewed archive; it does not establish that the relationship is absent from the wider market. No significance test, centroid, effect size, or causal model was applied.

Diagnostic Rules and Analytical Integrity

The interpretation followed an auditable evidence chain. A provisional diagnosis of fit required at least two converging sources, either within a case or across cases. Misfit required something more substantial than a preference: a documented case of conflict, workaround or operational burden. Cases supported only by commodity type and trading duration were left unclassified because neither attribute could substitute for spatial evidence.

To illustrate the rule, if a trader record stated that bulky merchandise required more display space, the meaning unit was coded as larger selling area = 1 (W). If a mapped display area was directly connected to a customer route, circulation exposure = 1 (P/O) was used. Silence remained missing and was never coded as 0. The example is presented in a paraphrased manner to clarify the coding logic rather than provide a literal quotation. Table 1 integrates the six steps of analysis. They do not translate into a cumulative score, and that is on purpose. The process generates a set of case-based evidence, partial diagnoses, multiple interpretations, inference boundaries, rationale for the design hypotheses, and a list of information required to implement the plan.

Table 1. Analytical stages and auditable outputs of the structured qualitative diagnosis.

Stage	Decision rule	Auditable output
1. Source inventory	Separate W, O, F, and P; record unavailable evidence.	Source register and data-gap log.
2. Meaning-unit construction	Retain case ID, commodity, duration, location, and statement context.	Case-linked meaning units.
3. Status coding	Use 1, 0, or missing; allow multiple codes; retain evidence origin.	Coding matrix and evidence trail.
4. Descriptive reading	Treat duration as continuous; report category frequencies.	Case profiles and descriptive counts.
5. Co-occurrence analysis	Count condition–preference pairs at meaning-unit level; report raw frequencies.	Reproducible co-occurrence matrix.
6. Diagnosis and validation	Compare converging evidence, conflicts, alternative explanations, and stakeholder interests.	Partial diagnosis, design hypotheses, and validation agenda.

Source: Authors' synthesis. W = interview; O = observation; F = photograph; P = map or inventory.

RESULTS AND DISCUSSION

Market Configuration and Operational Tensions

The survey recorded 97 shophouses, 506 kiosks, and 300 open stalls and street vendor spaces. Figure 1 illustrates a layered market as opposed to a uniform field. Several edges are lined with two-

storey shophouses, while Kiosks, a more formal trading structure, enclose trading zones. Most transient trading and the selling of fresh commodities can be found in open spaces. The trading activities that compete most for space are found at the intersections, where parking, public road transport and loading activities, as well as pedestrian movement, co-exist with trading activities. This high degree of interaction creates choice, but also competition for space.

This layered structure is relevant as an abundant supply of market stalls on their own cannot ensure optimal performance. At Pasar Raya I Salatiga, underused 'dead spots' were associated with suboptimal spatial arrangement and circulation, which reduced foot traffic through those areas (Masayu & Rukayah, 2025). The design of Tanjung Raja shophouses has similar problems. Stall design is important for the amount of space, daylight, cross ventilation, and the ability to load goods. While open stall design allows for ease of movement of air and increased visibility, they are also more susceptible to the elements of the outdoors. Hence, stall design depends less on the type of stall and more on the balance of space, routine, and the nature of items being sold.



Figure 1. Spatial organisation of commodity zones and supporting facilities at Tanjung Raja Market. Source: Google Earth, field survey and redrawing, 2023.

Table 2. Spatial components and operational implications at Tanjung Raja Market.

Spatial component	Inventory or observed condition	Operational implication
Shophouses	97 permanent two-storey units	Provide security and storage; performance varies with frontage depth, daylight, ventilation, and loading access.
Kiosks	506 enclosed trading units	Provide permanence; effectiveness depends on area, display depth, and position relative to customer routes.
Open stalls and street-vendor pitches	300 open or semi-open units, including temporary pitches	Increase visibility and flexibility but expose traders to weather and circulation spillover.
Parking and transport	Private vehicles, public transport, motorcycles, taxis, and travel vehicles	Support access, but pedestrian movement, parking, and loading overlap at several edges.
Supporting facilities	Management office, warehouse, and public toilets	Provide basic services; links to storage, waste, sanitation, and service movement require coordination.

