

# SUSTAINABLE DESIGN ELEMENTS FOR URBAN STREET MICROARCHITECTURE IN MALAYSIA

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## ABSTRACT

*Streets microarchitecture constructs are compact structures such as stalls, kiosks, phone booths, and toilets that one finds as one walks on the streets, alleys, walkways, pedestrian malls and such. Because of its smallness, they are usually seen to be unimportant in the development of townships and cities. In this paper a series of street investigation of human behaviour within the retail built environment projected a unique result on how formal and informal street space is cultured. Jacobs (1993) stated a great street should have characters; therefore, this event can bond a specific street identity within and would become a tourism product besides the daily retail activity. Microarchitecture, however, actually gives the first real impression of a town, city or country to visitors to a particular place or locale. Its impact is immediate and opinions are formed of the place and its people quite instantaneously. A lot of street microarchitecture are public amenities such as toilets and squares. Base on current phenomenology research studied, it gives a better justification on sustainable elements approach on street microarchitecture in Malaysia. Thus, in this research and practise base paper, it is imperative to study and understand its functions, aesthetics and design elements so that a sustainable architectural plan and street identity can be developed for the comfort of locals and visitors alike.*

**Keywords:** Urban, Street Microarchitecture, Design Elements, Sustainable

## 1. INTRODUCTION

In her efforts towards becoming a first world nation, the Malaysian government has set aside huge investments in the construction sector. This sector plays a significant role in the country's economy. In the built environment, there exists an important subsector, i.e. microarchitecture. The existence of microarchitecture, especially in urbanized areas, affects the country's development in many important ways. Microarchitecture refers to small or mini buildings found along the roads and in urban areas such as corner shops, recreational parks, public squares, specific facilities including overhead bridges, car parks, kiosks, pedestrian walkways and others. The role and uniqueness of street architecture is not usually understood by local inhabitants. Microarchitecture undertaken in the country's building projects needs to be given serious consideration to ensure that the ideas of the country's environmental development is accepted by all levels of society. Jacobs (1993) stated a great street should have characters; therefore, this event can bond a specific street identity within and would become a tourism product besides the daily retail activity.

### 1.1 Streets, Paths and Microarchitecture

Mental images of microarchitecture could bring about a harmonic balance between dwellers and their surroundings (Lynch, 1960). The urban image is a mental map that is formed which includes two physical elements or activities of a place or city. Image clarity depends on the legibility of the city itself. The existence of mini architecture in the city could actually assist in the orientation of a person's movement. The five city elements classified by Lynch are *paths, districts, edges, landmarks* and *nodes*. As a result, clear images allow a person to move about easily.

“Every citizen has had long associations with some part of the city, and his image is soaked in memories and meanings.”

The locations of street microarchitecture could have a strong impact on society. Therefore, its placement and construction needs are always sensitive to current requirements. To develop a responsive surrounding, another approach is needed. Lynch introduced an approach related to the legibility of the city image. Bentley et al. (1985) in ‘*Responsive Environment*’, on the other hand, emphasized that the physical design aspects have to be attractive. Bentley et al. put forth seven types of responsive environment. They are *permeability, variety, legibility, robustness, visual appropriateness, richness* and *personalization*.

An earlier research by Azimin et al. (2007) tries to ensure that a facility and the microarchitecture are responsive towards the surroundings as well as to meet the community’s requirements. The research finds that an effective street microarchitecture needs to include three important elements, namely, the cultural factor, event and authority (See Figure 1).

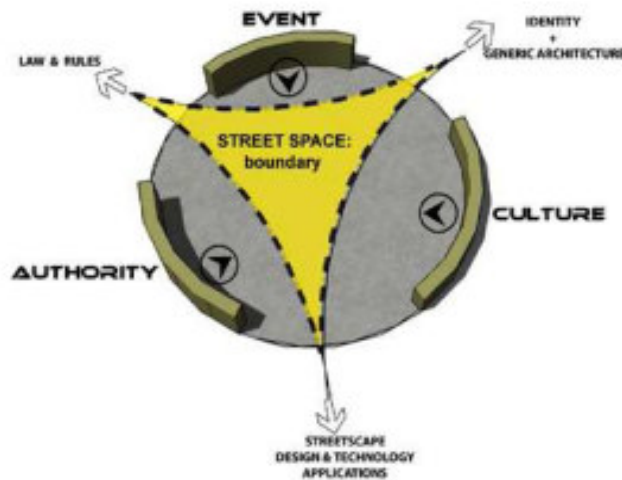


Figure 1: Elements of street microarchitecture theoretical framework. (Source: Azimin et al., 2005).

