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**PROCEEDINGS OF THE 16<sup>TH</sup> REGIONAL  
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SIMPORA XVI: 2025**

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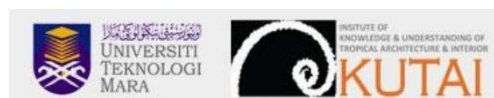
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man to the individual, society to collective social structures, shell to the built environment, and network to the connecting systems within a settlement (Dariwu et al., 2016).

According to Bintarto (1977), changes in land use contribute to variations in spatial development patterns (Jumeneng, 2009). As cited by Chaeriah (2021), Aziz (2014) identified three primary spatial growth patterns:

- Leap-frog Development (This pattern refers to scattered physical development that occurs sporadically and non-contiguously.)
- Linear Development (This type follows the main transportation corridors, forming linear or radial growth patterns.)
- Concentric Development (This pattern reflects a radial expansion that emanates outward from the city centre toward peripheral areas (Chaeriah, 2021).)

Growth of Urban Areas, According to Christaller's Central Place Theory, central locations function as service hubs for surrounding areas. When two centres are near each other, their service zones overlap, allowing shared access for populations between them. (Jamoliddinov & Dsilva, 2019; Mirzaya Putra, 2023). According to Alonso's Bid Rent Theory (1964) (Spatial Interaction), land values decrease with distance from the city centre. Commercial activities dominate high-value central areas due to accessibility benefits, while residential uses shift outward to avoid high land costs (Egan & Nield, 2000). This study uses a qualitative descriptive method to explore spatial development phenomena objectively (Rukajat, 2018). Primary data were collected through observations and interviews, while secondary data were sourced from documents such as the RDTR for Marpoyan Damai. Analysis, conducted without statistical tools, focused on spatial-temporal patterns in five key years: 2003, 2013, 2018, 2023, and 2025.

## RESULTS AND DISCUSSION

### General Overview

This study was conducted in Riau Province, specifically in Marpoyan Damai District, Pekanbaru City. Geographically, the district is situated between 101°14' and 101°34' East Longitude and 0°25' to 0°45' North Latitude, with a total area of approximately 27.79 km<sup>2</sup>.



**Figure 1:** Administrative Map of Pekanbaru City. Image Copyright, *Regional Development Planning Agency (BAPPEDA) of Pekanbaru (2014)*

Marpoyan Damai District is bordered by Payung Sekaki and Sukajadi to the north, Bukit Raya to the east, Kampar Regency to the south, and Tampan to the west. The district was

established in 2003 through the subdivision of the Tampan and Sukajadi Districts. Initially, it comprised five urban villages (*kelurahan*), but by 2013, the number had increased to six is Wonorejo, Tangkerang Tengah, Tangkerang Barat, Sidumulyo Timur, Maharatu, and Perhentian Marpoyan. Among these, Sidumulyo Timur is the largest in area (7.19 km<sup>2</sup>), while Wonorejo is the smallest (1.35 km<sup>2</sup>).

### Analysis of Factors Influencing Residential Development

#### a. Natural Factors

Natural factors, especially topography, significantly influence spatial planning by guiding development patterns and limiting activity distribution. Elevation variations across urban villages in Marpoyan Damai, as shown in Table 1, help explain differences in settlement distribution.

**Table 1:** Land Elevation by Kelurahan in Marpoyan Damai District, 2022. *Source: Marpoyan Damai District in Figures, 2023*

| No.                     | Administrative Area | Elevation (masl) |
|-------------------------|---------------------|------------------|
| 1.                      | Sidumulyo Timur     | 37               |
| 2.                      | Wonorejo            | 16               |
| 3.                      | Tangkerang Barat    | 14               |
| 4.                      | Tangkerang Tengah   | 13               |
| 5.                      | Maharatu            | 27               |
| 6.                      | Perhentian Marpoyan | 23               |
| Marpoyan Damai District |                     | 21,67            |

Based on Table 1, Marpoyan Damai's flat topography (13–37 meters above sea level) makes it ideal for housing, commercial, and service development, supporting integrated urban expansion with minimal physical barriers.

