Evaluation of Land Use Area of Rawa Buntu Station TOD Using Matrix 5.A.1. ITDP Standard 3.0 and Minister of Agriculture and Spatial Planning Regulation Number 16/2017

Andi Rachmad Arief Ramdhani¹*, Liong Ju Tjung¹

¹Department of Urban Regional Planning, Tarumanagara University, Jakarta, Indonesia
*Corresponding author. Email: andirachmad12@gmail.com

ABSTRACT
Transit-Oriented Development is a city development that integrates mass transportation modes, in its development is inseparable from the use of surrounding land that puts forward the concept of mixing and high density to form a compact city. Assimilation and high density in the TOD area may not be dominated by certain land uses, therefore criteria and size are needed that serves as a national and international guideline of Transit Oriented Development.

Keywords: Transit Oriented Development, land use, ITDP TOD Standard 3.0, Minister of Agriculture and Spatial Planning Regulation Number 16/2017

1. INTRODUCTION
The development of Jakarta as the National Capital and the Center for Indonesian Business has led to the expansion of urban areas to spread to surrounding cities, such as Bekasi, Depok, Bogor, Tangerang and South Tangerang. This is due to the large number of workers working in Jakarta unable to reach the price of occupancy in Jakarta which is getting higher along with the development of Jakarta. The buffer zone is an alternative housing for workers who work in Jakarta. One of them is South Tangerang City. Because of this, mass transportation is needed that can transport the commuters of the capital. The city of South Tangerang is crossed by KRL Commuter Line with 5 stops, namely Pondok Ranji Station, Jurangmangu Station, Sudimar Station, Rawa Buntu Station, and Serpong Station. The number of KRL Commuter Line users in Serpong line reached 35.1 million in 2016 [1]. One station that has a high trip generation is Rawa Buntu Station, the number of KRL users from Rawa Buntu Station in 2016 reached 16,000 people / day [2]. Rawa Buntu Station has its own potential for South Tangerang City, because according to the plan, Rawa Buntu Station will be a two-rail intermodal transfer point, namely the KRL Commuter Line and the Jakarta MRT [2].

Currently Rawa Buntu Station is being built Transit Oriented Development, which is developed on land owned by Rawa Buntu Station. The Development of Transit Oriented Development is also supported by the South Tangerang City Spatial Plan (RTRW) which makes the Rawa Buntu Station a Transit Oriented Development Area (TOD) with a city scale of 800m in accordance with the South Tangerang City Spatial Plan (RTRW).

The development that is being built by carrying the concept of Transit Oriented Development is marked by the existence of vertical dwellings and commercial areas which are right next to the Rawa Buntu Station. With the existence of these two land functions in the Rawa Buntu Station, it can be said that the Rawa Buntu Station currently carries Transit Oriented Development.

With the construction of Transit Oriented Development (TOD), there are several criteria and measurements that must be met. Criteria and measures regarding Transit Oriented Development (TOD) that are used universally are the TOD Standard published by the Institute for Transportation and Development Policy (ITDP) while the criteria and size applicable in Indonesia refer to the Minister of Agriculture and Spatial Planning Regulation Number 16/2017 Concerning Guidelines Development of Transit Oriented Areas.

1.1 Related Work
Based on the scale of the rules, it can be divided into 2 types.

1.1.1 Matrix 5.A.1. ITDP Standard 3.0
Matrix 5.A.1 ITDP Standard 3.0 governs the use of complementary land. In this rule there are 2 types of mixed land categories. Internally complementary, that is, the use of mixed land areas of the faith and non-settlements forms a complementary mix within the
construction and contextual complementary areas, which is part of the dominant project floor area dedicated to complementary use for the dominant use around the station service area. A building is said to be complementary internally if the use of settlements to use no less than 15% and not more than 85% of the total floor area woke up, while construction is said to be complementary contextually if more than half of the total area dedicated to which offset the category of use is dominant in the station or Development service area is complementary internally and located in the station area with the use of balanced settlements between 40% and 60% [3]. Following are the criteria, size, and points of the matrix 5.A.1 ITDP Standard 3.0.