An example of a present-day street microarchitecture is the phenomenon of *mamak foodstalls*. These stalls operate along five-foot walkways of many buildings in Malaysia. Their operation hours are from five in the afternoon till the wee hours of the morning. The eating space initially is small but gradually increases in size when more customers start coming in. At peak hours, the operators will place more tables and chairs in areas that are prohibited by authorities such as on walkways and road edges.

Hence, it is clear that the ‘event’ causes the increase in eating space demand. The ‘event’ is created by the ‘culture’ of the locals who enjoy dining out in the open until late at night. Nevertheless, the ‘event’ is still tied to the limits of the ‘authorities’ as there exists proper zoning to the designated commercial areas although there are no specific boundary that demarcates the private and the public areas.

## 1.2 Streets: The Beginnings of Microarchitecture

Any classification of the street begins with the Vitruvius ideology that uses different background leagues in staging. There are three types of backgrounds: *tragic, comic* and *satiric*. Each background has a different specification from the other. According to Serlio (1982), the *tragic* background has specifications of classical architecture. It is strengthened by the usage of columns, pediments, statues, and other mini elements that are related to aristocracy and royalty. The *comic* background is influenced by Gothic architecture. It reflects the image of a town or a city or places that have balconies or windows that are arranged according to a pattern. Lastly, the *satiric* background has elements of a suburban landscape (See Figure 2). It is decorated with trees, caves, hills and other factors that enhance the landscape elements.

Until today, microarchitecture has not been viewed within the context of urbanization. Some architects and designers design microarchitecture only as a by-product and it is always tied to cost. In addition, local authorities such as the City Council tend to develop microarchitecture solely on function, whereas the architecture has the potential to manage social issues, local climate, and the look of the city as well as the identity of the surrounding areas. The same goes with microarchitecture found along the roads and in public areas around the city. To produce an effective microarchitecture, an in-depth understanding of the city’s image is vital. It will assist a person in appreciating the role of pathways and public areas better and give a better overall impression of the city (See Figure 3).

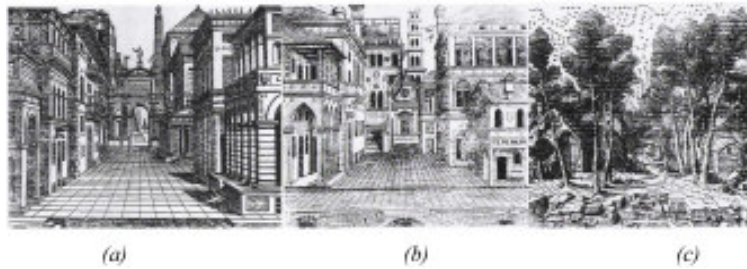


Figure 2: Three microarchitecture background: (a) Tragic, (b) Comic and (c) Satiric.  
(Source: Cliff, 2001).



Figure 3: Creative sustainable designs of bus stops.  
(Source: Richardson, 2001).

## 2. RESEARCH METHODOLOGY

A study on microarchitecture in the built environment involves daily activities and scenarios that happen in specific places. A series of literature review has led the research methodology towards qualitative approach. This can be described as the topic study that is conducted through intense and prolonged contact with life situation in the built environment research (Amaratunga et al., 2002). Hence, the field of microarchitecture can be seen within the interpretive science research reflecting the daily life of individuals, groups, societies and organizations in a typical monotonous situation (Miles and Huberman, 1994). Here, phenomenological (or interpretive science) inquiry uses qualitative and naturalist approaches to inductively and holistically understand human experience in specific contact settings.

## 3. ISSUES, STATEMENT OF PROBLEM AND SCOPE

In general, the existence of street architecture is in most cases unplanned. As a result, most of the designs do not have sustainable elements. For example, a stall that sells rice for lunch will be set up along the road side at certain hours, i.e. 11 a.m. to 3 p.m. Due to the transient nature of the business, stall operators do not need to take into consideration important factors such as building materials and design. A case in point is the present usage of polycarbonate material for bus stops. This material is not only insensitive to the tropical climate and culture but also visually garish.