Source: Field survey, 2023.

The photographs make this relationship easier to read in everyday use. Figure 2a shows trade, parking, and vehicle movement occupying the same circulation edge, whereas Figure 2b shows a narrower corridor with less activity. Figure 3 shifts attention from movement to enclosure: one image presents a permanent shophouse frontage, while the other shows an open stall protected by a lightweight barrier. The images show that enclosure, frontage depth, roof condition, display arrangement, and spillover do not operate as isolated attributes. A feature that supports one routine can constrain another.

The same negotiation extends to informal and semi-formal trading. Street vending is closely tied to public-space morphology and is shaped by health, well-being, policy, and governance conditions (Peimani & Kamalipour, 2022). Research on dynamic formalisation likewise shows that vendor location preferences and governance objectives can be considered together when the spatial parameters of formalisation are made explicit (Liu et al., 2025). Ignoring actual use carries its own risk.

Modernisation can produce spatial mismatch and underused facilities (Prabandari et al., 2024), while changes to market architecture may transform everyday practices and local cultural values (Dewi et al., 2024). For Tanjung Raja market, however, this does not mean that every edge should remain flexible. A more defensible direction is a stable service core combined with flexible edges that are clearly defined and managed.



Figure 2. Contrasting circulation-edge conditions: (a) overlap of trade, parking, and vehicle movement; (b) a narrow corridor with lower activity. Source: Authors' documentation, 2023.



Figure 3. Contrasting trading-space enclosures: (a) permanent shophouse frontage; (b) open stall with a dense display and lightweight weather protection. Source: Authors' documentation, 2023.

Use Duration and Evidence Sufficiency

Table 3 shifts the analysis from market inventory to the evidential strength of individual trader cases. Recorded duration and evidence coverage answer different questions: duration provides context, whereas evidence coverage determines whether a spatial diagnosis can reasonably be made.

That distinction separates the cases immediately. T01-T09 contain interview summaries but no case-level mapped or observed spatial evidence, so they remain unclassified. T10-T12 can be read differently because the interview records are accompanied by map or inventory material and observation evidence. Even then, the result is only a partial

diagnosis. Keeping duration and evidence coverage separate prevents commodity type or trading hours from becoming a convenient substitute for spatial performance.

Three cases reported 5 hours of use per day and were documented to have occurred during a busy trading period. The repository does not suggest these traders were participants of the periodic market. Their businesses may be fairly portable. Nevertheless, the available documentation indicates a need for the possibility of basic storage and shelter. The spatial configuration of these needs still has to be documented.

Six cases reported use between 7 and 8 hours per day, extending the trading day beyond the morning peak. As the trading day becomes longer, the operational prerequisites begin to include provision for the evening business such as security, storage, cleaning and weather protection, as well as the operational requirements of different kinds of goods such as food items versus staple grocery items.

The equipment used in T10's case study occupies a space for 10 hours during its operation. It relies on frontage, display depth, storage, and loading access. The southern-corridor position enhances vehicle movement but is further away from the most customer flow. The easiest access for servicing is at the expense of increased exposure to the market.

During 10 hours of operation, T11 has a more complex service concern. It has access and commodity proximity due to being near an important route and the meat, poultry, and fish group. This service concern does not resolve the documented service gaps. The files do not confirm arrangements to address any of the needs for clean water, drainage, washing, waste disposal, ventilation, or service access. A stall can be visible and accessible to the customer, yet still be deficient in provisions of the needed commodity.

T12 had the longest operation time of 12 hours, at a space between parking and the food service cluster. This space has a high level of customer exposure. There is no explanation in the files for this

trader remaining for this period. There are many possible answers, but there is not enough evidence to make a confident choice.

