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A STUDY ON KEVIN LYNCH'S URBAN DESIGN ELEMENTS AT BAYAN BARU TOWNSHIP, PENANG

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ABSTRACT

This study is to determine and measure the effectiveness of the urban design elements at Bayan Baru Township, Penang through mental mapping. The study is conducted based on observation and interview. Mental mapping is used to identify the urban design elements, and information from the interview is used to understand the place making by the local residents. The findings show that the township is mainly gridded with paths as the main urban element based on Colonial divide and rule concept. In contrast, the idea of 'Garden City' is expressed through the organisation of buildings with nodes and landmarks on mostly every districts. Study shows that the five urban design elements has been integrated successfully in the planning of the township. Path is the most dominant urban element in gridding the districts, while nodes and landmarks complement each other well in the planning. Edges do not play an important role as it is mainly identified as transportation edges expressed by paths. Nevertheless, the combination of urban design elements are considered successful in highlighting the image of Bayan Baru township in Penang.

Disciplinary: Architectural Sciences.

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1. INTRODUCTION

This paper will focus on the urban design elements of a case study in Penang under the category of 'Garden City' (see Figure 1). Urban design is the process of designing the built environment, such as towns, cities, streets and spaces. It involves the arrangement and planning that give form, shape and character to the built environment. The practice of urban design uses principles and urban design elements to arrange and blend architecture, landscaping, and city planning to form systematic and planned urban areas.

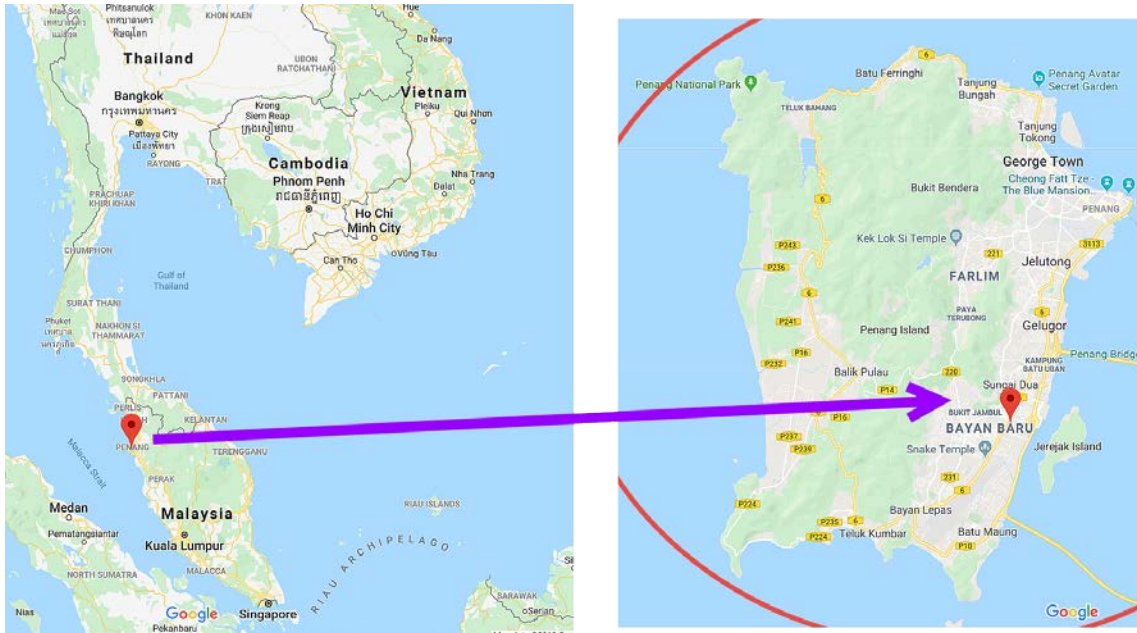


Figure 1: Geolocation of Bayan Baru, Penang, Malaysia (Courtesy of Google®).

The principles of urban design are well evaluated by Kevin Lynch in his classic work ‘The Image of the City’. His work explains how people orienting themselves in the city through mental mapping. People engage in way-finding by recognising and organising urban design elements into a coherent pattern (Lange, 2009). Lynch proposes five urban design elements under the practice of mental mapping – paths, edges, districts, nodes and landmarks (Lynch, 1960).

On the other hand, the concept of garden city was first initiated by Ebenezer Howard in 1898 in the United Kingdom. Garden city is a planned, self-sustained community surrounded by greenbelts and open spaces, aiming to promote a healthy lifestyle with employment opportunities (Howard, 1902). Howard founded Letchworth, the world’s first garden city in Hertfordshire, England in 1903 (The International Garden Cities Institute, 2018). Howard’s vision of garden cities has had an enormous impact upon urban planning in the new town around the world. In this paper, Bayan Baru is chosen as the case study to evaluate the integration of urban design elements to the development of the township under the concept of garden city. Figure 2 shows the location plan of Bayan Baru.

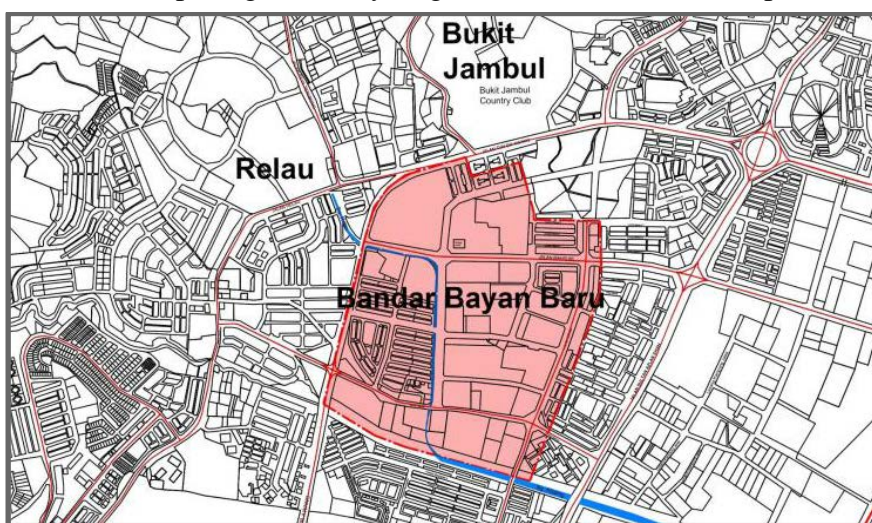


Figure 2: Location Plan of the Case Study: Bayan Baru.