#### b. Human Factors

Population growth in Marpoyan Damai reflects rising space demand and community involvement in shaping urban areas for living and economic use, highlighting the link between demographics, urbanisation, and local economic development.

**Table 2:** Population Growth in Marpoyan Damai District, 2003–2025. Source, BPS, 2025.

| No. | Year | Population    | Area (km <sup>2</sup> ) |
|-----|------|---------------|-------------------------|
| 1.  | 2003 | 111.700       | 29, 79                  |
| 2.  | 2008 | 126.316       | 29, 79                  |
| 3.  | 2013 | 137.658       | 29, 79                  |
| 4.  | 2018 | 131.550       | 29, 79                  |
| 5.  | 2023 | 150.313       | 29, 79                  |
| 6.  | 2025 | Not Available | 29, 79                  |

Population dynamics in Marpoyan Damai (2003–2023) reveal fluctuating trends, with initial growth driven by urbanisation and residential expansion. A decline in 2018 was likely influenced by socio-economic factors, followed by a rebound in 2023 alongside commercial sector growth. The emergence of mixed-use areas reflects community adaptation to ongoing spatial changes.

**c. Society** In Marpoyan Damai District, society functions both as a **user of space and as** a driver of spatial change. Between 2003 and 2025, the expansion of commercial zones has triggered social shifts, leading to more complex resident interactions and changes in settlement patterns. These dynamics have significantly influenced the district's overall urban spatial structure.

**Table 3:** The Impact of Commercial Activity on Residential Change and Social Interaction

| Patterns in Marpoyan Damai District, 2003–2025. Source, Analysis Results, 2025. |                                                      |                                                    |                                                                                   |
|---------------------------------------------------------------------------------|------------------------------------------------------|----------------------------------------------------|-----------------------------------------------------------------------------------|
| Year                                                                            | Commercial Activities                                | Settlement Characteristics                         | Social Interaction Patterns                                                       |
| 2003                                                                            | Informal local trade                                 | Traditional settlements                            | Strong <u>neighbourly ties</u>                                                    |
| 2008                                                                            | Growth of semi-formal housing                        | semi-formal housing<br>cohesion begins to weaken   | <u>Social</u>                                                                     |
| 2013                                                                            | culinary hubs and modern services                    | Cluster housing becomes dominant                   | Selective interaction in homogeneous groups                                       |
| 2018                                                                            | Dense commercial corridors                           | Mixed elite and dense housing<br>segregation grows | <u>Social</u>                                                                     |
| 2023<br>housing, better infrastructure                                          | Rise of digital MSMEs                                | Denser                                             | Shift toward digital interaction<br>Interaction declines without spatial planning |
| 2025                                                                            | Mixed-use expansion density;<br>on public facilities | , High pressure                                    |                                                                                   |

Over time, commercial expansion in Marpoyan Damai has reshaped both the physical landscape and social dynamics. Without proper spatial planning, the transition to dense mixed-use zones risks weakening community ties and reducing social interaction.

#### d. Buildings

In recent years, Marpoyan Damai District has experienced a notable shift from primarily residential land use to more commercially driven development. This transformation in building forms and functions reflects the rising economic value of land in the area.

- Commercial Buildings

- 1) Shop-Houses (Ruko)

The conversion of residential units into shop-houses (ruko) along secondary and collector roads reflects a growing trend in mixed-use development in Marpoyan Damai. These two- to three-story buildings combine commercial activity on the ground floor with housing above, driven by rising land values and market demand. Residents report that this model supports daily business efficiency by reducing time and transport costs. Overall, it represents both land-use transformation and spatial adaptation to intensified commercial activity, as shown in Figure 3.