Across the 12 cases, the 5–12-hour range is better understood as overlapping market rhythms rather than distinct trader classes. Shorter or periodic uses may be compatible with reversible pitches, whereas longer operations may depend more heavily on stable storage and services. Given the available evidence, a stable service core with flexible edges is more defensible than a strict separation between daily and periodic trade.

Because context influences how we understand duration, it is a contextual attribute that cannot be measured as a performance outcome. It may reflect access, storage, display capacity, loading, demand, perishability, transport, income needs, or business strategy. Given that each duration value is derived from a single case, the values presented here help to articulate the types of questions that require further validation rather than to suggest a causal relationship. The same caution applies to the condition-preference patterns discussed next.

Table 3. Evidence traceability matrix for the 12 trader cases.

Case	Commodity	Duration (hours)	Evidence
T01	Coffee	5	W
T02	Tofu and tempeh	5	W
T03	Smoked salted fish	5	W
T04	Fresh-cut chicken	7	W
T05	Vegetables	7	W
T06	Chicken and eggs	8	W
T07	Staple groceries	8	W
T08	Perfume	8	W
T09	Ready-to-eat food	8	W
T10	Household equipment	10	W + P + O
T11	Fresh fish	10	W + P + O
T12	Fruit	12	W + P + O

Source: Interview, maps, and field observations, 2023.

Note: W = interview; O = observation; F = photograph; P = map.

Condition-Preference Patterns

The coded conditions cluster around a limited number of recurring spatial issues. Exposure to circulation is present in five cases, while stall openness is present in four cases, stall form and stall location are present in two cases, and darkness

and the shophouse form are present in only one case, respectively. These counts describe the archive's coverage; they do not indicate how common the issues are across Tanjung Raja Market. Preference codes are also uneven. Stall availability and completeness is the most frequently recorded preference, appearing in six cases. Access to the selling location and a larger selling area each appear in three cases, while an open and bright environment appears in two. Multiple coding was permitted, so one case could contribute to several preference categories. The counts should therefore be read as traces of discussion rather than as estimates of respondent prevalence.

This unbalanced pattern is particularly important because a 'complete stall' should not be viewed simply as a fully enclosed one. For example, during a relatively short trading period, completeness might refer to a market pitch, shade, and basic storage. For longer periods, a complete stall may also require security, daylight, ventilation, water, drainage, waste handling, additional storage, and workable customer and service access/egress routes. Completeness therefore varies with trading routine and commodity type.

Access, area, and openness raise different but related operational challenges, often within the same stall. Access is about visibility, customer flow, and delivery. Area concerns display, washing, movement of goods, and loading. Openness may improve airflow and daylight while also increasing rain exposure and the risk of theft. These trade-offs will help to inform design, but on their own, do not prove that a particular intervention will work.

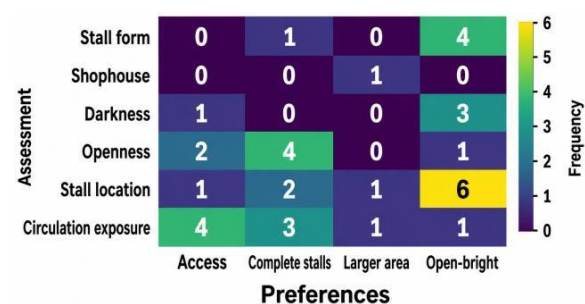


Figure 4. Co-occurrence of market-condition assessments and spatial preferences at the meaning-unit level; values are raw code-pair frequencies. Source: Authors' analysis, 2023.

This descriptive reading concludes with the raw co-occurrence matrix in Figure 4. Meaning unit counts have intentionally been used to avoid representing the matrix as percentages. It should be noted that using percentages grossly overestimates the importance of a very small archive. For that reason, raw frequencies have been used. Additionally, the use of raw frequencies obviates the necessity to explain the limits of the analysis.

This matrix is not a respondent matrix and should not be interpreted as such. In many instances, one meaning unit may be derived from multiple cases, and one meaning unit may be used to define multiple pairs. As a result, a total in one of the columns may exceed the number of cases for which the preference applies. Similarly, zero should be interpreted the same way. Zero means that no pair was defined in the material that was reviewed. This should in no way be interpreted as though no pair is present in the rest of the market.