This study determined the urban design elements implemented in Bayan Baru township, Penang,

and measure the effectiveness of the urban design elements used in urban planning.

The reasons of choosing this case study are: (1) Bayan Baru is now one of the most rapidly developed townships in Penang under the category of ‘Garden City’ and (2) it can be easily accessed for site visit. Research and analysis will be presented to show the connections between people and places and how well the urban design elements are adopted in urban planning.

2. LITURATURE REVIEW

Understanding the Kevin Lynch (1960) five urban design elements, it is necessary to realise their importance towards a city’s image, and how people orient in the city. It is important to understand the relationship between the urban design elements, as a good integrated city image can be exhibited through the combination of these elements.

2.1 URBAN DESIGN ELEMENTS

2.1.1 PATHS

Path is an urban city nerve to ease the user’s movement. According to Yasin, Hassan & Al-Ashwal (2017), it is a channel where people potentially move such as roads, pedestrian walkways, transit lines, and railroads. Under colonial divide and rule concept, it is an effective urban design element to organise the township into a grid system.

2.1.2 EDGES

Edges in urban neighbourhoods can be either impermeable or permeable. Typical examples are transportation edges, usually expressed by arterial roads like highways and rail lines, or spaces like parking lots, large industrial sites and vacant land (Yasin et al., 2017). In some cases, watercourse edges and façade edges can also become effective orientation elements.

2.1.3 DISTRICTS

District is an administrative division on an area. It can be distinguished by its similar identity or character (Yasin et al., 2017). Typically, the classification of district can be based on functions and activities such as commercial, residential, education, and public amenities. A successful planning of district typically shows a strong context and interrelationship of activities.

2.1.4 NODES

Nodes are typically places where the crowds gather. The gathering point can be a primary junction or an open plaza where people need to travel from one to another point by crossing the path. Nodes can be classified as outdoor nodes and indoor nodes, where people always recall and mark as a place of activity in the township (Pauzi et al., 2018).

2.1.5 LANDMARKS

Landmarks can be defined as an object or building to identify a place. It can be anything recognisable like a monument, skyscraper, or even part of the building structure as well. It gives people a clear image or identity while visiting a place. Landmarks also can be described as concrete speakers and attractive elements in various sizes, which reflect community life (Bocekli, 2003).

2.2 BACKGROUND OF CASE STUDY: BAYAN BARU TOWNSHIP

Bayan Baru is a residential neighbourhood located within the Southwest Penang Island District, adjacent to the Bayan Lepas Free Industrial Zone. The name ‘Bayan Baru’ means ‘new town’ as it was developed under the concept of town-country where the advantages of town and country are combined. Founded in 1972 by the Penang Development Corporation (PDC), the township has evolved into a booming neighbourhood with many commercial and retail developments (Tye, 2017). Before that, it was once paddy fields due to its strategic location that was near two rivers – Sungai Relau and Sungai Ara. However, it was always flooded when rain coincided with the high tide as the river expanded. Over the decades, the condition was improved by rectified drainage and other mitigation works, such as canalising Sungai Relau and Sungai Ara, which are channeled to flow to Sungai Kluang before emptying into the sea. Nevertheless, flash flood still occurs occasionally during heavy rainfall mainly due to blocked drainage (Tye, 2017).

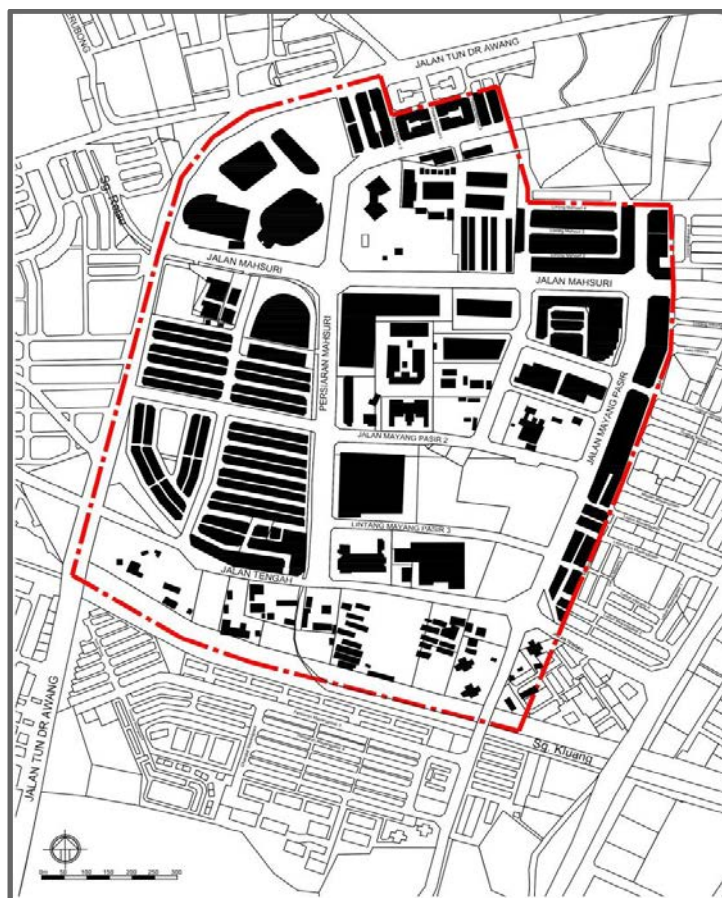


Figure 3: Ground Plan of the Case Study: Bayan Baru.

Bayan Baru development was largely influenced by the industrial decentralisation strategy that causes a change of land use patterns (Hassan, 2005). The strategy intended to build new city centers, housing areas and industrial areas in previously underdeveloped areas, one of them being Bayan Baru. Besides, rural urbanization is another strategy applied in the development of Bayan Baru, aiming to reduce congestion in metropolitan areas by channeling migration to these new towns. The environment of a new town, services and facilities are introduced into rural areas to eliminate the social and economic inequalities between urban and rural inhabitants (Ngah et al., 2015). Over the years, the change of land use patterns can be seen in the urban landscape and fabric. Figure 3 shows the ground plan of Bayan Baru.