Table 1 Criteria, Scale, and Points of Matrix 5.A.1 ITDP TOD Standard 3.0

| Criteria | Scale | Points |
|----------|-------|--------|
| The dominant land use categories in station service areas include: | 50% to 60% the total of floor area | 8 |
| | 51% to 70% the total of floor area | 6 |
| | 71% to 80% the total of floor area | 4 |
| | More than 80% the total of floor area | 0 |

1.2 Minister of Agriculture and Spatial Planning Regulation Number 16/2017
In the Minister of Agriculture and Spatial Planning Regulation Number 16/2017 there are rules that govern related to the proportion of land use, namely the proportion of residential and non-residential land use. Each TOD service scale has a different proportion of area. For TOD with city service scale, the proportion of area of residential land use is 20% - 60% while non-residential land use is 40% - 80% [4].

1.3 Our Contribution
This paper will present the percentage of land use area and floor area of land use in Rawa Buntu Station TOD by comparing it with the rules based on ITDP TOD Standard 3.0 and Minister of Agriculture and Spatial Planning Regulation Number 16/2017.

1.3 Paper Structure
This paper consists of three parts, in the first part it will discuss the area of land use and land use floor at Rawa Buntu Station TOD according to the South Tangerang City Spatial Plan (RTRW) 2011-2031 the second compares the percentage of land use area at Rawa Buntu Station TOD based on ITDP TOD Standard 3.0 and Minister of Agriculture and Spatial Planning Regulation Number 16/2017. At the end of the paper conclusions and recommendations will be given from the results of the comparison.

2. BACKGROUND

2.1 Land use in Rawa Buntu Station TOD
In calculating the area of land use in Rawa Buntu Station TOD the tool used is GIS to calculate the spatial area and Spatial Zoning Plan of South Tangerang City 2011-2031 as a guide for urban planning. The following is a map of land use, building coverage ratio, and floor area ratio of Rawa Buntu Station TOD based on South Tangerang City Spatial Plan (RTRW).

Figure 1 Map of Land Use Plan of Rawa Buntu Station TOD
Source: Mapping data by Regional Development Planning Agency of South Tangerang Municipality

Figure 2 Map of Building coverage ratio plan of Rawa Buntu Station TOD
Source: Mapping data by Regional Development Planning Agency of South Tangerang Municipality
Based on the map that has been made, it can be seen the extent of each land use. The following is the area of land use in Rawa Buntu Station TOD based on Spatial Zoning Plan of South Tangerang City.

**Figure 3 Map of floor Area Ratio of Rawa Buntu Station TOD**
Source: Mapping data by Regional Development Planning Agency of South Tangerang Municipality

**Table 2 Calculation of Land Use and Floor Area in Rawa Buntu Station TOD**

| Land Use Plan       | Land Use Area (m²) | Building Floor Ratio (Max) | Building Coverage Ratio (Max) | Floor Area (m²) | Percentage of Total Land Use Area | Percentage of Total Floor Area |
|---------------------|--------------------|-----------------------------|------------------------------|-----------------|-----------------------------------|-------------------------------|
| Lake                | 4912.23            | 0                           | 0                            | 0               | 0.31%                             | 0.00%                         |
| Cemetery Area       | 4693.35            | 0.2                         | 25%                          | 234.6675        | 0.30%                             | 0.01%                         |
| Educational Area    | 43562.71           | 4.8                         | 60%                          | 125460.6        | 2.76%                             | 3.72%                         |
| Commercial Area     | 374137.08          | 9.6                         | 70%                          | 2514201.2       | 23.73%                            | 74.62%                        |
| Residential Area    | 920279.42          | 1.2                         | 60%                          | 662601.18       | 58.37%                            | 19.67%                        |
| Vertical Residential Area | 33560.24 | 3                           | 60%                          | 60408.432       | 2.13%                             | 1.79%                         |
| Field Area          | 9975.98            | 1.2                         | 25%                          | 2992.794        | 0.63%                             | 0.09%                         |
| Road Green Space Area | 37053.04 | 0                           | 2.50%                        | 0               | 2.35%                             | 0.00%                         |
| Park                | 148394.76          | 0.15                        | 15%                          | 3338.8821       | 9.41%                             | 0.10%                         |
| Total               | 1576568.81         |                             |                              | 3369237.7       | 100.00%                           | 100.00%                       |

Source: QGIS Calculation

Based on these calculations, it can be seen that the dominant land use is commercial area with building floor area reaching 74.62% while the percentage of residential and non-residential use is 60.50% for residential and 39.50% for non-residential.

