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ANALYSIS OF TRANSPORTATION SYSTEM DEVELOPMENT IN TRANSIT-ORIENTED DEVELOPMENT (TOD) AREA OF RAWA BUNTU, SOUTH TANGERANG

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ABSTRACT

This study examines Transit Oriented Development (TOD) in South Tangerang City, focusing on the Rawa Buntu TOD area. TOD aims to integrate public transportation modes with non-motorized networks, fostering sustainable mobility and reducing dependence on private vehicles. The research highlights the policy framework and infrastructural developments supporting TOD in South Tangerang, such as Regional Regulation No. 9 of 2019 and Mayor Regulation No. 118 of 2022. Employing mixed methods, including surveys, field observations, literature reviews, and spatial analysis, the study assesses the transportation system and infrastructure conditions. Results show that most roads in South Tangerang are in good condition, with significant movement patterns between key districts. Rawa Buntu Station, a strategic transit node, demonstrates robust integration with various transportation modes, serving approximately 11,000 passengers daily. The study concludes that Rawa Buntu TOD area boasts comprehensive transportation infrastructure and efficient services, enhancing urban connectivity and sustainability.

KEYWORDS *Transit Oriented Development (TOD), Sustainable Mobility, Public Transportation Integration*

INTRODUCTION

Transit Oriented Development (TOD) is a concept that aims to create value-added areas around transit nodes, such as train stations or bus stops, with a focus on integration between different modes of public transportation. (Calthorpe, 1993). This concept emphasizes the importance of integration between mass transit

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networks, such as trains, buses, or trams, and non-motorized transport networks, such as pedestrian and bicycle streets. This integration aims to create a welcoming environment for public transportation users, with facilities that support efficient and sustainable mobility. One of the main characteristics of the TOD concept is the integrated development of the area, where various functions such as housing, offices, shopping centers, and other public facilities are combined in one compact area. (Zhang. Y. & Lee. L.H., 2017)..

The TOD concept also encourages efficient land use by minimizing reliance on private vehicles, thereby reducing traffic congestion and air pollution. Strategically located around transit nodes, TOD areas facilitate people's access to public transportation and mobility to different parts of the city more easily and efficiently. Overall, the development of transit-oriented areas is an important step in creating a more sustainable, environmentally friendly, and highly competitive city, by maximizing the benefits of an efficient and integrated public transport system.

The policy for the development of transit-oriented areas in South Tangerang City has been established through (City Government of South Tangerang City, 2012) in South Tangerang City Regional Regulation Number 9 of 2019 concerning Amendments to Regional Regulation Number 15 of 2011 concerning the Regional Spatial Plan of South Tangerang City Year 2011-2031. In Article 11 paragraph (2) letter d, one of the strategies to increase the accessibility of regional and national scale activities that are integrated and hierarchical is carried out through developing TOD areas including the development of areas in and around transit nodes for added value which focuses on integration between mass public transport networks and between mass public transport networks and non-motorized transportation mode networks, as well as reducing the use of motorized vehicles accompanied by the development of mixed and dense areas with moderate to high spatial utilization intensity. In Article 25 paragraph (3) letter d number 1 that the development of TOD areas at stations City-scale TOD areas are located at Rawa Buntu station and Rawa Buntu station. In addition, the development of Transit-Oriented Areas is also regulated through Mayor Regulation Number 118 of 2022 concerning Detailed Spatial Planning of South Tangerang City Planning Area. (City Government of South Tangerang City, 2022). In this regulation, Transit Oriented Areas are regulated through special provisions in article 106.

The development of Transit-Oriented Areas in South Tangerang City is expected to provide economic and social benefits, including reducing congestion. (Dinas Cipta Karya dan Tata Ruang Kota Tangerang Selatan, 2023).. In addition, the implementation of the TOD concept is also expected to realize environmentally friendly urban development through reduced energy consumption, as well as reduced carbon emissions caused by urban mobility.

RESEARCH METHOD

To analyze the development of transportation systems in the Rawa Buntu Transit Oriented Development (TOD) Area, the research method used is a mix method in the form of: 1) Survey and Field Observation**.** Conducting surveys and field observations to understand the movement and mobility patterns of people

around the Rawa Buntu TOD area. This survey may include direct observation of public transportation users, pedestrians, and private vehicle users in the area; 2) Literature Study. Conduct a literature study to gather information on concepts and best practices in developing transportation systems for TOD areas. The literature study can also help in understanding the trends and challenges associated with TOD development in similar locations; 3) Secondary Data Analysis. Collect and analyze secondary data related to the transportation system in Rawa Buntu TOD area, such as public transportation passenger movement data, traffic patterns, and population demographic data around the TOD area; 4) Spatial Analysis. Using spatial analysis techniques to map the movement and mobility patterns in the Rawa Buntu TOD area, as well as to identify potential locations for the development of new transportation infrastructure, such as transit terminals or bicycle lanes.