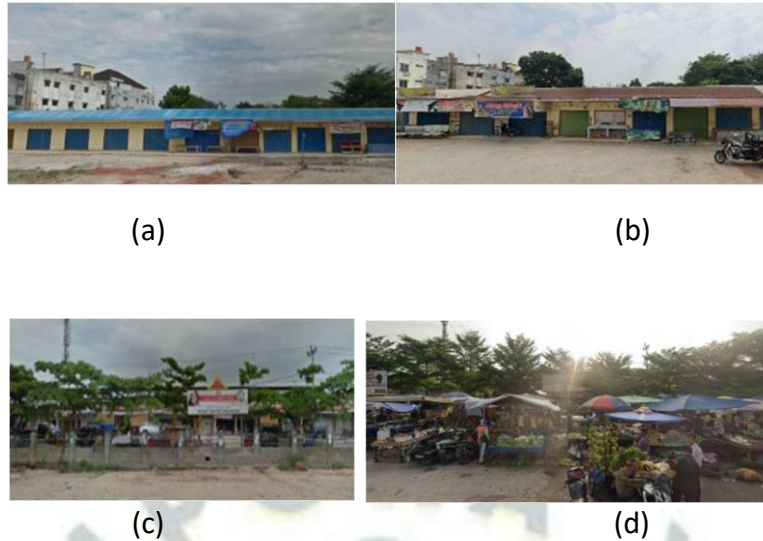


**Figure 2:** (a) Residential building in 2021, (b) Converted into a commercial shophouse by 2025, Image Copyright, Google Maps and Author's Survey, 2025.

- 2) Traditional Markets

Markets in Marpoyan Damai District, particularly Pasar Dupa and Pasar Arengka, function as key commercial and social hubs that shape local spatial structure. Located within residential areas, they drive population concentration and land-use changes, influencing urban form, accessibility, and settlement patterns, as shown in Figure 3.





**Figure 3:** (a) Dupa Market, 2018; (b) Dupa Market, 2025; (c) Arengka Market, 2015; (d) Arengka Market, 2025. Image Copyright, Google Maps and Author's Survey, 2025

Pasar Dupa (established in 1988) and Pasar Arengka (developed in the 1990s) originated from community and private initiatives in Tangkerang Tengah and Sidomulyo Timur, respectively.

- **Residential Buildings**

In the early stages of urban growth, Marpoyan Damai District's residential area was primarily composed of general housing, mainly self-built, single-story units developed outside formal planning regulations. These organic settlements emerged as a community-driven response to housing demand prior to the implementation of structured zoning and land-use policies.

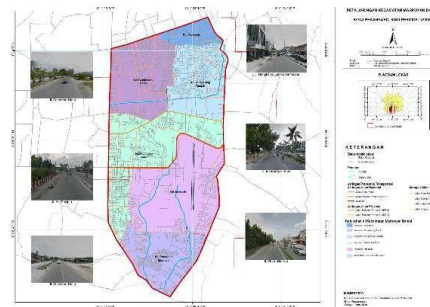


**Figure 4:** (a) Residential house before expansion, 2022; (b) House with added rental units, 2025. Image Copyright, Google Maps and Author's Survey, 2025

**e. Road Network**

From 2003 to 2025, Marpoyan Damai District's road infrastructure expanded by 117.58 km, significantly influencing spatial development. Enhanced connectivity between kelurahan supported residential and commercial growth, improved accessibility, and elevated land

values in previously underdeveloped areas. This expansion positioned the road network as a key driver of urban hierarchy and functional spatial structure.