Within those limits, access to the selling location was paired most often with circulation exposure, appearing in four meaning units. Stall openness followed with two, while darkness and stall location appeared once each. The pattern is useful because it shows how access was discussed: through connection to routes, visibility, and the quality of enclosure. It does not measure statistical strength. Stall availability and completeness co-occurred with stall openness in four meaning units, circulation exposure in three, stall location in two, and stall form in one. Traders were not describing completeness as permanence alone. Their accounts linked it to access, light, air, storage, security, and service capacity, reinforcing the earlier argument that fit is relational.

The preference for a larger selling area appeared once with shophouse form, once with stall location, and once with circulation exposure. These frequencies are too small for generalisation, but they remain useful for design because they sharpen the question that needs to be tested. Adequate area should be considered together with position, work sequence, access, and loading rather than judged from floor area alone.

An open and bright environment produced a different pattern. It co-occurred most often with stall location, in six meaning units, followed by stall form with four and darkness with three; stall openness and circulation exposure each appeared once. This suggests that traders discussed environmental quality through a mixture of light, air, openness, position, and enclosure. It should not be read as a count of physical stalls.

None of these co-occurrences shows that one condition caused a particular preference. Their value is more practical and deliberately limited: they identify pairs worth observing again, measuring, and discussing through fuller interviews. The matrix improves traceability, but it cannot compensate for a small and incomplete archive.

Read together, the case matrix and co-occurrence patterns present behavioural-spatial fit as a relationship among physical structure, movement, environmental conditions, governance, and commodity operations. It is not an index. The more useful question is whether a benefit in one dimension creates a burden in another, a trade-off noted in space-choice research (Jens & Gregg, 2021); traditional-market choices reflect multiple attributes (Widiyani et al., 2025). That relational reading becomes the basis for assessing the two empirical propositions.

Assessment of Empirical Support and Theoretical Interpretation

In this context, the archive offers reasonable support for the primary proposition: stall fit is relational rather than inherent to a particular stall type. This is because the same characteristic can both help and hinder market trading. For instance, visibility can help to increase customer contact, but might also worsen congestion. Openness can help to improve daylight and air circulation in the stall, but might increase exposure and risk of theft. Although the evidence remains case-bound, the same pattern recurs across the inventory, observations, and coded preferences.

The secondary proposition is less supported. In the cases and the co-occurrence matrix, some evidence for circulation and some constraints on flexibility

can be found. For climate, the only evidence that exists is perceived openness, light, and air as it was not measured. Governance, rent, tenure, and enforcement were not held at the case level. In this instance, the proposition should remain a program for further research rather than an established empirical finding.

The status of the procedural step to present rationale, alternative interpretations and validation is different from a third empirical statement. This step aims to avoid giving preliminary architectural interpretation the same weight as an observation from the field. Tables 4 and 5 show where the inference ends, unambiguously separating what was found and what remains to be tested.

This interpretation does not aim to supplant existing theories, but rather builds upon them. In their article, Stevens et al. (2024) apply the theory of affordances to show how architecture can facilitate or limit the actions it enables. Behavioral mapping links observed activity to place and socio-spatial relations (Shilon & Eizenberg, 2024). For the interpretation of access and retail interaction, studies focus on spatial configuration (Arslan & Ergener, 2023; Lima et al., 2024). The role of visibility in wayfinding through multilevel environments is addressed by studies in the area of strategic visibility (Gath-Morad et al., 2024). The area of preference research considers perceived attributes and spatial or market-user choice (Jens & Gregg, 2021; Abid et al., 2026; Widiyani et al., 2025). This research converts these ideas into bounded and testable design hypotheses.