**2.2. Comparison of Floor Area of Land Use with ITDP TOD Standard**

Based on the calculations explained in the previous section, it can be seen that the dominant land use is commercial area with a percentage of 74.62%. If referring to Matrix 5.A.1. ITDP Standard 3.0, the points gained are 4 points.

**2.3. Comparison of Area of Land Use with Minister of Agriculture and Spatial Planning Regulation Number 16/2017**

Based on the calculations explained in the first section, it can be seen that the percentage of residential and non-residential areas is 60.50%; 39.50%. If referring to the Minister of Agriculture and Spatial Planning Regulation Number 16/2017, the Rawa Buntu Station TOD does not follow the TOD standard, the scale of the city service, but not too significant.
3. CONCLUSION

Based on the calculations explained in the first section, it can be seen that the percentage of residential and non-residential areas is 60.50%: 39.50%. If referring to the Minister of Agriculture and Spatial Planning Regulation Number 16/2017, the Rawa Buntu Station TOD does not follow the TOD standard, the scale of the city service, but not too significant.

Table 3 Simulation of Floor Area Using 5 for Maximum Building Floor Ratio

| Land Use Plan     | Land Use Area (m²) | Building Floor Ratio (Max) | Building Coverage Ratio (Max) | Floor Area (m²) | Percentage of Total Land Use Area | Percentage of Total Floor Area |
|-------------------|--------------------|----------------------------|-----------------------------|----------------|----------------------------------|--------------------------------|
| Lake              | 4912.23            | 0                          | 0                           | 0              | 0.31%                            | 0.00%                          |
| Cemetery Area     | 4693.35            | 0.2                        | 25%                         | 234.6          | 0.30%                            | 0.01%                          |
| Educational Area  | 43562.71           | 4.8                        | 60%                         | 125460.6       | 2.76%                            | 5.80%                          |
| Commercial Area   | 374137.08          | 5                          | 70%                         | 1309479.8      | 23.73%                           | 60.50%                         |
| Residential Area  | 920279.42          | 1.2                        | 60%                         | 662601.18      | 58.37%                           | 30.61%                         |
| Vertical Residential Area | 33560.24 | 3                          | 60%                         | 60408.43       | 2.13%                            | 2.79%                          |
| Field Area        | 9975.98            | 1.2                        | 25%                         | 2992.79        | 0.63%                            | 0.14%                          |
| Road Green Space Area | 37053.04 | 0                          | 2.50%                       | 0              | 2.35%                            | 0.00%                          |
| Park              | 148394.76          | 0.15                       | 15%                         | 3338.88        | 9.41%                            | 0.15%                          |
| Total             | 1576568.81         |                            |                             | 2164516.3      | 100.00%                          | 100.00%                        |

Source: QGIS Calculation

Based on these calculations it can be seen that the dominant land use floor area is 60.50% so in Matrix 5.A.1. ITDP Standard 3.0 points will increase to 6 points.

REFERENCES

[1] B. P. Stastistik, “Jalur Bogor Doinasi Penumpang Kereta Commuter Jabodetabek,” 2 Desember 2017. [Online]. Available: https://databoks.katadata.co.id/datapublish/2017/12/02/jalur-bogor-dominasi-penumpang-kereta-commuter-jabodetabek.

[2] E. Simorangkir, “Jalur MRT Mau Diperpanjang Sampai Tangsel, Ini Rutena,” 27 Oktober 2018.

[3] I. f. T. a. D. Policy, TOD Standard 3.0, New York: Institute for Transportation and Development Policy, 2017.

[4] M. A. T. R. P. Nasional, Peraturan Menteri Agraria Tata Ruang/Badan Pertanahan Nasional Nomor 16 Tahun 2017 Tentang Pedoman Pengembangan Kawasan Berorientasi Transit, Jakarta: Kementerian Agraria Tata Ruang/Badan Pertanahan Nasional, 2017.