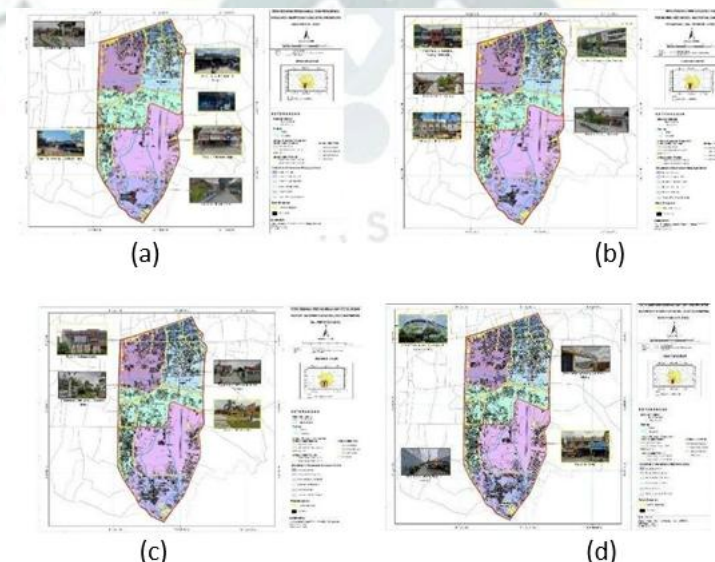


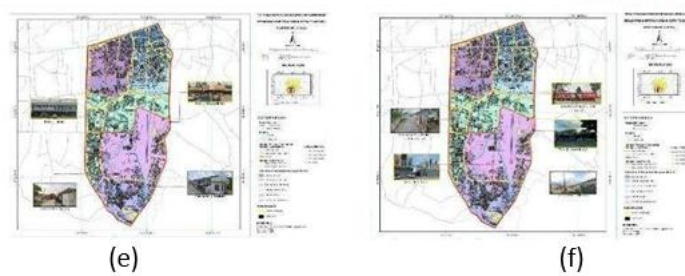
**Figure 5:** Road Network in 2025. Source, Author's Analysis, 2025

Between 2003 and 2025, the road network in Marpoyan Damai expanded from 436.49 km to 555.04 km, covering major, secondary, and collector roads. This expansion greatly improved accessibility, connecting central and peripheral areas and integrating previously disconnected zones into the district's urban fabric.

### **Spatial Distribution Analysis of Commercial and Residential Areas**

From 2003, 2008, 2013, 2018, 2023, and 2025, Marpoyan Damai experienced notable commercial and residential expansion. Time-series GIS analysis reveals clustering of commercial growth along arterial roads and intersections, influenced by accessibility. Meanwhile, residential development expanded both outward from commercial hubs and inward toward key access points, creating a layered urban structure shaped by infrastructure and land value.





**Figure 6:** Settlement and Commercial Area Distribution Map from 2003 to 2025 (a) in 2003, (b) in 2008, (c) in 2013, (d) in 2018, (e) in 2023, and (f) in 2025. Source, Author's Analysis, 2025.

#### a. Development of Commercial Facilities (2003–2025)

From 2003 to 2025, commercial facilities in Marpoyan Damai grew significantly, with retail shops increasing by 1,990 units and shophouses by 1,288, while traditional markets remained at 2, as presented in Table 4.

**Table 4:** Number of Commercial Facilities, 2003–2025. Source, Analysis Results, 2025.

| Year | Categories of Retail and Commercial Infrastructure |                             |                                    |
|------|----------------------------------------------------|-----------------------------|------------------------------------|
|      | Market                                             | Store / Kiosk               | Shop-Houses                        |
| 2003 | 2                                                  | 1.301                       | 1.130                              |
| 2008 | 2                                                  | 1.740                       | 1.427                              |
| 2013 | 2                                                  | 2.185                       | 1.650                              |
| 2018 | 2                                                  | 2.677                       | 1.964                              |
| 2023 | 2                                                  | 3.130                       | 2.280                              |
| 2025 | 2                                                  | 3.291                       | 2.418                              |
| The  | spatial<br>distribution                            | of commercial<br>activities | In Marpoyan Damai, evolved<br>from |

scattered nodes at major intersections (2003–2008) to broader expansion with housing growth (2013–2018), and by 2023–2025, concentrated at strategic road corridors, forming stable mixed-use zones—reflecting land-use reorganisation and urban ecological principles.