Diagnostic Trade-Offs and Inference Boundaries

The relational reading becomes evident when we discuss it as a series of trade-offs. Five of the most important trade-offs are visible. Visual trade-offs, for instance, give customers access to and contact with staff, but this can result in congestion if there is too much display, queuing, or even parking or loading in the space meant for pedestrians. Trade-offs can also mean openness to light and air, but it can create heat, rain exposure, and increase the possibility of theft. Trade-offs also mean permanence can mean storage and security, but it can mean lack of flexibility and increase cost. Trade-

offs in zoning can be strong and support hygiene and shared servicing, but some will put traders away from visible routes. Stronger circulation control can mean safer movement and also means the loss of productive edges used by intermittent traders. In this case, managing benefits and burdens is more realistic than trying to solve every conflict. One of the trade-offs, environmental openness, particularly requires attention in a hot-humid climate because 'more open' does not always mean 'more comfortable'. Ventilation affects thermal comfort and indoor air quality (Fan et al., 2022). Visual comfort extends beyond illuminance (Blanco Cadena et al., 2022), while mechanical ventilation in shops can affect thermal comfort and age of air (Huang & Qu, 2021). Tanjung Raja has no archived measurements of temperature, humidity, air speed, or illuminance. Environmental interpretation must therefore rely on trader summaries and observations.

Table 4 matches findings to alternatives and makes explicit the inference boundaries. For example, there may be constraints to a system's ability to deliver service, fill orders, and/or store goods throughout extended trading hours. However, such hours may also be the result of demand, financing, time of day, and/or the business' strategies. Preference for a particular trading site may be seen as the locational convenience of the trader, but it may also be associated with cost, historical allocation, informal control, and/or tenure. Seasonal climatic conditions may impact the trade-off between an open versus closed trading system, and parking and/or loading may be a constraint only during peak trading. Therefore, all findings are treated as case configurations as opposed to independent variable effects.

Table 4. Alternative explanations and inference boundaries for the principal findings.

Finding	Main interpretation	Alternative explanation	Inference boundary
Longer duration in the fruit and household-equipment cases	Access, storage, or stall capacity may support longer use.	Demand, income needs, transport schedules, tenure, or strategy may determine duration.	Duration is contextual evidence, not a performance outcome.

Preference for a visible and easy-to-reach selling location	Circulation exposure may increase customer contact.	Rent, historical allocation, tenure, or informal influence may determine location.	Rent, allocation, tenure, and pedestrian-flow data were not retained.
Preference for open and bright conditions	Environmental permeability may support comfort and legibility.	Weather, season, roof condition, glare, or security may alter the preference.	Temperature, humidity, air speed, and illuminance were not measured.
Need for permanent or complete stalls	Security and storage may support daily activity.	Affordability, tenure, and investment capacity may shape demand.	The archive contains no rent, income, investment, or tenure data.
Overlap among parking, loading, and circulation	Arrival and service areas may generate movement conflicts.	Conflicts may be concentrated on peak days or particular times.	Observation frequency, duration, and route counts were not retained.
Preference for stalls near circulation edges	Visibility may support customer contact.	Trader preference may conflict with pedestrian safety, emergency access, or management interests.	Customer, management, and emergency-access data are unavailable at case level.

Source: Authors' synthesis based on case records, field observation, and relevant literature.

The three mapped cases reinforce that caution because none offers a simple confirmation. T10 shows that vehicle access does not guarantee pedestrian exposure. T11 shows that an accessible location can remain operationally inadequate when commodity services are unverified. T12 shows that long duration and high visibility cannot automatically be treated as signs of success. Together, the cases keep the diagnosis provisional while also showing why market performance must be read as multidimensional.

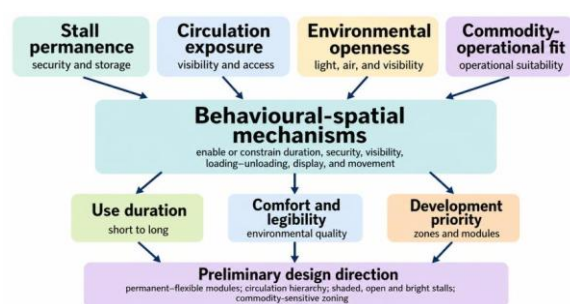


Figure 5. Reasoning pathway from behavioural-spatial evidence to preliminary revitalisation hypotheses; arrows show analytical sequence rather than causal effects.

