

OBSERVATIONAL STUDY ON SHOPHOUSE CONFIGURATIONS ADAPTABILITY IN PENANG, MELAKA, MUAR, AND KUALA LUMPUR: DESIGN PREFERENCES, AESTHETIC APPEAL, AND SOCIAL COHESION

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ABSTRACT

Malaysian shophouses are vital cultural assets, embodying the nation's architectural and socioeconomic history. However, rapid urban development and changing lifestyles threaten their preservation, often prioritising modernisation at the expense of heritage. A critical issue is the lack of empirical research on how design alterations affect user satisfaction and social cohesion, leading to ad-hoc renovations that may erode their historical value while failing to meet contemporary needs. Many modified shophouses struggle to balance functionality, thermal comfort, and community engagement, risking their role as social hubs in urban neighbourhoods. This study investigates these challenges by analysing design adaptations, aesthetic preferences, and social impacts in shophouses across Penang, Melaka, Muar, and Kuala Lumpur. Through observational methods and matrix analysis, it assesses spatial layouts, materials, and user interactions. Findings reveal that hybrid designs—combining heritage features with modern upgrades—are most effective, strategically using double-skin façades, open spaces, and communal corridors to enhance liveability and social cohesion. The study advocates for evidence-based design strategies to ensure shophouses remain sustainable, culturally resonant, and socially inclusive.

Keywords: Shophouse adaptability, observational methods, design preferences, social cohesion.

1.0 INTRODUCTION

As a symbol of Malaysian cities, shophouses offer a distinctive fusion of architectural, historical, and cultural value. Originating in the colonial era, these structures have changed to accommodate shifting societal expectations, urban demands, and economic transformations (Rashid & Heath, 2022). As cities like Penang, Melaka, Muar, and Kuala Lumpur work to balance heritage preservation and contemporary urban growth, the flexibility of shophouses has drawn more attention in recent years (Firzan et al., 2022). Through an analysis of design choices, aesthetic appeal, and their influence on social cohesiveness, this study aims to comprehend the adaptation of shophouses in these four cities. Through observational techniques, the study provides a clear explanation of how end users engage with these areas and how such interactions influence the social and physical surroundings.

In urban studies, adapting and preserving old structures, like shophouses, has become crucial, especially in developing areas. Sustainable adaptation strategies are crucial for promoting economic growth while satisfying user expectations (Hussain & Ujang, 2020). Another finding stated by Said et al. (2021) stresses the value of conserving old shophouses since they enhance Malaysian cities' cultural character and allure for tourists. However, adapting old buildings to meet contemporary requirements without sacrificing their historical authenticity has been challenging (Balocco & Cecchi, 2020). Little research has discussed the physical attributes and social dynamic impacts on shophouses. Thus, this research will focus on how design preferences, aesthetic

appeal, and social cohesion can enhance the adaptive reuse potential of historic shophouses in tropical urban contexts, particularly in Malaysia.

2.0 LITERATURE REVIEW

In Malaysia, shophouses' adaptability has drawn increasing attention from cultural conservation, architectural studies, and urban studies (Abdul Rahman & Lim, 2024; Lim & Ismail, 2023; Phang et al., 2023). With an emphasis on their adaptability in contemporary urban development, the discussion summarises recent research on shophouses' design, preservation, and social impact. Three main areas serve as the framework for the review: (1) aesthetic appeal and design preferences (Tan & Yusof, 2022); (2) sustainable adaptation strategies (Abdul Rahman & Lim, 2024); and (3) community dynamics and social cohesiveness (Phang et al., 2023; Yusoff & Koh, 2024).

2.1 Design Preferences and Aesthetic Appeal

Malaysian shophouses are renowned for their distinctive architectural designs, which combine colonial, Chinese, Indian, and indigenous elements. Recent studies have underlined the significance of maintaining these aesthetic features while modifying shophouses to meet modern requirements. Hussain and Ujang (2020) point out that end-users like shophouses with modern interior designs and historic façades. Maintaining shophouses' aesthetic appeal and functional relevance requires balancing the old and the new. The versatility of shophouses is also greatly influenced by the colours and materials used. Research by Al-Obaidi et al. (2022) shows that double-skin façades and light-coloured exteriors in tropical climates help reduce heat absorption while improving indoor comfort. Their study also found that adding vertical blinds and shading devices enhances functionality and visual appeal in dense urban areas.