RESULT AND DISCUSSION

Table 1. Road Condition of South Tangerang City

No.	Road Condition	2019	2020	2021	Percentage
1	Good	376,85	374,36	347,55	90,35%
2	Medium	5,45	5,86	32,99	8,58%
3	Broken	1,25	3,77	2,29	0,60%
4	Severely Damaged	1,14	0,7	1,86	0,48%
Total		384,69	384,69	384,69	100,00%

Source: South Tangerang City in Figures 2023

Table 1 shows that most of the roads in South Tangerang City are of good quality, with a percentage of around 90.35%. Although there are some roads that are in moderate or damaged condition, the percentage is still relatively low. In addition, South Tangerang City has a total of 117 bridges with a total length of 711.27 meters. (BPS Kota Tangerang Selatan, 2023). This information is important to understand the condition of the infrastructure that supports connectivity and mobility in the city. By having detailed data on the condition of road and bridge infrastructure, the local government can plan and allocate resources more effectively for the maintenance, repair, and development of transportation infrastructure in South Tangerang City.

Figure 1. Transportation Network of Rawa Buntu Station TOD Area

Rawa Buntu Station is a class III/small train station located in Rawa Buntu Village, Serpong District, South Tangerang City. The station is included in the Jakarta Operation Area I, and is located adjacent to the planned city complex Bumi Serpong Damai (BSD). The station is not far from the Serpong exit on the western Jakarta-Serpong Toll Road. In addition, the location of this station is quite strategic because it is adjacent to the Serpong area housing complex. The distances of stations in South Tangerang City that become 5 (five) priority stations for the development of TOD areas in the future are as follows.

Distance between Rawa Buntu Station and 4 (four) other stations in South Tangerang City

No.	Description	Distance (Km)	Distance (m)
1	Rawa Buntu - Serpong	1,5	1.529
2	Rawa Buntu - Sudimara	4,5	4.528
3	Rawa Buntu - Jurang Mangu	6,6	6.591
4	Rawa Buntu - Pondok Ranji	8,8	8.767

Source: RTRW Kota Tangerang Selatan Year 2012-2032

In the Rawa Buntu Station TOD Area, there is city transportation that crosses the area including City Transport BO4 with the route Tangerang City - BSD Terminal, and City Transport D16 with the route BSD Terminal - Simpang Muncul. The capacity of public transportation services can reach 11,190 passengers with a total of 115 vehicles with 6 vehicles on the route. The movement matrix in South Tangerang City can be seen in Table 3.

Table 3. Origin-Destination Matrix of Rawa Buntu TOD Area

District	**O/D**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Serpong	1	0	7.999	12.992	11.920	21.148	22.914	4.049
Serpong Utara	2	8.005	0	11.925	10.930	19.435	20.944	3.725
Ciputat	3	12.627	11.857	0	17.540	31.168	33.842	6.004
East Ciputat	4	11.882	10.889	17.574	0	28.566	31.050	5.517
Pamulang	5	20.634	18.950	30.565	27.956	0	54.104	9.566
Pondok Aren	6	22.229	20.304	32.995	30.215	53.791	0	10.342

Setu	7	4.051	3.725	6.039	5.538	9.811	10.668	0

Source: Analysis Results, 2024

Based on this matrix, it can be explained that movement between locations (zones) in Kota Tangerang Selatan shows a certain pattern. In this context, the rows in the table represent origin zones, while the columns represent destination zones. From the matrix analysis, it can be seen that the largest movement originating from Serpong Sub-district goes to Podok Aren. Conversely, the largest movement to Serpong Sub-district originates from Pondok Aren. Thus, it can be concluded that Serpong Sub-district has a significant movement to Podok Aren, while Pondok Aren is an important source of movement to Serpong Sub-district.

Level of Service (LOS) is a method used to evaluate road performance, which is often used as an indicator of congestion. (Tamin, 2000). A road is classified as congested when the LOS calculation is close to 1. To determine LOS, we compare the traffic volume with the basic road capacity (V/C). By doing this calculation, we can classify the level of service on a road section.

Level of Service (LOS) has six levels of service, each of which describes the traffic flow conditions on a road section as shown in Table 4.

Table 4. Level of Service

Service Level	Description
Level A	Free flow
Level B	Stable flow (used for designing intercity roads)
Level C	Steady flow (used for designing urban roads)
Level D	The current starts to become unstable
Level E	Unstable current (intermittent)
Level F	Obstructed flow (stop, queue, traffic jam)

As for the Level of Service (LOS) in the Rawa Buntu TOD area, Serpong Raya road has a level of service F, Puspitek Raya road has a level of service F, Rawa Buntu road has a level of service, Ciater Raya road has a level of service C.