Today, Bayan Baru is one of the most rapidly developed garden city in Penang due to its proximity to the Bayan Lepas Free Industrial Zone. It houses many condominium and apartments within the residential district, as well as many eateries in the commercial district, ranging from ‘mamak’ stalls to the fast food and ‘Kopitiam’ like outlets (EdgeProp, 2016). Bayan Baru Market (officially known as Bayan Baru Market Complex and Community Hall) is the biggest market in the area, housing a wet market, dry market and hawker centre.

Due to the increase of employment opportunities, there is a shift in population out of Georgetown and towards Bayan Baru and its immediate neighbourhood. It provides the people with multiple blessings such as the accessibility to new amenities and facilities. For instance, the Subterranean Penang International Conference and Exhibition Centre (SPICE), which is formerly known as Penang International Sports Arena (PISA), was redeveloped in the township by a major Malaysian property developer, SP Setia (Tye, 2017).

3. METHODOLOGY

The study was conducted from qualitative research referring to Kevin Lynch’s study on the quality of the urban element during the site visit at Bayan Baru Township. The figure-ground plan (see Figure 3) will be scrutinised to match the record in the layout plan with the site survey on the quality of urban design elements. Meanwhile, interviews have been conducted with the locals and tourists.

Noted the term ‘Jalan’ is a Malay word, which can be defined as a road or way by which people or vehicles may pass between places. On the other hand, ‘Sungai’ is defined as a river or any natural stream of water.

3.1 URBAN DESIGN ELEMENTS

3.1.1 PATHS

The paths can be analysed by looking on its sizes, accessibility and popularity of usage. Through the observations and interviews towards the local residents and tourists, precise information can be gathered to categorise the roads for analysis purpose.

3.1.2 NODES

Nodes are determined based on its function, attraction, uniqueness and popularity in Bayan Baru Township. It is often places where people gather and meet, such as road or street junction. There are some constraints using observation techniques to identify the nodes as some places are not operating 24 hours. Hence, interviewing the locals or the pedestrian nearby would be the best alternative.

3.1.3 DISTRICTS

Districts are identified based on the building usage of each zone. They are classified into commercial district, residential district, small holdings and public amenities. Besides, the types of housing are further defined into residential low-rise, condominium and apartment to indicate the living zoning in the township.

3.1.4 EDGES

Edges are determined based on the edges typologies, including amorphous edge, distinct edge and overlapping edge. Furthermore, the basic characteristics of an edge - opaque, transparent and permeable - also act as a crucial role in the identification and evaluation of the edge quality in the formation of the township (Desai, 2018).

3.1.5 LANDMARKS

Landmarks are determined based on the recognisable objects and built masses in the township. Site observation is applied to identify the different building types that can serve as a clear image to the citizens in guiding and recognising a place. Interviews are also carried out among the locals to identify the importance of the different buildings within the studied zone to the locals as well as tourists. The criteria include the architecture value, history, function, size and height of the building.

4. ANALYSED RESULTS

Referring to the five urban design elements, analysis was carried out after the on-field study. Through in-depth data collections from the interviews with the local residents and tourists, the results are discussed based on the five urban design elements.

4.1 URBAN DESIGN ELEMENTS



Figure 4: Bayan Baru Township main entrance

4.1.1 PATHS

Bayan Baru Township is located at the southern part of Penang Island where it can be accessed by using Jalan Tun Dr Awang (arterial road) from Penang 1st Bridge and Penang International Airport. The main entrance to access the township is from Setia SPICE where Jalan Tun Dr Awang connect to Jalan Mahsuri (see Figure 4). Through observation, the path of Bayan Baru Township can be categorised into two types of pattern - transportation and pedestrian. Figure 5, the transportation paths are accessed by vehicles and motorcycles along the arterial road (primary), collector road (secondary) and local road (tertiary).

The arterial roads act as a connector to the collector roads following a perimeter system, while the local roads lead to specific commercial shop or housing. The path pattern of the whole development of the township is following the colonial divide and rule system using arterial road as a grid for the organisation of buildings. There is a few of arterial roads (45-meter to 40-meter road reserve) in Bayan Baru, such as Jalan Mahsuri, Jalan Tengah, and Jalan Mayang Pasir (see Figure 6). Common vehicles including public transport can be observed during heavy traffic hour. The Setia SPICE and One World Condominium can be approached from Penang town through Jalan Tun Dr Awang via linkage to Jalan Mahsuri, as well as from Jalan Mayang Pasir. Next, Sunshine Square can

be approached from town by using Jalan Mahsuri and Jalan Mayang Pasir as well. Besides, government service department like Bayan Baru Polis Station, Fire Station, Hospital Pantai Mutiara and S.R.K. Seri Permai are all located along Jalan Tengah.

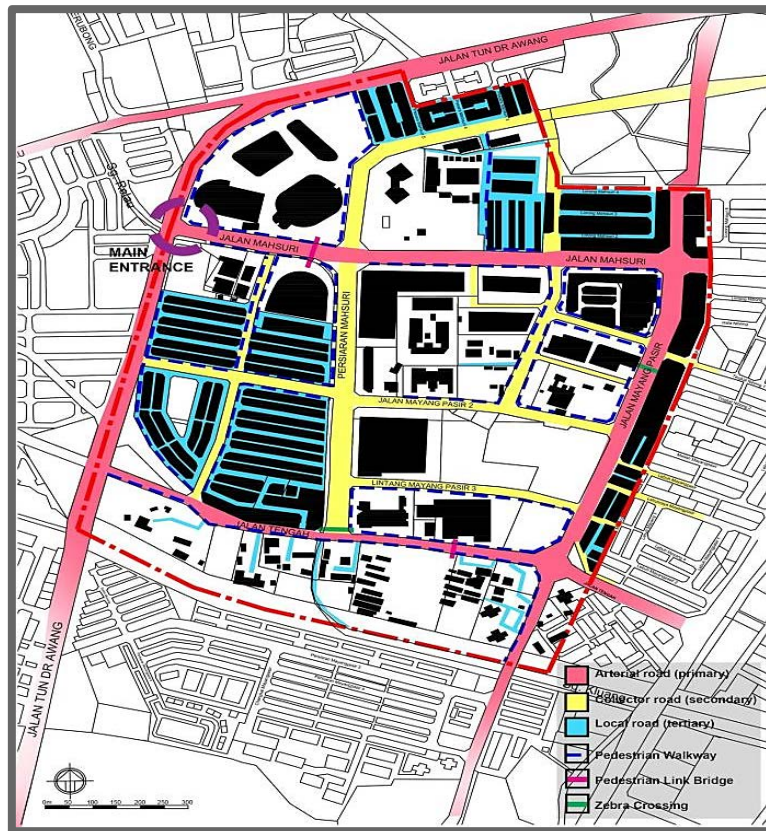


Figure 5: Path Diagram of the Case Study: Bayan Baru.