2.2 Sustainable Adaptation Techniques

Shophouse preservation requires sustainable adaptation, especially amid the fast-paced urbanisation and climate change. The role of daylighting laws, energy-efficient materials, and green building techniques in increasing shophouse flexibility has been the subject of recent studies. For instance, al-Obaidi et al. (2022) stress the value of daylighting in tropical regions, where adequate ventilation and natural light can greatly enhance indoor environment quality. According to their research, shophouses' visual appeal and usability can be improved by carefully placing windows, courtyards, and skylights. The adoption of energy-efficient materials is another essential component of sustainable adaptation. Materials like insulated roofing and double-skin façades, according to Bansal et al. (2020), can lower energy use without sacrificing the shophouse's historic character. Furthermore, it has been demonstrated that adding green spaces, like courtyards and pocket corridors, improves the urban microclimate and offers gathering places for people to socialise (Jasme et al., 2020).

2.3 Social Cohesion and Community Dynamics

Shophouse adaptation is a social issue and a concern for design and sustainability. Shophouses are frequently used as gathering places for the community, especially in old cities. The effects of shophouse adaptation on community dynamics and social cohesiveness have been the subject of recent research. For example, Said et al. (2021) discovered that shophouses featuring common areas and open courtyards strengthen social bonds between inhabitants, business owners, and guests. These areas promote social events that foster community, like markets, festivals, and unofficial get-togethers. However, social problems might also result from shophouses being modified for commercial use. Long-time residents' daily routines may be disturbed by the conversion of shophouses into hotels, cafes, and retail establishments, especially in heritage zones, according to Baillargeon (2021). This emphasises the necessity of a well-rounded strategy that considers the social ramifications of shophouse modifications to ensure they benefit the neighbourhood and the economy.

2.4 Gaps in the Literature

Even though recent research has greatly advanced our knowledge of shophouse adaptability, there are still a number of unanswered questions. First, little is known about how adaptable shophouses are in tiny cities like Muar, where economic growth and historical preservation sometimes clash. Second, how end users engage with modified shophouse environments has not been extensively studied using observational methods. In order to fill these gaps, this study will use observational methods to examine design choices, aesthetic appeal, and social cohesiveness in four cities: Penang, Melaka, Muar, and Kuala Lumpur.

3.0 METHODOLOGY

This research employs structured observational methods to analyse shophouse adaptability across four Malaysian cities (Penang, Melaka, Muar, Kuala Lumpur), conducting 240 hours of behavioural mapping in 12 case-study buildings (3 per city) representing diverse urban contexts as shown in Figure 1 below.