Sustainable development means that the well-being of the current and future generations goes hand in hand with the development of the surroundings and the usage of its natural resources. This is espoused by Hadi, et al. (2006) in his book, *Mencari Kelastarian Bandar Kecil*. He posits that there is a lack of understanding towards sustainability in suburb in Malaysia. The meaning of sustainability needs to be exposed in order to create an environment of street microarchitecture that is at once sustainable and effective.

This paper concerns current practices in the design of the street architecture and the understanding of sustainable elements that needs to be infused in future microarchitecture constructs. This paper will also describe several projects found in Malaysia in order to give a comparative feel to the discussion as well as providing ideas for the country's future microarchitectural directions.

### 3.1 Measuring Elements in Sustainable Designs

In general, the meaning of sustainability of microarchitecture in an urban context is that it is able to provide comfort to the denizens of the area. Simultaneously, the microarchitecture should also be able to connect seamlessly with its zonal fringes. The sustainability idea can be expanded to include the measurability of architectural elements such as thermal comfort, acoustics, ventilation and others. Other forms that will be discussed in this paper are visual quality and materials.

**i) Sustainable materials.** Early microarchitecture buildings were made of wood material and leafy (especially *rumbia*) rooftops for the erection of street stalls. In the early 1980s, most of the materials used in the design of microarchitecture focused on steel and iron for its base structure. As for the structure and wall finish, most would use clay bricks and rough cement rendered. This was because these materials were easily obtainable and disposed of. The idea of sustainability was lost in the building translation.

**ii) Sustainable visuals.** Visually, the microarchitecture should enhance the identity and image of the locality and give visitors a good first impression. The job of maintenance is to protect the identity or the natural heritage and city image. Currently, no single authority is serious in expanding the idea of sustainable development in totality. Local authorities have to play a major role in ensuring that visual quality and sustainability of an area is maintained.

#### 4. A PROPOSAL: MICROARCHITECTURE AND ITS IMPORTANCE

Microarchitecture plays a significant role in connecting the public domain with the world of architecture. Logically, microarchitecture should be able to introduce the uniqueness of a local culture and act as a proof of how effective a certain social or commercial activity is being carried out in a particular zone. For instance, a commercial activity involves the public, buyers and sellers, and facility provider and maintainer. A provider/maintainer in this context refers to local authorities or those in charge of a district or zone. This authority regulates matters such as licensing, laws and providing and maintaining facilities in areas under its jurisdiction.



Figure 4: Current problems in microarchitecture in Malaysia: Designed street micro stall made from unsuitable materials.



Figure 5: Bus stop transformed into a shelter for motorists and pedestrians during a downpour.



Figure 6: A diagrammatic concept of the three interconnected entities—Public, Sellers-Buyers and Provider in a zone of street microarchitecture.

The existence of microarchitecture can be viewed as an introductory agent to a street. If a unit of microarchitecture is placed in a location that is exact and appropriate, it would be easily identifiable (See Figure 4, 5 & 6). Tourists, in particular, will be most interested in goods that are sold in microarchitecture units in cities they are visiting as they are more versatile and approachable. By observing these consumers, it is possible to derive a sustainability model of a microarchitecture design. For example, there are times when we buy fried bananas at a street stall and eat them there. The question is, “Are we responsive towards the condition of the stall from the angles of comfort, cleanliness, or material used in its construction?” Stall makers and stall operators take the easy way out by buying the cheapest available material for their stall’s construction. One can never expect the operator to conduct studies on factors of culture, climate, thermal comfort, etc. (See Figures 7 and 8).





Figure 7: Current models of Malaysian street retail microarchitecture.



Figure 8: Stall designs canopy (with canvas or Polypropylene materials) typically found in Malaysia.

Elements of microarchitecture can be grouped either into public facilities or retail shops. The public facilities consist of the following items:

- Public toilets,
- Amenities/ information kiosks/ signposts,

- Bus/ taxi stands,
- Street furniture, and
- Public prayer halls.

On the other hand, retail shops are made up of the following items:

- Retail sales kiosks and eateries, and
- Non-permanent stalls.

It is observed that the evolution of microarchitecture in this country has been gradual. Public amenities have not been given serious thought due to low financial gains in this construction subsector. Local authorities usually provide them on an *as and when* basis. As for the retail segment, the sellers' only concern is maximizing profits. The rental of both space and licence are profit motivated. The lack of coordination in both the private and public sectors inhibits sustainable growth. Thus, many of the street microarchitecture units are often neglected due to selfish personal interests.