Figure 6: Jalan Mahsuri (left), Jalan Mayang Pasir (middle) and Jalan Tengah (right)



Figure 7: Persiaran Mahsuri (left), Jalan Mayang Pasir 2 (right)

The collector roads (26m to 20m road reserve) are 4-meter car lanes which connect the users from main paths, such as Persiaran Mahsuri (see Figure 7), into the residential, commercial and recreational areas at Bayan Baru Township. The main entrance of Elite Avenue and Umar Ibn Al-Khattab Mosque can only be accessed from the secondary path (Jalan Mayang Pasir 2) (Figure 7). Bayan Baru food court and wet market main entrance can be accessed from Lintang Mayang Pasir.



Figure 8: Persiaran Mahsuri 2/5 (left), Tingkat Mayang Pasir (right)

Also, the tertiary roads (15-meter to 12-meter road reserve) can be observed in specific areas like residential (see Figure 8) or government amenities. Some tertiary roads also link to commercial shops.



Figure 9: Pedestrian Link Bridge at Jalan Mahsuri (left) and Jalan Tengah (right)

The second type of path is pedestrian walkway, leading people from one place to another place such as commercial and residential area. Unfortunately, there is no specific or proper lane for cyclist. The whole study area barely has any facility that provides for cyclist. In contrast, the pedestrian walkway is nearly everywhere. It leads people from their home to any commercial area; hence showing a friendly urban design. Additionally, there are pedestrian link bridges at crowded places like school and commercial area (see Figure 9). Based on our observation, the pedestrian link bridge located at Jalan Tengah helps students crossing the road to S.R.K. Sri Permai and Raja Tun Uda High School.



Figure 10: Zebra Crossing at Jalan Mayang Pasir (left) and Jalan Tengah (right)

Next, zebra crossings are located at Jalan Mayang Pasir and Jalan Tengah (see Figure 10). These zebra crossings link the residential area to the commercial place. For example, the zebra crossing at Jalan Mayang Pasir connects Taman Sri Tunas and Bayan Baru Wet Market.

4.1.2 NODES

Figure 11 shows the outdoor and indoor nodes within the studied zone. Even though Bayan Baru is considered as Garden City, the organisation of the building is based on the colonial urban design pattern where the layout follows the grid system. It can be seen that almost every grid in the layout has their own node provided.

One of the most significant nodes in terms of functionality and popularity would be Setia SPICE. Located along Jalan Mahsuri, the SPICE Arena it is Penang's main indoor sports centre and people came here for business, exhibition and any international concert. Thus, it becomes a focal point where

locals and tourists can gather around to enjoy the facilities and spaces provide. Besides the SPICE Arena, SPICE Garden also considered as a main outdoor node that allows the public to come and enjoy the environment (Figure 12).



Figure 11: Node Diagram of the Case Study: Bayan Baru



Figure 12: SPICE concert (left), SPICE rooftop garden (middle) and playground (right)

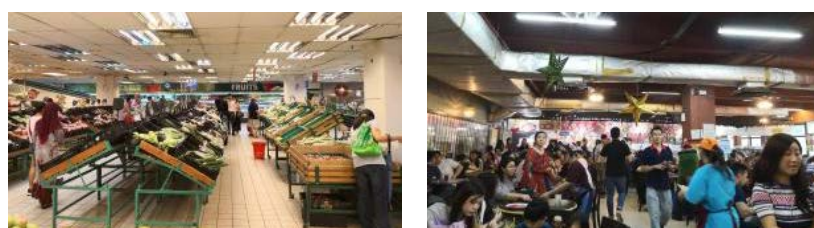


Figure 13: Sunshine Square Mall Shopping Area (Left) and Food Court (Right)

Next, the major indoor node will be Sunshine Square Mall where it located in between the junction of Jalan Mahsuri and Jalan Mayang Pasir. Sunshine Square is opened in 1993. It is

five-storey shopping mall which caters the surrounding community, as well as shoppers from the nearby towns and residential areas such as Bayan Lepas (see Figure 13). Until today, the mall could still attract a large crowd as it embarks on an upgrading exercise once every couple of years to maintain its quality of services. In 2005, Sunshine unveiled a new brand logo, refurbished the department stores and expanded the supermarket into the new wing previously occupied by the food court (Tye, 2019).



Figure 14: Bayan Baru Wet Market (Left) and Food court (Right)

Besides, Bayan Baru Wet Market and Food Court is also considered as a major indoor node at Lintang Mayang Pasir 4 in between the Bayan Baru Mosque and Sunshine Square. The wet market is well-arranged and the food court attracts many people to come (see Figure 14). The area is public welcoming as it provides sufficient parking lots near to the building.



Figure 15: Ramadhan Bazaar at Umar Ibnu Al-Khattab Mosque

Umar Ibnu Al-Khattab Mosque is also considered as a major indoor node. The mosque is designed to cater the all Muslims at Bayan Baru area where people can come to a Friday praying session from 12 pm to 2 pm. Besides, the open car park of the mosque will be used as a bazaar during the Ramadhan period (Figure 15). Elite Avenue is identified as an indoor node (Figure 16). The whole development has a good catchment in the fast-developing Bayan Baru area. At the residential area, Elite Avenue Condominium have their own indoor node as well like lobby at the podium and rooftop garden that serve for the residential only. Besides, The Promenade at opposite of the Elite Avenue has an internal street between the retails, serving as an outdoor node.