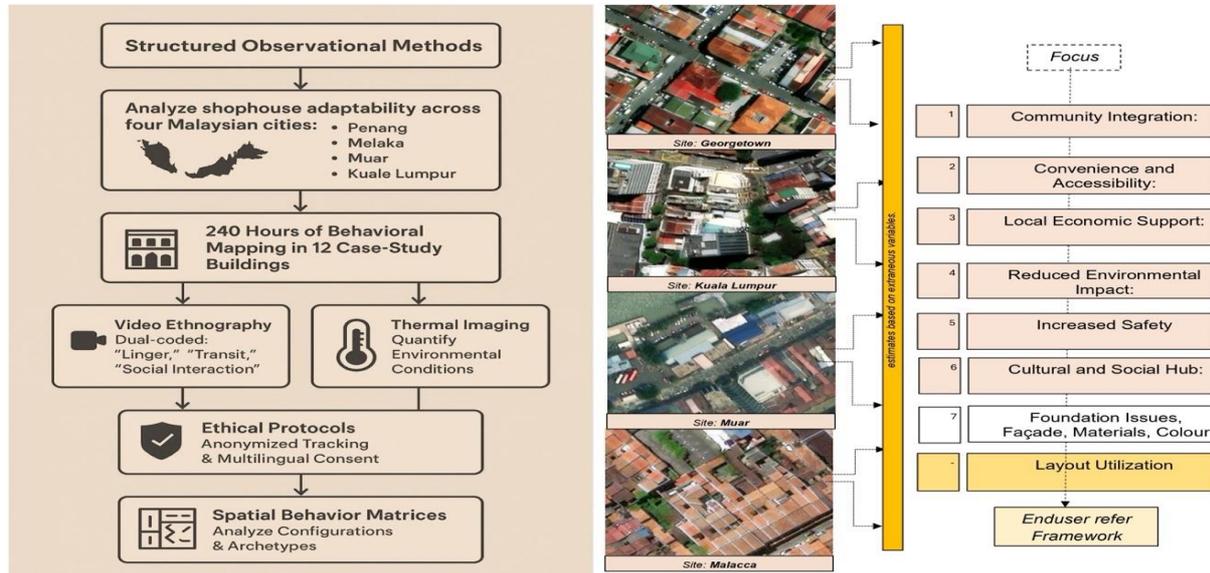


Fig. 1: Observations take into account elements like orientation, zoning, materials, and colour in Penang, Melaka, Muar, and Kuala Lumpur. (Source: Google Maps and Author).

This will consider elements like orientation, zoning, materials, and colour in varied metropolitan settings and rich architectural histories of pre-war shophouses that combine colonial, Chinese, Indian, and indigenous influences. Researchers documented user interactions with architectural elements, space utilisation patterns, and microclimate adaptations through mapping indications, where each city was independently annotated with footage using a behavioural framework ("lingering," "transit," "social interaction"). All data were synthesised into spatial behaviour matrices analysing linear configurations, colour-specific zoning, and shape/enclosure archetypes, with special attention to touristic heritage zones where design preferences and social behaviours most prominently intersect.

4.0 ANALYSIS

Design adaptation & aesthetic preferences analysis

This analysis of shophouse adaptations in Kuala Lumpur highlights contrasting responses to urban climate challenges. In KL's riverfront Lebuhr Pasar district (Fig. 2), metal ventilation panels and full-length windows dominate, emphasising airflow in dense urban conditions, while varied colour sections indicate fragmented aesthetic choices. In contrast, Muar's seafront Bandar Maharani uses ornamental metal panels and north-south oriented pocket corridors to mitigate evening heat, with uniform colour stringers reflecting cohesive material planning.

KL's spatial organisation shows ad-hoc commercial adaptations, while Muar demonstrates intentional microclimate design, showing how smaller cities can apply thermally responsive strategies with fewer resources. Both rely on hybrid materials (wood-glass-metal composites), reflecting a regional blend of heritage aesthetics and modern performance needs.