Source: Authors' synthesis, 2026.

Figure 5 brings these lines of reasoning together. Evidence on permanence, circulation exposure,

environmental openness, and commodity operations is interpreted together. These dimensions are read through observable mechanisms such as security, storage, visibility, loading, display, movement, air, and light. These mechanisms inform questions about use duration, comfort, legibility, and development priorities; the sequence does not represent tested mediation, prediction, or causal influence.

The pathway also explains why a single standard stall type is unlikely to serve every operation equally well. A longer-term operation may depend on stable services, whereas temporary trade may require only a reversible pitch within a defined schedule. Bulky goods require frontage depth and loading access. Fresh food requires a different service package, including water, cleaning, drainage, ventilation, and waste management. The design question is therefore not simply which stall is 'best', but which spatial and service combination fits a particular routine.

That logic points to a practical response: combine stable service infrastructure with flexible edges that are clearly defined, scheduled, priced, and managed. Flexibility, in this sense, is not an absence of rules. It is a planned design quality that allows space to adapt while responsibilities remain legible, consistent with public-space research that places flexibility alongside proximity and diversification (Sepe, 2025). This principle leads directly to the preliminary development directions in Table 5.

Preliminary Development Directions and Validation Needs

Table 5 translates the diagnosis into preliminary design ideas while making their evidential status explicit. Some ideas are grounded directly in empirical or observational evidence, while others translate problems identified in the literature into preliminary solutions. Architectural interpretation connects these forms of evidence to a proposed design. It cannot, however, establish in advance that the design will work. Making that distinction explicit prevents recommendations with different levels of support from appearing equally well verified.

Table 5. Evidence basis, preliminary design hypotheses, and validation requirements.

Empirical basis	Proposal origin	Evidence status	Preliminary design hypothesis	Validation before implementation
Demand for complete stalls near selling routes	Case evidence + architectural interpretation	Archive theme; prevalence unknown	Test secure modules with adjustable frontages and scheduled space for periodic traders.	Participatory models; cost and rent; tenure; displacement risk.
Visible locations were valued; edge conflicts were observed	Case evidence + circulation literature	Observation and archive converge; flow magnitude unknown	Test a primary pedestrian route, display limits, loading schedules, and controlled spillover.	Pedestrian and vehicle counts; peak periods; emergency access; management agreement.
Open and bright space was valued	Case evidence + environmental literature	Archive and photographs converge; performance unmeasured	Test shaded frontages, high-level openings, roof ventilation, and protected displays.	Temperature; humidity; air speed; illuminance; rain; glare; security.
Commodity and duration indicate different requirements	Architectural interpretation + technical literature	One case per commodity; limited empirical support	Test service packages for fresh food, ready-to-eat food, bulky goods, and periodic trade.	Larger sample; water, drainage, waste, loading, workspace, and operating-cost audits.
Parking, public transport, loading, and pedestrians meet at the market edge	Observation + access literature	Location supported; frequency not counted	Test legible pedestrian entrances, short-term service points, and separated arrival functions.	Time-based traffic survey; land control; enforcement capacity; accessibility.

Source: Authors' synthesis based on the inventory, observations, interview records, and literature.

These proposals are useful only if the indicators used for validation match the intervention being tested. Circulation changes require pedestrian and vehicle counts, obstruction duration, conflict-point mapping, loading schedules, and emergency-access checks. Semi-open enclosures need measurements of temperature, humidity, air speed, illuminance, rain exposure, glare, and security. Commodity-sensitive modules require audits of workspace, water, drainage, waste, storage, and operating cost. Social and economic effects matter just as much: rent, displacement, affordability, tenure, and business continuity need to be examined because a technically improved stall can still fail in practice. Pedestrian improvements should be evaluated against user-centred criteria such as safety, convenience, comfort, accessibility, and continuity (Yang & Lee, 2024). At the same time, markets should not be reduced to circulation systems; they are dynamic spaces produced through social, material, institutional, and mobility relations (MMP et al., 2022).