Figure 16: Bayan Baru Elite Avenue (left), Outdoor node at The Promenade (right)

Another node is Giant Hypermarket along Jalan Mayang Pasir (see Figure 17). It is the only Giant hypermarket in Penang opened in 2005. Giant hypermarket is designed to serve the community

by providing a large variety of goods which is very convenience to the people. However, it is going to be demolished due to a newly proposed mixed development by Ideal Property Group, called Bayan Baru City Centre. In term of design layout, the hypermarket does provide a huge parking space to cater the costumer, at the same time the interior of the market is huge enough to gather all the customer from everywhere.



Figure 17: Bayan Baru Giant Hypermarket



Figure 18: 'Happy-Dance' Exercise at Sunway Tunas Open Field

At Sunway Tunas residential, there is an open field for the neighbourhood serving as an outdoor node. The basketball court can be rented to the youngster if they want to use the court at night with the spotlight. When the court is not used to play basketball, it is used as a platform by the residents of Sunway Tunas to organise dance exercise activities (see Figure 18).

4.1.3 DISTRICTS

As shown in Figure 19, the studied zone can be classified into four main districts - residential district, commercial district, small holdings and public amenities. The residential district can be further broken down into landed housing, apartment and mixed-use development (condominium and retail). Within the studied zone, Taman Sunway Tunas and Taman Mahsuri are the main residential landed housing in the area. Sunway Tunas was developed as a housing area with double-storey terrace houses by Sunway City Sdn Bhd. The housing area is well connected to the public amenities and commercial buildings. On the other hand, for residential high-rise, it can be observed that there are more mixed-use condominiums than apartments. The mixed-use condominiums are located within the commercial district to incorporate retails in the lower floors. For instance, they are Arena condominium, D'Piazza condominium, The Promenade, Elit Heights, and The One condominium.

The commercial district is situated at the centre of the township, and surrounded by the residential district. Hence, residents can easily access to the commercial area. There is a lot of eateries in the area. For instance, the hawker centre of Bayan Baru Market is one the most popular open eateries among the community, especially factory workers due to its variety of food choice and its affordable price range. As for relatively new developed eateries, the retails of The One, The

Promenade and Elit Heights are the more popular choices among the community, especially the young population. Meanwhile, Sunshine Square and Giant Hypermarket are the shopping malls serving the area.

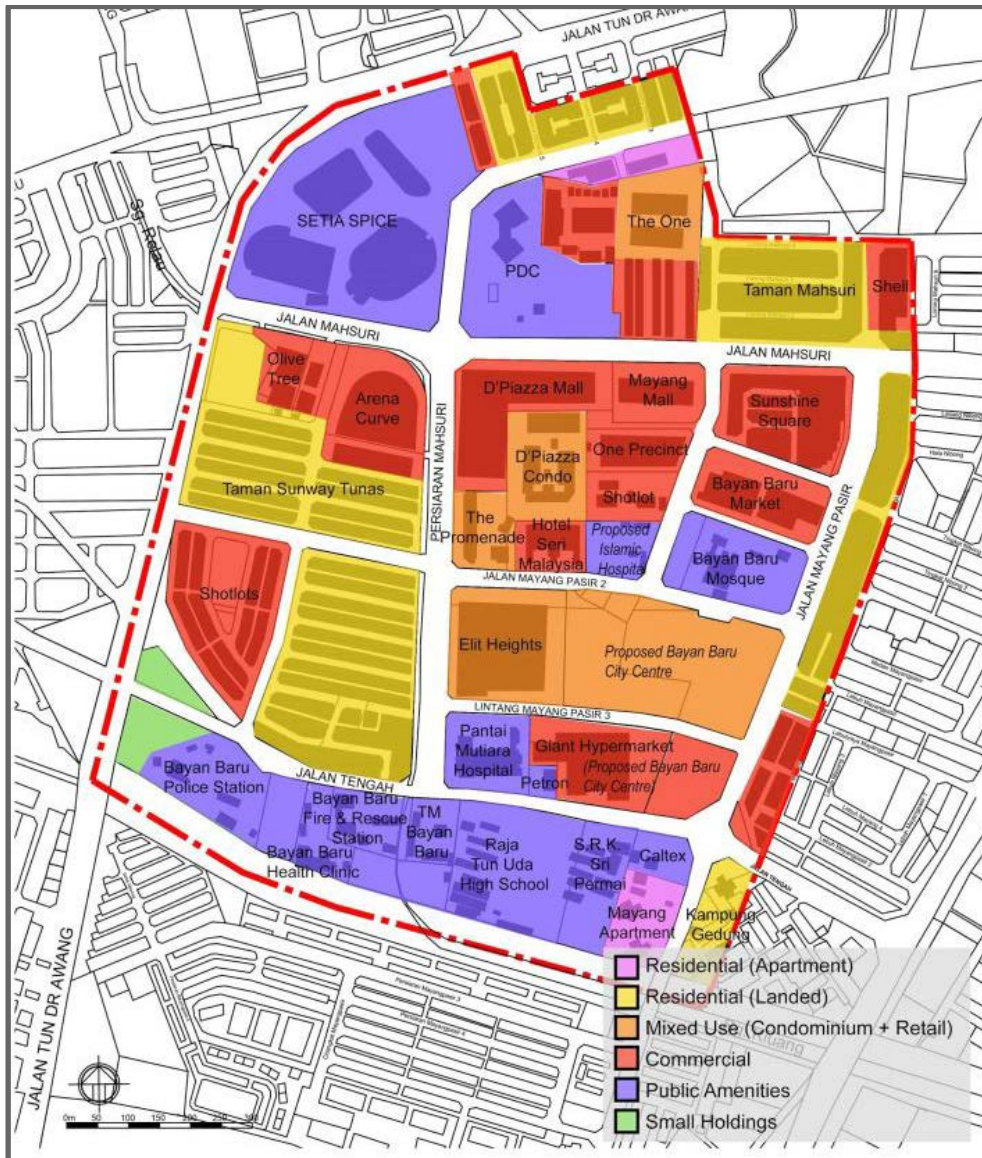


Figure 19: District Diagram of the Case Study: Bayan Baru

The significant public amenities within the studied zone include Subterranean Penang International Conference and Exhibition Centre (SPICE), Penang Development Corporation (PDC), Masjid Bandar Bayan Baru, Pantai Mutiara Hospital and SMK Raja Muda. Hence, the residents can access to different amenities within travelling distance.