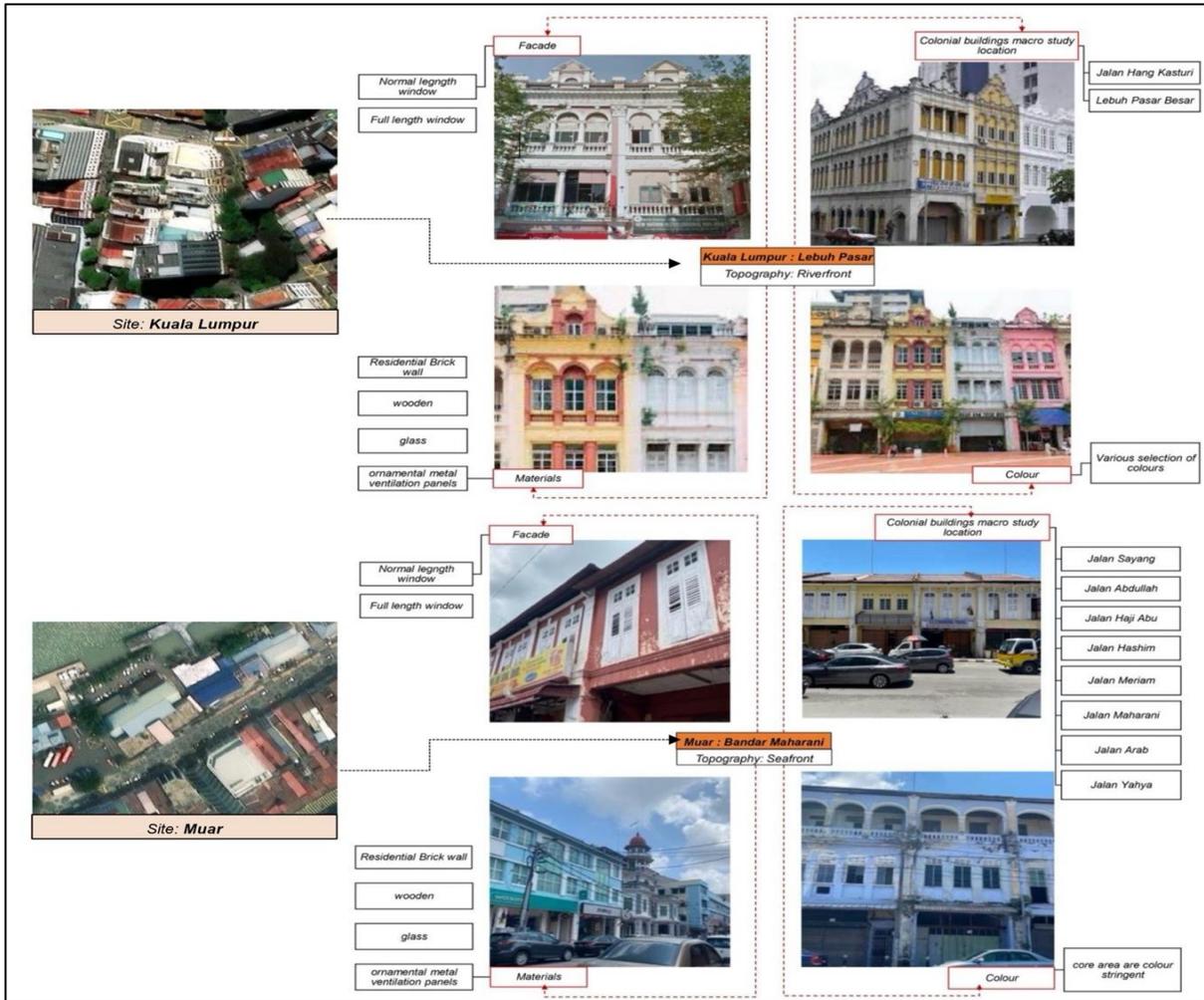


Fig. 2: The exterior and macro mapping for Muar and Kuala Lumpur. (Source: Authors).

The analysis of shophouse adaptations below shows how historic policies and topography shape materiality and spatial organisation. In Melaka's riverfront context, constructed metal ventilation panels and partial colour-coding along Jalan Hang Jebat demonstrate a utilitarian approach to humidity control, using repetitive brick-wood compositions and standardised window proportions (normal/full-length). Contrastingly, Penang's seafront Georgetown employs ornate metal panels and full-length windows to enhance commercial visibility, with vibrant multi-chromatic façades along Lebuah King reflecting UNESCO aesthetic mandates. Both cities share hybrid climate strategies—Melaka's linear material organisation optimises river breezes, while Penang's parallel shaded/unshaded zones mitigate solar gain. Penang's small tube frames and lotted screens highlight its tourist-driven material diversity versus Melaka's functional uniformity, underscoring how regional priorities (economic vs. environmental) manifest in adaptive reuse.