#### b. Dynamics of Residential Growth

Residential development in Marpoyan Damai increased steadily by 9,598, driven by population growth, urban expansion, and demand for housing near commercial areas, as presented in Table 5.

**Table 5.** Total Residential Units 2003-2025. Source, Analysis Results, 2025.

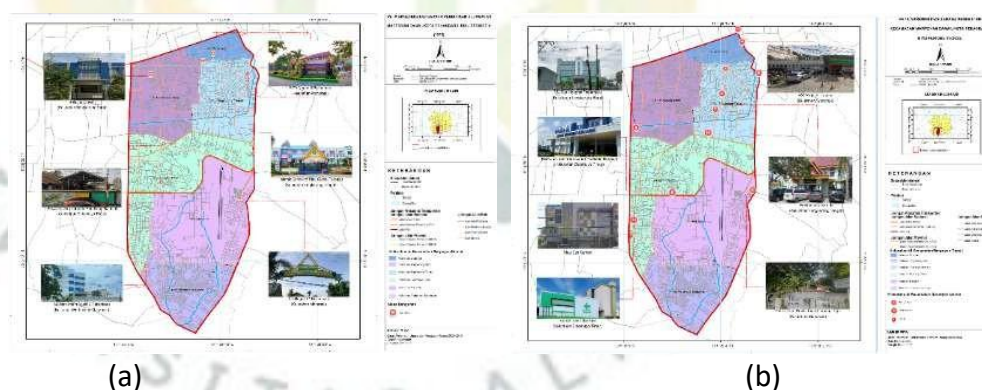


| Year | Total Residential Units |
|------|-------------------------|
| 2003 | 9.736                   |
| 2008 | 12.426                  |
| 2013 | 15.863                  |
| 2018 | 17.714                  |
| 2023 | 18.665                  |
| 2025 | 19.334                  |

From 2003 to 2025, residential development in Marpoyan Damai evolved from linear growth along main roads to infill and clustered expansion into secondary areas. This transition reflects increasing urban pressure and a shift toward a more complex, polycentric urban structure.

### Urban Area Growth Analysis

#### a. Accessibility



**Figure 7: (a) Map of Educational Infrastructure in 2025 and (b) Map of Healthcare Infrastructure in 2025.** Source, Analysis Results, 2025

#### ● Educational Infrastructure Development

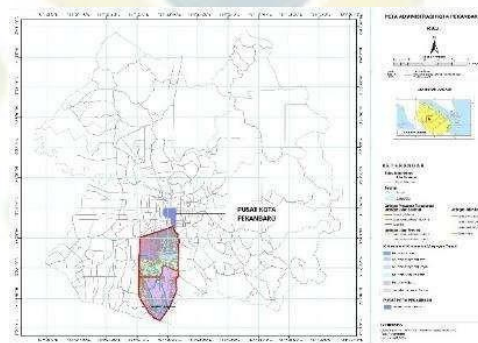
Between 2003 and 2025, Marpoyan Damai experienced a significant increase in educational facilities, driven by population growth and urban expansion. From limited access in 2003, the district expanded to 55 kindergartens, 42 elementary schools, 17 junior high schools, 14 senior high schools, and 2 higher education institutions by 2025. This reflects improved access and spatial equity, supported by infrastructure and digital advancements, as shown in Figure 7(a).

- **Healthcare Infrastructure Development**

Between 2003 and 2025, healthcare infrastructure in Marpoyan Damai expanded notably, reflecting urban growth and better public services. From a limited base in 2003 (5 hospitals, 1 Puskesmas, 10 private practices, 2 polyclinics), the numbers rose by 2025 to 12 hospitals, 6 Puskesmas, 57 private practices, and 20 polyclinics. This improvement reflects a more balanced spatial distribution and enhanced access to healthcare, Figure 7 (b).