From the pattern of the arrangement of districts, we can suggest that the town planning was based on colonial ‘divide and rule’ concept based on the functionality of the buildings. Besides, the boundaries of different districts were determined by the arterial roads, as suggested in Section 4.1.1.

4.1.4 LANDMARKS

There are many landmarks in Bayan Baru. Figure 20 shows the category of landmarks classified based on its hierarchical order, from architecture value, height to function. Under the major landmarks based on its architecture value, the most successful landmark is Setia SPICE. Located along Jalan Mahsuri, it is Penang’s main indoor sports centre and the preferred venue in Bayan Baru

for meetings, incentives, conferences and exhibitions (MICE).

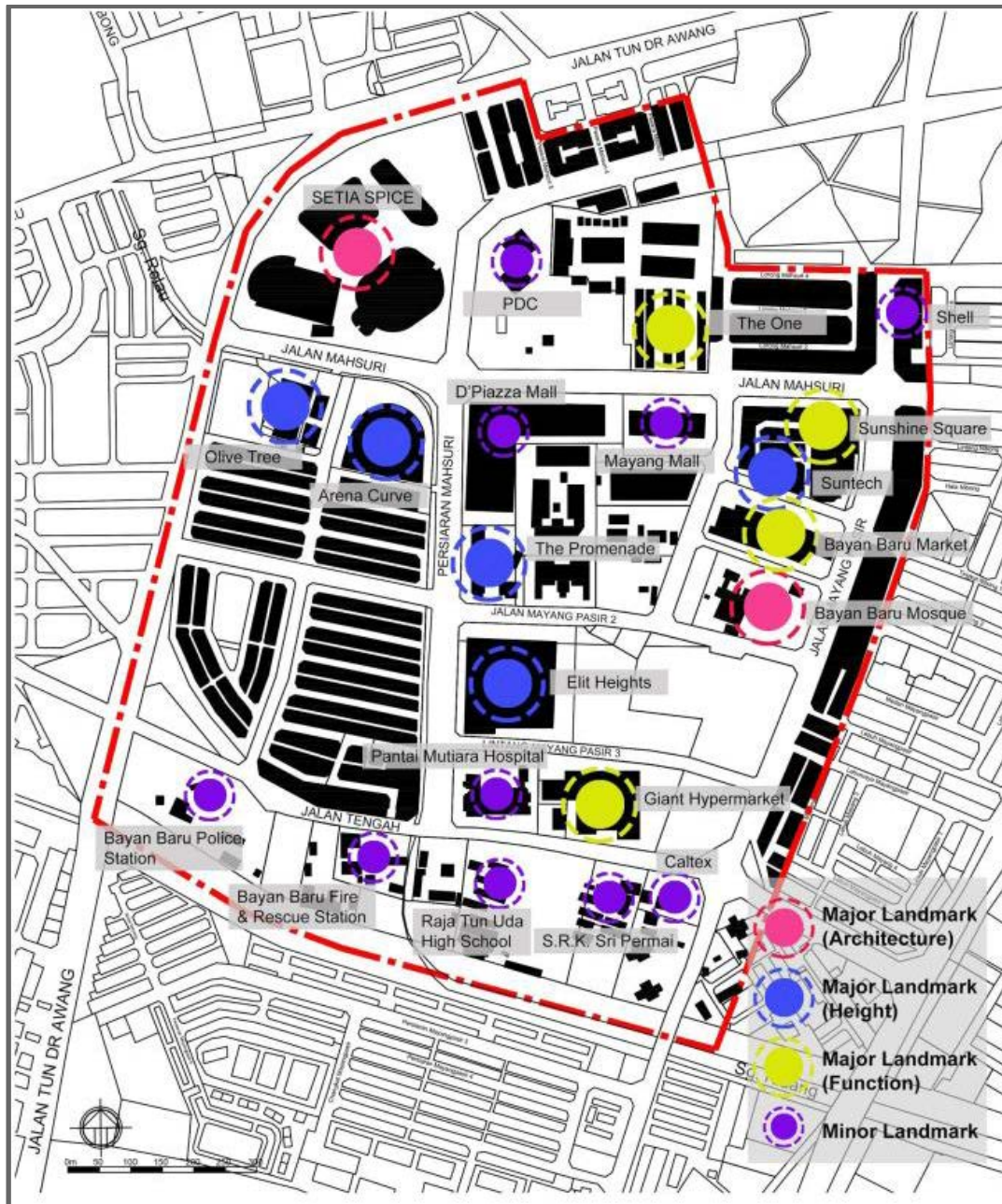


Figure 20: Landmark Diagram of the Case Study: Bayan Baru



(1) SETIA SPICE

(2) SPICE Roof Structure and Pyramid Skylight

(3) Bayan Baru Mosque

Figure 21: Major Landmarks Identified Based on Architecture Value

According to Setia Spice (2018), its 120m modern iconic roof structures were installed with 1600 custom-made glass panels along Jalan Tun Dr Awang, and it is the first ever 654-LED colour-changing roof in Asia. The Pyramid Skylight and Pearl Crown that are aligned in the centre of the roof was inspired by Louvre Pyramid in Paris designed by architect I.M.Pei (see Figure 21). Such unique architecture feature has successfully become an identity in Bayan Baru.

Besides, another major landmark in architecture value is Masjid Umar Ibn Al-Khattab, also known as Bayan Baru Mosque (see Figure 21). Built in the 1980s, it is the main mosque in Bayan Baru, named after Umar Ibn Al-Khattab, the second caliph, a highly regarded figure among Sunni Muslims (Tye, 2008). It is located along Jalan Mayang Pasir and is just one road across Bayan Baru Market.

Next, the major landmarks can also be classified based on height. The most prominent building would be Olive Tree Hotel. Situated along Jalan Mahsuri, it has quickly gained popularity due to its strategic location beside SETIA SPICE. It only requires 8 minutes' drive from Penang International Airport and 15 minutes' drive from Penang Second Bridge. Besides that, there is a few mixed-use developments in the area that can be recognised through the height of building, such as The Promenade, Elit Heights, The One and Arena Curve. Suntech is also another high-rise landmark functioning as a business tower. Generally, the building design gives the impression of extreme simplicity by applying the simplest and fewest element to create the maximum effect. As shown in Figure 22, the minimalist style mostly uses white with cool grey to black tones as the main colour scheme with glass wall and window (Hassan et al., 2015). Although these high-rise buildings are not especially unique on their own, they can still help drivers and pedestrian in way-finding in the area.