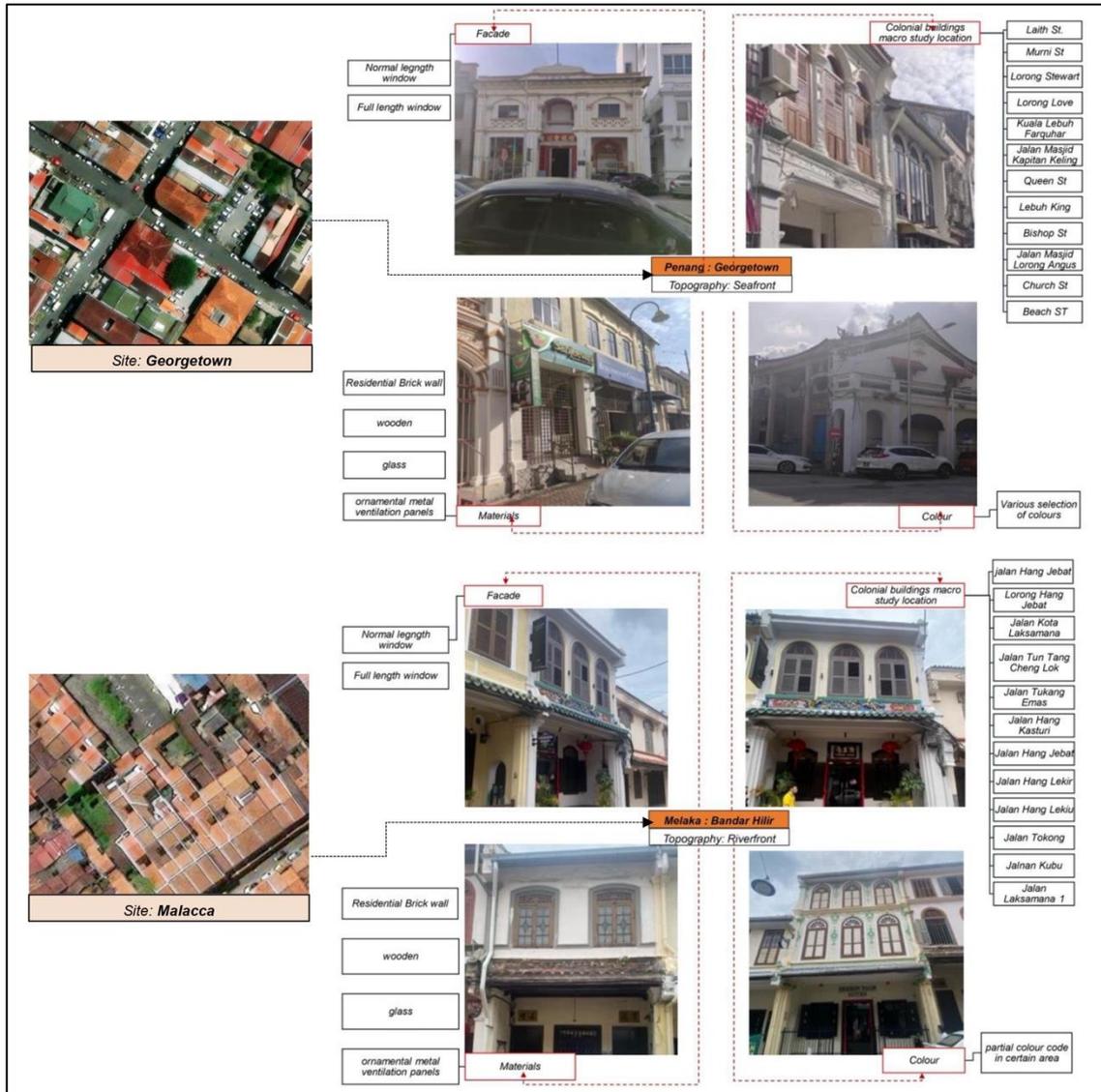


Fig. 3: The exterior and macro mapping for Bandar Hilir and Georgetown. (Source: Authors).

Social impact analysis

In Muar (Bandar Maharani), behavioural data highlights concentrated high transit activity along riverside streets and adjacent piers in Figure 1 below, reflecting the waterfront's role as a key transit and commercial hub. Streets parallel to the river connect commerce, eateries, and transport points. In contrast, social interaction zones appear near civic buildings and public lots, where people gather and linger, signalling a slower-paced rhythm within this small-town heritage fabric. A central intersection shows bright yellow from overlapping red routes, marking a hub of movement and social interaction, likely a main town square. Red linear paths radiate outward along perpendicular streets, while the surrounding blocks show limited lingering (minimal green), concentrating pedestrian activity at the centre.

The pedestrian data in Kuala Lumpur's Medan Pasar in Figure 4 reveals dense red zones concentrated at the central intersection and surrounding main roads, reflecting urban intensity and its role as a transit hub near LRT access points. Movement is fast-paced and directional. Still, green interaction zones appear near shaded trees, small plazas, and pedestrian islands—spaces that encourage rest and socialising despite dominant transit flows. This points to the multifunctional behaviour embedded in the city's historic commercial core. Pedestrian routes crisscross the dense area. Two green social hotspots—near the image centre (right) and lower left—likely represent public squares or markets. Red corridors link these: a diagonal red path from lower left to upper right intersects with another from the top centre. Their meeting near the central green hub forms a yellow zone,

suggesting vibrant overlap between transit and lingering. The pattern shows how gathering places are embedded along main pedestrian routes, enabling continuous urban activity.



Fig. 4: Pedestrian distribution (red=high transit, green=high social interaction).
(Source: Maps).