**b. Proximity to City Centre as a Determinant of Spatial Growth**

Proximity to the city centre and major roads plays a crucial role in shaping residential and commercial development in Marpoyan Damai, consistent with Alonso's Bid Rent Theory. Subdistricts closer to the CBD, like Wonorejo ( $\pm 1.3$  km), rely on local alleys and internal roads, while Tangkerang Tengah ( $\pm 4.6$  km) and Tangkerang Barat ( $\pm 5.3$  km) benefit from arterial access. Sidomulyo Timur ( $\pm 7.1$  km) connects via main road linkages, Perhentian Marpoyan ( $\pm 6.0$  km) through neighbourhood roads, and Maharatu ( $\pm 12.5$  km) via primary infrastructure. These varying levels of accessibility directly influence investment patterns, land value, and urban density.



**Figure 8:** Map of Pekanbaru City Centre and Marpoyan Damai District. Source, Analysis Results, 2025.

Urban growth in Marpoyan Damai is concentrated near the city centre and main roads, where high accessibility and land values support dense commercial and residential development. Peripheral areas expand more slowly, reflecting concentric urban patterns shaped by infrastructure and land-price variations.

**c. Land Price Dynamics**

Between 2003 and 2025, land prices in Marpoyan Damai rose steadily, with the highest increases occurring near major roads and commercial centres. This trend aligns with Alonso's Bid-Rent Theory, which links land value to accessibility and land use intensity. Spatial variations in price growth reflect the role of infrastructure and shifting urban functions, as detailed in Table 7.

**Table 6:** Land Prices in Marpoyan Damai District, 2003–2025 Source, Analysis Results, 2025.

| Year | Price Range on Main Roads (Rp/m <sup>2</sup> ) | Price Range off Main Roads (Rp/m <sup>2</sup> ) | Source and Note                                                |
|------|------------------------------------------------|-------------------------------------------------|----------------------------------------------------------------|
| 2003 | Rp.1.000.000 -Rp. 2.000.000                    | Rp. 300.000-Rp. 400.000                         | Resident Interviews                                            |
| 2008 | Rp.2.000.000 -Rp. 2.500.000                    | Rp. 500.000-Rp. 700.000                         | Resident Interviews                                            |
| 2013 | Rp. 2.500.000-Rp. 3.500.000                    | Rp 600.000- Rp 800.000                          | Resident Interviews and Market Trends                          |
| 2018 | Rp. 4.000.000-Rp. 5.000.000                    | Rp 750.000-Rp 1.200.000                         | Property Advertisements, Market Data, and Resident Interviews. |
| 2023 | Rp 5.000.000- Rp. 6.000.000                    | Rp 800.000 – Rp.1.500.000                       | Based on Property Advertisements and Market Data               |
| 2025 | Rp 6.000.000- Rp. 8.000.000                    | 1.000.000- Rp 2.500.00                          | Interviews with Residents and Housing Developers/Owners        |

From 2003 to 2025, land prices in Marpoyan Damai rose steadily, driven by spatial transformation and economic growth. Initially low due to limited infrastructure, values surged as access to arterial roads improved. Areas near these roads became prime zones for residential and commercial development, while peripheral areas saw slower growth until after 2018, when spillover effects and better connectivity boosted their value.

## CONCLUSIONS

Between 2003 and 2025, commercial expansion in Marpoyan Damai followed a linear pattern along key transportation routes, influencing a shift in residential development from scattered to more concentrated forms. This transformation reflects the dynamics of land-use conversion and population densification, consistent with Doxiadis' spatial hierarchy, Christaller's central place theory, and Alonso's bid-rent model. These patterns highlight how accessibility and commercial activity reshape urban structure, reinforcing the importance of

integrated spatial planning to address land-use pressures and ensure sustainable urban growth.

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