Accessibility to Rawa Buntu Station can be accessed through a variety of available transportation routes, including public transportation, ojek pangkalan, taxis, online transportation, and other options. With a variety of transportation options, it is easier for users to reach their destination more easily and efficiently.

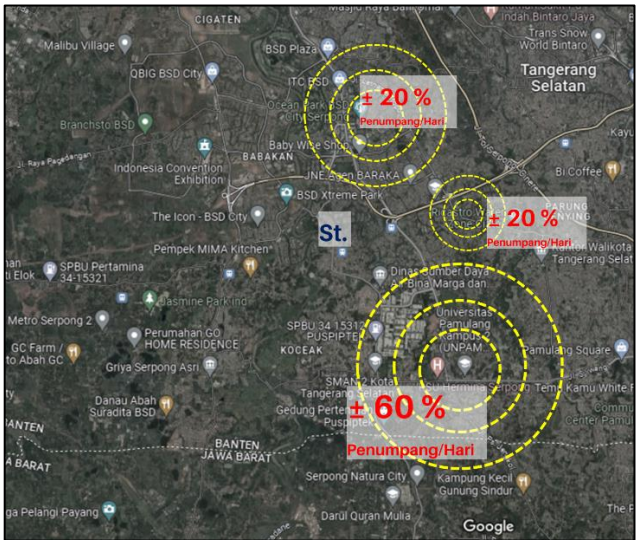

Figure 2. Accessibility of Rawa Buntu TOD Area

Accessibility to Rawa Buntu Station can be reached via several main routes, including Jalan Rawa Buntu, Jalan Tekno Widya, Jalan Raya Serpong, and Jalan Ciater. Rawa Buntu Station has been integrated with the Rawa Buntu bus stop and is served by Angkutan B04 and Trans TA2. Rawa Buntu Station is able to serve around ± 11,000 passengers per day, with the majority of passengers being workers who work in the capital city of Jakarta. (Dinas Cipta Karya dan Tata Ruang Kota Tangerang Selatan, 2023).. Assumption of Public Transportation users 70% = 7700, Private Vehicle users 10% = 1100, Drop On/Online 20% = 2200. With diverse transportation services and large capacity, Rawa Buntu Station is one of the important access points for transportation users in the region.

The transportation network in the Rawa Buntu Station TOD Area consists of several road functions including secondary arterial roads, secondary collector roads, secondary local roads, toll roads and urban railroad networks. The longest road in the 0-800 meter radius Rawa Buntu Station TOD Area based on its function is the Toll road function and the longest road in the 0-800 meter radius Rawa Buntu Station TOD Area is the Pondok Aren-Serpong Freeway. Details can be seen in table 5 below.

Table 5. Road Network of Rawa Buntu TOD Area

Street Name	Road Function	Long
Jl. Cilenggang Raya (ROW 40)	Secondary Arterial Road	1.62
Jl. Raya Rawa Buntu (ROW 40)		1.38
Total		3.00
Jl. Widya Kencana (ROW 12)	Secondary Collector Road	0.55
Total		0.55
St. Rw. Access Road Buntu	Secondary Local Road	0.15
Jl. Cilenggang I		0.33
Jl. Gg. H. Lati		0.02

Jl. HML Abdul Syukur		1.19
Jl. M. Toha		0.40
Jl. Pare		0.52
Jl. PDAM		0.32
Ornamental Wheel Street		0.25
Jl. St. Rw. Buntu		0.08
Carrot Street I		0.16
Total		3.43
Pondok Aren-Serpong Expressway	Toll Road	3.37
Serpong-Balaraja Expressway		1.13
Total		4.50
Pondok Cabe - Rawa Buntu Trase	Urban Railway Network	0.72
Serpong - Soekarno Hatta Airport Trace		0.79
Tanah Abang - Serpong - Parung Panjang - Cikoya Trase		1.61
Total		3.12

Source: Analysis Results, 2024

Figure 3. Road Network of Rawa Buntu TOD Area

The Rawa Buntu Station TOD area with a radius of 0-800 meters covering an area of 83.30 Ha has been integrated with several train stations and type C terminals, including the Small Passenger Station of Pondok Cabe - Rawa Buntu Urban Railway Trase, Large Passenger Station of Rawa Buntu Station, Small Passenger Station of Pondok Cabe-Rawa Buntu Urban Railway Trase and Type C Terminal of Rawa Buntu Station.