In Georgetown, Pulau Pinang, the data in Figure 5 reveals a classic grid layout with red zones marking key pedestrian transit routes across the orthogonal network. These indicate efficient walkability and active corridors between shophouses, local businesses, and cultural landmarks. Green areas—at intersections, courtyards, and shaded sidewalks—signal high social interaction, reflecting a historical urban rhythm that blends movement with pause. Narrow alleys and mixed-use buildings support a shared public realm. A bold red vertical path on the left represents a major pedestrian thoroughfare, possibly near a park or commercial axis. Two distinct green zones—upper left and lower right—mark social hubs such as plazas or gathering spaces. The orange tint near the lower right cluster shows moderate overlap where foot traffic enters a social zone, while the upper green zone sits more isolated, reflecting a quieter congregation.

The behavioural heatmap in Bandar Hilir, Melaka, particularly along Jalan Hang Jebat, shows a dominant red corridor along the heritage main street, indicating constant pedestrian flow in this tourist-heavy zone. Attractions like souvenir shops, food stalls, and heritage sites reinforce its role as a transit spine. Social interaction zones (in green) appear in internal courtyards, shaded areas, and near cultural landmarks, offering relief and spaces for pause within the high-flow setting. The map shows several small social hubs and a linking corridor. A green zone to the left marks one gathering space, while a yellow hub to the right represents an overlap of movement and social activity. A red diagonal path connects the hubs, suggesting a popular pedestrian route. A vertical red strip on the right indicates continued foot traffic through the second hub. This pattern reflects distributed social nodes connected by active routes, where people circulate across multiple centres rather than a single core.

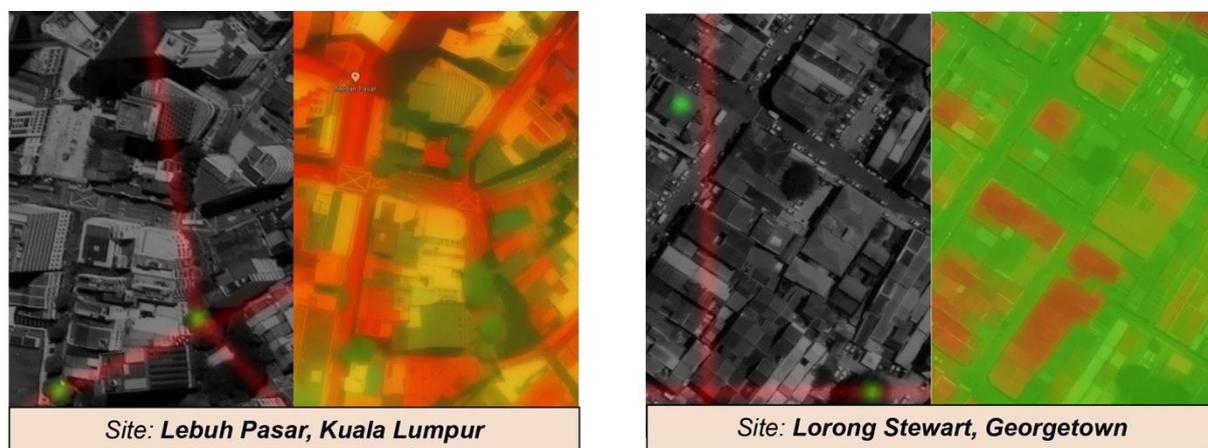
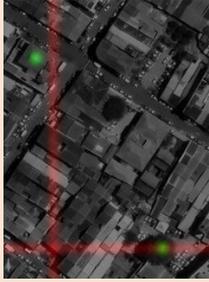
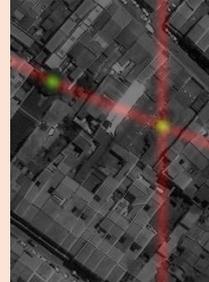


Fig. 5: Key pedestrian transit routes across Melaka & Pulau Pinang.
(Source: Authors)