(1) Olive Tree Hotel



(2) The Promenade



(3) Elit Heights



(4) The One



(5) Arena Curve



(6) Suntech

Figure 22: Major Landmarks Identified Based on Height

Additionally, the major landmarks in Bayan Baru can also be identified through the building function and usage (see Figure 23). The only two shopping malls in Bayan Baru - Sunshine Square mall and Giant Hypermarket - can be easily recognised in the township. Another landmark under this

category is the Bayan Baru Market Complex.



(1) Sunshine Square Mall



(2) Giant Hypermarket



(3) Bayan Baru Market

Figure 23: Major Landmarks Identified Based on Function



(1) PDC



(2) Mayang Mall



(3) Pantai Mutiara Hospital



(4) D'Piazza Mall



(5) Raja Tun Uda High School



(6) S.R.K. Sri Permai



(7)
Bayan Baru Fire and Rescue
Station



(8)
Petron



(9) Caltex



(10) Shell



(11) Bayan Baru Police Station



(12) Bayan Baru Health Clinic

Figure 24: Minor Landmarks in Bayan Baru

Besides all the major landmarks mentioned, there are also other minor landmarks in the area, as shown in Figure 24. One of them is the Penang Development Corporation (PDC). PDC was established by the late Tun Dr. Lim Chong Eu in 1971. Aiming to spearhead the socio-economic

development of Penang, it was instrumental in the development of new townships. According to Tye (2014), PDC will be relocated into Mayang Mall while its present building will be demolished to make way for the proposed BPO Prime.

Other minor landmarks include public amenities along Jalan Tengah such as Pantai Mutiara Hospital, D’Piazza Mall, Raja Tun Uda High School, S.R.K. Sri Permai, Bayan Baru Police Station and Bayan Baru Fire and Rescue Station. Petrol stations such as Petron, Caltex and Shell also serve as minor landmarks in the area.

While all the minor landmarks can provide a guide for people to navigate in the township, they are not as significant as the major landmarks. Due to the building function, being public amenities, administration and education, the minor landmarks only serve a specific group of people, unlike the commercial buildings which can easily attract crowds. Also, as the location of these minor landmarks is further away from the arterial roads, they are not as noticeable as the major landmarks.

In short, we notice that most of the major landmarks are at the edge of the district facing the arterial road. The location makes the landmarks successful in serving as a clear image in the township. On the other hand, when there are many major landmarks in the area, the purpose of minor landmarks in way-finding becomes less important.

4.1.5 EDGES

Figure 25 shows the edges within the studied zone. Firstly, Sungai Relau is a distinct edge formed by a natural watercourse, separating Taman Sunway Tunas in the residential district and the commercial district next to it. However, the river is not as significant as it only serves as a canal to prevent flooding (Tye, 2017). Nevertheless, Jalan Mahsuri and Persiaran Mahsuri are aligned to the river in order to classify the districts.

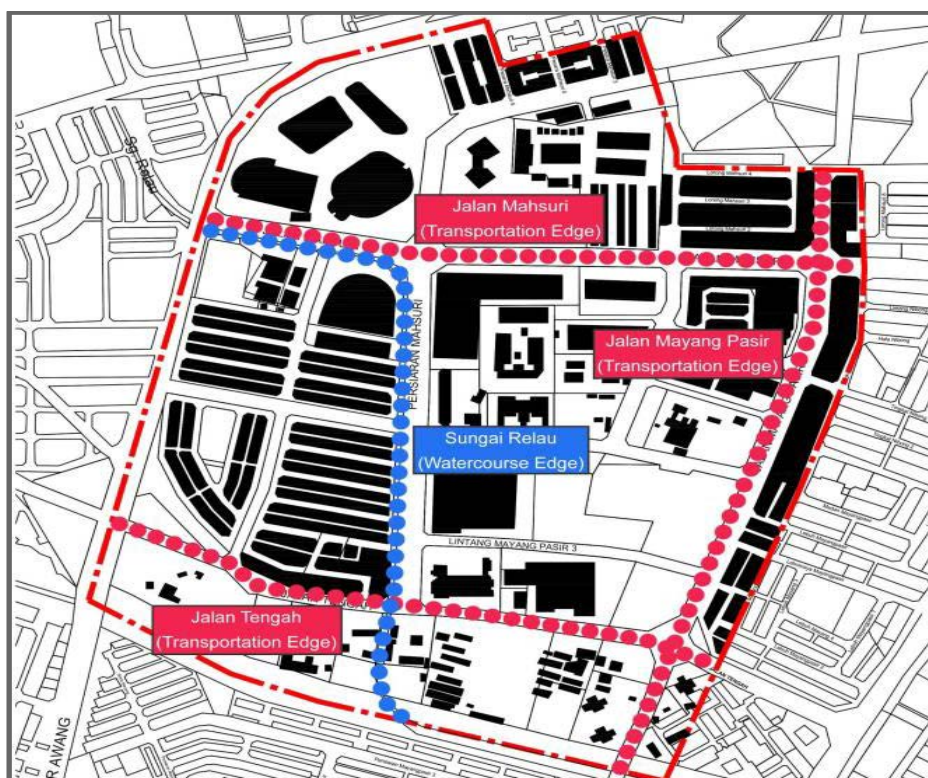


Figure 25: Edge Diagram of the Case Study: Bayan Baru.

The change in building typology is also obvious from residential low-rise to mixed-use high-rise. Next, the arterial roads also act as transportation edges that separate different building typologies in the township. For instance, public amenities such as SPICE and PDC are separated from the commercial district to the South direction by Jalan Mahsuri. Besides, Taman Sunway Tunas from the residential district is separated from the public amenities to the South direction by Jalan Tengah. Lastly, Jalan Mayang Pasir separates the commercial district to its west and the residential district to its east.

5. DISCUSSION

Based on the overall result, the analysis based on Lynch's five elements of urban design characteristic at Bayan Baru Township, as well as the conclusion will be discussed accordingly in this chapter.