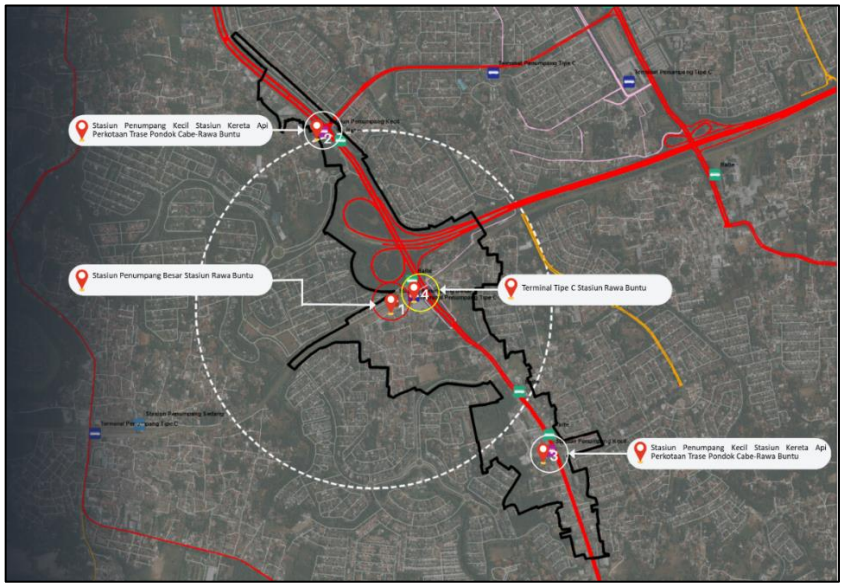

Figure 4. Intermodal Integration of Rawa Buntu TOD Area

As for the travel distance from Rawa Buntu Station to the stations and terminals described above, it can be described as follows: 1) Large Passenger Station of Urban Railway Station of Pondok Cabe - Rawa Buntu Trajectory can be reached for 5 minutes by car, 4 minutes by motorcycle, 16 minutes by bus and 12 minutes on foot; 2) Large Passenger Station of Pondok Cabe-Rawa Buntu Urban Railway Tract can be reached for 5 minutes by car, 3 minutes by motorcycle, 20 minutes by bus and 12 minutes on foot; 3) Terminal Type C Rawa Buntu Station is very close to Rawa Buntu station so it can be reached only by walking for 2 minutes.

CONCLUSION

The number of Fleet and Capacity by Need is sufficient from the demand for transportation with the assumption of 7700 Passengers, the LOS of the Transport Route is at Level Of Service C-F, and the transport route has not served the generation point as a whole. From the description of the discussion, it can be concluded that:

1. Accessibility to Rawa Buntu Station is very good, as it can be accessed through various transportation routes such as public transportation, motorcycle taxis, taxis, and online transportation.
2. Rawa Buntu Station is well integrated with other transportation infrastructure, including the Rawa Buntu bus stop, B04 shuttle, and Trans TA2.
3. The service capacity of Rawa Buntu Station is quite large, able to serve around ± 11,000 passengers per day, especially workers who work in the capital city of Jakarta.
4. The transportation network in the Rawa Buntu Station TOD Area includes various road functions, such as secondary arterial roads, secondary collector roads, secondary local roads, toll roads, and urban rail networks.

5. The Rawa Buntu Station TOD area has been integrated with several train stations and a type C terminal, strengthening transportation connectivity in the region.
6. Travel distances from Rawa Buntu Station to other stations and terminals vary, but most can be reached in a relatively short time, either by motor vehicle, public transport, or on foot.

Overall, this shows that the Rawa Buntu Station TOD Area has comprehensive transportation infrastructure and efficient services, making it an important access point for transportation users in the region. To create a healthy urban space, it is necessary to expand the road network for safe and convenient pedestrianization.

REFERENCES

BPS Kota Tangerang Selatan. (2021). *Kota Tangerang Selatan Dalam Angka 2021*.

Calthorpe, R. (1993). *The Next American Metropolis: Ecology, Community, and the American Dream*. Princeton Achitect Press.

Dinas Cipta Karya dan Tata Ruang Kota Tangerang Selatan. (2023). *Executive Summary Kawasan TOD Rawa Buntu* (2023rd ed.). Dinas Cipta Karya dan Tata Ruang Kota Tangerang Selatan.

Ouda. (2012). Peraturan Daerah Nomor 09 Tahun 2012. *Peraturan Daerah*, *66*, 37–39.

Pemkot Kota Tangerang Selatan. (2022). *PERATURAN WALI KOTA TANGERANG SELATAN NO.118 TAHUN 2022 TENTANG RENCANA DETAIL TATA RUANG WILAYAH PERENCANAAN KOTA TANGERANG SELATAN TAHUN 2022-2042*.

Tamin, O. Z. (2000). *Perencanaan dan pemodelan transportasi*. Penerbit ITB.

Zhang. Y., & Lee. L.H. (2017). *Smart Traffic Management for Sustainable Urban Mobility: Challenges and OpportunitiesSmart Traffic Management for Sustainable Urban Mobility: Challenges and Opportunities*.