In Bangsar Baru, Kuala Lumpur, for example, there are many outstanding changes on its streets due to its touristic pull. This has created a variety of bistros, cafes and restaurants that have universal appeal. Consequently, the microarchitecture designs for the police beat and taxi stand in the area are also found similarly appealing.

On closer inspection, the sustainable elements of these buildings are not truly outstanding due to indiscriminate use of polycarbonate material that attracts heat. This material is widely used in the mistaken notion of architectural modernity. This is cause for concern as the vernacular Malay architecture is well-known for its sustainable features (See Figure 9). The elements below need to be given proper attention in the development of street microarchitecture:

1. Unit design
2. Façade variety
3. Pedestrian walkways and background
4. Construction materials



Figure 9: A taxi stand (left) and a prayer kiosk (right) partially influenced by vernacular Malay architectural house concepts in a search of sustainable design elements such as the ventilation system, thermal comfort, lighting and visual quality.

#### 4.1 Unit Design

*Architectural Image.* The design of each unit has to be guided by an architecture that takes into consideration the climate and local culture. The introduction of local designs infused with Malay architectural elements is commendable but may not be wholly needed as it may not be suitable with the functionality of a particular microarchitecture unit. The total use of wood as the base structure cannot be implemented due to high cost. A detailed study on current styles and local characteristics will have to be first conducted. What need to be included are elements such as ventilation and the open-plan concept of the Malay vernacular design which has been proven to be functional and aesthetically superior.

*Innovation and Creativity.* From the perspective of design, it is important to have an attractive and creative one. To break the monotony of sameness along the streets, it is advisable to introduce a non-conservative design. For example, a microarchitecture unit can be designed by applying the flow of the sunlight and shadow as elements for area landmark and shelter. It is also desirable to have a mix of modern elements so as to offer the best design for users. As stated by Nasar (1998), there are five factors that are popular for all seasons in urban areas:

- a. Naturalness
- b. Upkeep–civilities
- c. Openess and defined space
- d. Historical significance and content
- e. Order

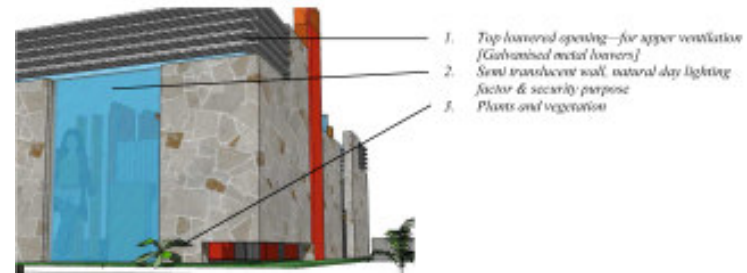


Figure 10: An award winning innovation on Malaysian Eco-Public Street Lavatory (ECSTRACT™) by the first author at the British Invention Show 2007 in London using sustainable system and materials. (Source: Azimin, 2007).

*Function of Design Based on Energy Use.* Practical energy usage is highly preferable when designing a sustainable design. The use of cross ventilation and shading devices can maximize internal comfort. It is also highly encouraged to use photovoltaic cell panels to create “zero energy” in each unit (Figure 10).

*Flexibility.* Many of the microarchitecture units fall in the category of compact design and its operational character is usually temporary. Therefore, the requirements of each unit’s changeability in the modular system or size increase have to be investigated and provisions made to maximize space as well as the functionality.

#### 4.2 Facade Variety

The location of the unit or selection of site has to be in tandem with the function of the unit itself. The unit itself lends very well to the ‘island’ type because at least 90% of micro-buildings are located on pedestrian walkways that are multi-directional (Figure 11). As such, each unit requires a multi-façade character that will increase direct-visual contact between space and man.



Figure 11: A diagrammatic concept of the ideal microarchitecture unit location in the pedestrian walkway area.

Sequencing of units will reflect a unique aesthetic quality if the series are arranged according to familiar groupings. Gestalt's theory states:

*Gestalt psychologists have argued that aesthetic order and coherence comes from the grouping and recognition of patterns, and that to make environments more coherent visually we use principles of organization or grouping to create a good form from the parts (Von Meiss, 1990).*

The study suggests the following pattern and aesthetic sequence series:

- Sense and rhythm pattern
- Appreciation of rhythm
- Recognition of balance
- Sensitivity to harmonic relationships

#### 4.3 Pedestrian Walkways and Background

*Street walkways.* It is perfectly acceptable to place micro units in pedestrian walkways. Its location, however, should not impede pedestrian activity. On top of this, pedestrian security needs to be taken care of. In our country, there are micro unit facilities that are placed close to the edge of the road that may invite unwanted accidents.