For that reason, implementation should proceed in phases and, where possible, remain reversible. A first phase can address problems that are directly verifiable, including safety, sanitation, drainage,

roof condition, and lighting. A second can test how loading, parking, public transport, and activity spillover are managed on ordinary days and periodic-market days. Later phases can pilot commodity-sensitive modules and circulation-supported services at a small scale before wider adoption. Each phase should involve traders, customers, managers, and service workers in participatory design, examine cost, rent, and tenure effects, and be followed by post-occupancy evaluation.

Limitations and Research Agenda

These recommendations are made within certain evidential constraints. The archive has a small scope and is incomplete. Twelve case studies cannot make a determination on the prevalence of a phenomenon, and nine case studies do not have mapped or observed spatial information at the case level. The archive also does not have systematic counts of flows, environmental observations, waste audits, sales records, rent records or tenure, unit occupancy, or independent coding assessments. Finally, complete case participant records, verbatim records of interviews, records of the length of interviews, and requests for ethical clearance were

not available. These gaps are significant and impact diagnostic certainty and the findings' applicability.

Those limitations also define the next research steps. A larger sample could first build fuller case profiles covering trader status, stall type, business tenure, commodity, trading hours, income, supply pattern, and evidence source. Repeated behavioural mapping could then be combined with pedestrian and vehicle counts, thermal and visual measurements, sanitation and waste audits, and loading records on ordinary and peak market days. Finally, participatory models and reversible prototypes could be tested through before-and-after evaluation. Relevant criteria include accessibility, movement conflict, visibility, comfort, cleanliness, rent burden, trader retention, and business continuity.

Only after that deeper local validation would cross-case comparison become meaningful. It could test which elements of the diagnostic structure remain useful in markets with different climates, management systems, tenure arrangements, and levels of periodic trade. The participant base should also widen to include customers, managers, porters, transport operators, emergency-service representatives, and vulnerable users. Trader preferences are essential, but they cannot represent every safety, access, and governance interest present in a market.

CONCLUSION

The research question is addressed by organising market inventory, trader routines, spatial preferences, and evidence provenance within a structured behavioural-spatial diagnosis. Tanjung Raja Market contains 97 shophouses, 506 kiosks, and 300 open stalls and street-vendor pitches, while recorded daily use across the 12 cases ranges from 5 to 12 hours. The central issue is not a simple shortage of trading units. It is how frontage, customer flow, servicing, environmental protection, and commodity operations are coordinated within the same market environment.

Four dimensions emerge and are clearly related: stall permanence, circulation exposure, environmental openness, and the fit between the commodity operations and the market place. The

first proposition is supported because no single stall type proves to be the most appropriate; fit is the result of the relationship between space and routine. The second proposition is supported to some extent. Circulation and commodity requirements are clear; however, climate, governance, rent, and tenure remain unmeasured.

A lack of supporting evidence makes a difference. With an additional nine cases classified and three supporting partial diagnoses, the dominant approach is a qualitative decision pathway. Source tags are retained, and frameworks are provided so that the gaps in evidence are clear and alternative explanations are provided when a proposal is made. Instead of suggesting answers, this study outlines paths to consider: a stable core of services within flexible boundaries; circulation spillover that is controlled; covered and ventilated semi-open spaces; provision for water, waste, drainage, storage, display, and loading; and legible arrival areas. These considerations should be co-designed with both market users and managers and assessed for their costs, rental value, tenure, safety, and displacement impacts. An assessment of these should proceed by technical measurement and post occupancy evaluation. The outcome is not a final design. It is a more informed basis for proposing these directions to be tested.

ACKNOWLEDGEMENTS

The authors thank the traders, market users, and local stakeholders who supported the field observations and shared information about everyday activity at Tanjung Raja Market.

FUNDING

This research received no external funding.

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