Table 1: Comparative Shophouse Adaptation Metrics Across Four Malaysian Cities

	Penang (George Town)	Kuala Lumpur (Lebuh Pasar)	Melaka (Bandar Hilir)	Muar (Bandar Maharani)
Metric				
Façade Design	Ornate metal panels, multi-chromatic façades	Commercial metal panels, fragmented colours	Brick-wood uniformity, partial colour-coding	Ornamental panels, uniform colour stringers
Climate Features	Concurrent shaded/unshaded zones	Riverfront ventilation panels	Linear river-breeze alignment	North-south pocket corridors
Façade Retention Rate	72% (UNESCO-driven)	34% (Commercial pressure)	68% (Tourism balance)	55% (Local-scale focus)
Avg. Temp. Reduction	2.8°C (double-skin façades)	1.5°C (partial adaptations)	3.1°C (courtyards + shading)	2.3°C (pocket corridors)
Social Spaces/100m ²	4.2 (open corridors)	1.1 (limited communal areas)	5.0 (pocket corridors)	3.8 (shared courtyards)
Commercial Conversion	41% (boutique hotels)	82% (retail/offices)	58% (cafes/galleries)	33% (local businesses)
Resident Displacement	22% (moderate gentrification)	67% (high gentrification)	35% (managed tourism)	15% (community-led)
Space-Use Behaviors				
				
	Linear Corridor and Distant Nodes	Network of Crossing Flows	Multiple Hubs with Connector	Central Intersection Hub
• Lingering (min/hr)	18.2	6.5	22.4	15.3
Transit (paths/hr)	42.1	68.3	38.6	45.2
Social Interaction	8.7 conv./hr	2.1 conv./hr	12.5 conv./hr	9.3 conv./hr
Social Spaces/100m ²	4.2	1.1	5.0	3.8
• % Long-term Residents	58%	29%	63%	72%
Policy Effectiveness	Tiered grants (89% uptake)	Weak enforcement (42% compliance)	Material subsidies (75% uptake)	Community workshops (63% success)

5.0 DISCUSSIONS

The findings presented through comparative spatial, thermal, and behavioural metrics provide empirical clarity on the adaptability of shophouses in Penang, Melaka, Muar, and Kuala Lumpur. By analysing aesthetic integration, climate-responsiveness, and patterns of human behaviour, the study underscores how design strategies directly impact cultural preservation, environmental comfort, and social connectivity. The cross-city matrix confirms that Melaka exhibits the most holistic model, while Kuala Lumpur reflects the most fragmented adaptation outcomes due to intense commercial pressures.

5.1 Considerations for Designing and Visual Appearance

The data indicates that Penang and Melaka lead in integrating historic façades with modern interior upgrades, supported by high façade retention rates (72% and 68%, respectively) and vibrant colour zoning aligned with policy enforcement (UNESCO in Penang, tourism incentives in Melaka). These approaches align with Hussain and Ujang (2020) and Jin & Wang (2021), affirming that a hybrid visual language—where colonial elements are preserved alongside contemporary material choices—enhances both appeal and function. Conversely, with the lowest façade retention (34%) and highly fragmented colour and material application, Kuala Lumpur exhibits a pattern where commercial expediency overrides heritage considerations. This confirms the contradiction with Said et al. (2021), who advocate preserving façade integrity in urban adaptations. As such, stronger heritage zoning and architectural control guidelines are urgently required in KL to stabilise its visual identity and cultural continuity.

5.2 Methods of Sustainability Adaptation

Thermal performance analysis reveals that Melaka achieves the highest average temperature reduction (3.1°C), followed closely by Penang (2.8°C), mainly due to implementing passive cooling strategies such as pocket corridors, courtyards, and double-skin façades. These methods echo the passive design strategies proposed by Al-Obaidi et al. (2022) and Parsaee et al. (2020), supporting enhanced microclimate performance without compromising heritage value. Muar demonstrates practical adaptability through orientation-aligned corridors and uniform material palettes, enabling 2.3°C temperature reductions with lower financial inputs. In contrast, Kuala Lumpur's minimal thermal gains (1.5°C) and inconsistent use of shading and ventilation features, particularly in high-transit areas like Jalan Kasturi, reflect weak policy enforcement and lack of targeted subsidies. Replicating Melaka's subsidy model across cities could significantly elevate environmental performance, particularly in heat-exposed urban cores.