*Background.*

##### i. Architecture (primary)

Knowledge and sensitivity of an area should be investigated. Additionally, the current design character of a particular locality has to be determined. Current shophouses in Malaysia can be categorized as:

- Shophouses in the early 1870-1880s
- Shophouses in the transition era, i.e. in the early 1890-1940s—heavily influenced by Palladian characteristics
- Shophouses in the late era—a mixture of styles such as eclectic, Sino-Malay, Palladian, neo-classical, art deco and others

##### ii. Natural surroundings and landscape (secondary)

Knowledge and sensitivity to natural surroundings and landscape is important to unite all elements in sustainable microarchitecture. The architect or designer needs to combine both these elements to ensure an effective characterization of a unit that is appropriate to the geography and local culture of the particular area.

#### 4.4 Construction Materials

Since many of these microarchitecture units are exposed to the tropical climate, the use of environmental friendly materials in designing the units has to be emphasized. There are many mismatches found today such as:

- a. The use of polycarbonate material as rooftops has increased the temperature of the units;
- b. The use of mild steel that does not have anti-rust coating will result in paint erosion and high rusting;
- c. The use of metal awning and asbestos roofing needs to be discarded as they absorb heat and is a health hazard.

Good examples of material that ought to be used in sustainable designs are:

- a. Timber that has been treated or recycled such as *Cengal*, *Merbau*, and *Meranti*. Wood has an affective and unique feature in sustainable architecture. This is evidenced in its wide usage in the vernacular Malay architecture itself and is supported by a study done by Cavanagh and Kroeker (2005):

*“... wood has strong claims to a sustainable architecture based in locality, diversity and the links between culture and environment. These claims are rooted in history, but times of transition are times of jeopardy.”*

- b. The use of other material such as stainless steel that has been galvanized will result in great sustainability. A good proof is that galvanized steel has been used to build lamp posts and road dividers in Malaysia for more than 30 years. This fact is also backed by the American Galvanized Association (AGA, 2007):

*“Galvanizing is found in almost every major application and industry where iron or mild steel is used. The utilities, chemical process, pulp and paper, automotive, and transportation industries, to name just a few, historically have made extensive use of galvanizing for corrosion control. They continue to do so today. For over 150 years, hot-dip galvanizing has had a proven history of commercial success as a method of corrosion protection in myriad applications worldwide”.*

- c. Other sustainable materials that are based from natural resources such as concrete, clay bricks and granite are highly recommended. The level of resistance of these materials is great. They stand the test of time and are suitable for today’s building elements.

As a result the sustainability design elements of microarchitecture will be successful if materials and visual appearance are carefully considered respectfully from the points of view of authority, retailers and the public. See Figures 12-15.



Figure 12: Various sustainable materials in a pleasant combination.  
(Source: Richardson, 2001).



Figure 13: A creative arrangement of ‘contour layering’ wood screen.  
(Source: Richardson, 2001).





Figure 14: An interesting arrangement of natural materials of a microarchitecture unit. (Source: Richardson, 2001).



Figure 15: A remodeling by Diller Scofidio and Reflo in the pedestrian walkway in Manhattan High Line (Source: [http://www.thehighline.org/design/prelim\\_design/highline.htm](http://www.thehighline.org/design/prelim_design/highline.htm)).

## 5. CONCLUSION

The implementation of a sustainable design plan cannot be viewed only from one perspective. All stakeholders including local authorities, town planners, architects, designers, users and local inhabitants will have to provide input. The study encourages the usage of sustainable ideas, elements and materials immediately. The key to achieving an ideal and sustainable design is to take into consideration the factors of design, culture and local climate. Generally, the best sustainable design elements should accommodate functional, economical, flexibility and clearly identified non-decorative elements. Additionally, Malaysian microarchitecture sustainability needs to consider its tropical climate and placement within the pedestrian urban street space. Although street microarchitecture is small in size, it has the ability to impact visitors and locals alike.

## 6. ACKNOWLEDGEMENTS

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