5.1 URBAN DESIGN ELEMENTS

5.1.1 PATHS

The paths in Bayan Baru Township play a main role to enhance the development to its finest. The perimeter system inside out the township gives a great impact to the local economic. The arterial road, collector road, and local road fully fulfill their purpose to direct the visitors into different districts. At the same time, the pedestrian walkways also create convenience to the local people and visitor. Most of the pedestrian walkways are designed to link to the commercial area with bus stop provide along the way. It encourages people to access everywhere in the area. However, there are still some improvements needed to be done in certain area due to poor connectivity and accessibility between the district. For instance, there is only a few pedestrian link bridges and barely no zebra crossing provided. It loses the purpose of garden city where it should be encouraging people to travel by walking. Then, in term of accessibility, some of the pedestrian walkway cannot be accessed due to low maintenance where the pathway is almost covered by grass. There are also certain areas that do not cover pedestrian walkway. For example, it is difficult for residents at Sunway Tunas to walk to certain commercial area like Elite Avenue or D'Piazza Mall directly due to lack of zebra crossing and pedestrian link bridge, not to mention that the district is segregated by arterial and collector roads. Thus, instead of walking people would still rather to drive from one place to another place.

5.1.2 NODES

The layout of Bayan Baru township is based on colonial grid system with garden city concept, and every grid has their own nodes. The element of nodes in Bayan Baru township has been strongly supported by various type of path where it brings people from outside to come and enjoy the facility and space as well. Then we found out that almost all of the nodes still work perfectly fine. For example, for the node at the residential area, the local still fully utilize the usage of the green field to have different kind of activities, whereas commercial areas also provide sufficient space like car park and public space to cater the visitor from outside. The most significant public node is held at Setia SPICE where it successfully attracts people to come because of its unique content and design. With these factors, people can easily remember their time in Bayan Baru township.

On the other hand, some of the nodes might not function at its finest. One of the examples is

D'Piazza Mall. The retail shop failed to attract people into the business. There is no architecture value in the development of D'Piazza Mall. Moreover, the newly built buildings surrounding the area are mostly under mixed-use development. These will give people more reason to choose where they want to go, and people might be attracted by newly open retail shop and facility surrounding that area. Thus, some of the oldest building cannot sustain very well in such circumstance unless they improve their management to attract back the people.

5.1.3 DISTRICTS

The clarity of districts in Bayan Baru is high as it is classified based on the colonial divide and rule concept. Nevertheless, it is still noticeable that the planning follows the theory of Garden City, in which the commercial district is planned at the centre of the township so that it is easily accessible from other parts of the township. Most landmarks and nodes are concentrated in the commercial district to attract crowds to the town centre. Besides, since the commercial district are gridded by the arterial roads (Jalan Mahsuri and Jalan Mayang Pasir) and the collector road (Persiaran Mahsuri), it promotes better pedestrian connectivity between different commercial buildings as pedestrians do not need to cross any arterial road to move within the commercial area.

In contrast, the location of the shophouses beside Taman Sunway Tunas of the residential district is isolated from other commercial buildings. As a result, they do not share the popularity of other commercial buildings in the main commercial district. This scenario suggests the importance of concentrating the commercial buildings in the town centre to ensure a high level of usage. Nevertheless, the overall planning of the districts is still deemed to be successful, combining the main principle of Garden City and Colonial divide and rule concept.

5.1.4 LANDMARKS

Bayan Baru township has many landmarks in the different districts. SETIA SPICE is one of the most successful landmarks in the area. This suggests that people's appreciation of a building is the highest when a building is unique in terms of architecture value. Similarly, Bayan Baru mosque is another successful example due to its typology as a religious building.

Since the township was planned in a grid-system with roads, landmarks are located in every area along the arterial and collector roads. Locals and tourists are able to navigate easily in the township by referring to the landmarks in their mental map. Next, the landmarks and nodes often complement each other in the town planning. This combination is effective in pulling crowds to the township and makes the neighbourhood more lively.

5.1.5 EDGES

The primary edges that define the area are the transportation edges by the arterial roads. Although there is a watercourse edge by Sungai Relau, it is only considered as a minor edge as nature is unimportant in the planning of Bayan Baru township. On the contrary, the transportation edges mainly define all the districts in the area using a perimeter grid system. Hence, this could suggest that the merging of urban design elements, namely path, edge and district, is successful in complementing each other. On another perspective, the facade edges are not as obvious because unlike colonial town in Georgetown with rows of shophouses, the building types in Bayan Baru consist of more variety.

Hence, the buildings do not produce a consistent and obvious facade edge in the township.

6. CONCLUSION

Urban design elements in Bayan Baru Township has been analysed after the qualitative survey and analysis. We can conclude that the five urban design elements - path, node, district, landmark and edge - are fairly expressive in shaping the township. Although Bayan Baru is deemed to be a garden city, the planning is generally based on the colonial divide and rule concept. Hence, the path is the most prominent urban design element in planning the township into a grid system in which buildings are organised into different districts in high clarity. Nevertheless, the concept of planning in garden city is still applied by integrating a lush of greenery in the township. Also, the commercial district is located at the centre of the township to act as an urban magnet to invite crowds.

Next, landmarks and nodes are also effective in recognising the township. Within every grid in the district planning, there are many significant nodes and landmarks to revive and identify the places. Hence, the locals and tourists can easily create a mental map, which aids in the way-finding in the township. Moreover, the activities that are brought in to the township by the commercial area keep the city sustainable. On the other hand, the edges within the studied zone are less significant on its own as it is only expressed through the transportation paths. Also, the watercourse edge only helps to guide road planning without expressing the concept of nature in a garden city.

In short, Bayan Baru township is successful in the planning of the five urban design elements. It is memorable as a lively neighbourhood with integrated commercial activities. Nevertheless, there might be a trend of oversupply of retail spaces that remained empty for an extended period. One of the examples is D'Piazza mall. Therefore, we could suggest incorporating interesting architecture features into the business pattern as people's appreciation level of buildings has increased over the years. This will ensure a positive image of the township and keep the urban design elements functional over time.

7. AVAILABILITY OF DATA AND MATERIAL

Data can be made available by contacting the corresponding authors

8. ACKNOWLEDGEMENT

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