5.3 Social Cohesion and Community Dynamics

Behavioural data (Table 1) demonstrates the influence of design on social interaction. Melaka's pocket corridors and internal courtyards yield the highest social interaction rates (12.5 conv./hr) and lingering time (22.4 min/hr), emphasising the spatial logic of informal gathering zones within touristic heritage districts. This supports the theories of Lynch (2022) and Said et al. (2021) on spatial permeability and visibility promoting community bonding. Muar also performs well, with high long-term resident retention (72%) and moderate interaction (9.3 conv./hr), affirming the role of community-led adaptive reuse in maintaining social routines. Penang's case is more nuanced—while visual appeal is high, over-commercialisation in hotspots like Love Lane reduces deep social engagement, reflected in a lower conversation rate (8.7 conv./hr). Kuala Lumpur lags, with only 2.1 conv./hr and minimal green zones, where urban intensity disrupts communal rhythms, echoing Baillargeon's (2021) critique on gentrification-induced social fragmentation.

5.4 Urban Planning and Conservation Implications

The contrasting performances across cities demonstrate the need for differentiated urban planning responses. Melaka's success stems from clear zoning, design codes, and material subsidies, balancing tourism and local identity. Penang benefits from high policy uptake (89%) but needs to mitigate tourist saturation to revive authentic community ties. Kuala Lumpur's challenge lies in weak compliance (42%) and absent social indicators in development controls. As such, urban plans must integrate social cohesion benchmarks (e.g., a minimum of 10 conv./hr interaction zones) and regulate pedestrian flow (<50 paths/hr) to protect cultural rhythms. Muar, though small-scale, offers a scalable grassroots model with strong community integration and minimal displacement.

5.5 Policy Recommendations

Behavioural analysis from the matrix reveals actionable patterns. In Penang, locations like Queen Street and Church Street achieved high orientation and visual scores but required spatial decluttering to promote lingering. Melaka excelled in interaction zones (e.g., Jalan Hang Kasturi) with high scores across all matrix dimensions, indicating a successful integration of tourist heritage zoning, façade preservation, and community-centred design. Muar presents a strong grassroots model with moderate zoning policies but strong social presence and low displacement. While scoring high in zoning and functionality, Kuala Lumpur struggled in social and visual cohesion. The evidence calls for three immediate, location-specific interventions:

- i. Enforce a social interaction threshold: Heritage zones should aim for at least 10 conversations/hr, using Melaka's corridor designs as a model.
- ii. Control pedestrian flow intensity: Kuala Lumpur should reduce transit saturation (<50 paths/hr) through shaded walkways and rest pockets, enhancing social permeability.
- iii. Implement targeted incentives: Tiered tax benefits for thermal and social upgrades (e.g., double façades, shaded seating) as shown effective in Penang (25% increase in lingering) should be expanded across cities.

These policies should be embedded into urban governance frameworks and supported by cross-agency collaborations between local authorities, heritage boards, and resident associations. Only through behavioural-informed and climate-conscious design policies can Malaysian cities ensure the longevity, vibrancy, and inclusiveness of their historic shophouses.

6.0 CONCLUSION

This study affirms that the adaptive reuse of Malaysian shophouses must strike a deliberate balance between heritage preservation, climate responsiveness, and social inclusivity. By employing structured observational methods, the research identifies distinct urban patterns and performance outcomes shaped by spatial design, material application, and behavioural dynamics. Melaka is the most comprehensive model, with pocket corridor configurations and strong zoning mechanisms supporting thermal comfort and vibrant social interaction (12.5 conv./hr). Penang demonstrates high visual appeal and effective passive design strategies, although tourist saturation dampens deeper community engagement. In contrast, Kuala Lumpur reflects the challenges of rapid commercialisation, where high pedestrian transit (68.3 paths/hr) coincides with weak façade retention (34%) and diminished social cohesion. Despite its smaller scale, Muar showcases promising community-driven adaptations that balance functional upgrades with high resident continuity (72%). Three core elements underpin successful shophouse adaptation:

- i. Heritage-conscious design—retaining architectural character through façade preservation and material continuity.
- ii. Climate-responsive solutions—such as double-skin façades, pocket corridors, and shaded walkways that improve urban comfort.
- iii. Behaviorally informed planning—ensuring spatial configurations foster interaction and minimise displacement.

Urban policies must adopt city-specific strategies to operationalise these insights. These include enforcing minimum social interaction benchmarks, regulating transit intensity through public realm enhancements, and incentivising thermal and communal upgrades. Heritage adaptation cannot be treated as a uniform process; instead, it must reflect each city's unique socio-cultural and environmental fabric. Ultimately, this study offers a replicable framework for tropical cities seeking to future-proof their historical assets by aligning architectural integrity.

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