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**Zakaria Hossain**

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# Structure, Engineering and Environment

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## MEASURING TOD READINESS OF THE BANDAR LAMPUNG CITY

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### ABSTRACT

Referring to the Bandar Lampung City Regulation Act No. 10/2011 concerning Regional Spatial Planning (2011-2030) emphasized that city government will develop an integrated activity center area at the mass public transportation node through the concept of Transit Oriented Development (TOD) in Bandar Lampung City. In article 20 explained more details of TOD location will be built and developed in the area of the transit station Tanjung Karang. In preparing the development of the TOD area in the primary center, city government will prepare the integration of bus services that implicates also on the provision of facilities for pedestrian. The steps undertaken by city government are based on Ministerial Regulation Act of ATR/BPN No. 16/2017 concerning Guidelines for Development of Transit-Oriented -Development which generally regulates the procedures for developing transit-oriented areas based on specific criteria and characteristics. This paper explores the readiness of the Tanjung Karang transit station as a TOD area using Calthorpe scheme, Indonesian guidelines and ITDP standard. Measurement results indicate, the Tanjung Karang station not yet functioning as TOD. The main variables i.e. walk, cycle, connect, transit, mix, densify, compact, and shift has been stated in the city Act, but there is no implication in the field within surrounding area after almost ten years planned.

*Keywords: TOD, Readiness, Procedure, Implication, Tanjung Karang*

### INTRODUCTION

Currently, the Indonesian Government has begun to implement more innovative strategies in addressing rapid motorization issues in major cities such as expressed by capital Jakarta by integrating land development along MRT line. One of the innovations applied is the Transit Oriented Development (TOD) concept as a transit-based development strategy. Transit Oriented Development is at the very heart and soul of sustainability, and brings together compact, walkable communities with high quality rail systems. This creates low carbon lifestyles by enabling people to live, work, and play without depending on a car for mobility. This type of lifestyle can reduce energy consumption and driving by up to 85% [1]. Based on long experiences in developed cities of developed countries, there are a number of factors driving the trend toward TOD. They are rapidly growing, mind-numbing traffic congestion nation -wide, growing distaste for suburbia and fry-pit strip development, growing desire for quality urban lifestyle, growing desire for more walkable lifestyles away from traffic, changes in family structures: more singles, empty-nesters, growing national support for smart growth, respectively. TOD means integrated urban places designed to bring people, activities, buildings, and public space together, with easy walking and cycling connection between them and near-excellent transit service to the rest of the city. It means inclusive access for all to local and citywide opportunities and resources by the most efficient and healthful

combination of mobility modes, at the lowest financial and environmental cost, and with the highest resilience to disruptive events. Inclusive TOD is a necessary foundation for long-term sustainability, equity, shared prosperity, and civil peace in cities [2]. The Bandar Lampung city itself embarked on an implementation step towards a transit-oriented city through City Act's No. 10/2011 enacted Regional Spatial Planning for period of 2011-2030 [3]. In article 20 mentioned more detail that the area of TOD will be built and developed in Tanjung Karang station and surrounding areas. This paper explores the extent of TOD's achievement of readiness, after a ten-year planning process since being declared by the city government. This kind of step needs to be conducted due to understanding the degree to which transit corridors and station areas are potential places for TOD helps public agencies implement TOD. To date, the Metropolitan Council does not have a system for evaluating the potential for TOD along transit corridors and within station areas. Instead, TOD evaluation is typically performed on a project-by-project basis without considering the existing corridor and station area [4].

### METHODOLOGY

Bandar Lampung is the capital and largest city of the Indonesian province of Lampung. Located on the southern tip of Sumatra, Bandar Lampung was originally called Tanjungkarang–Telukbetung, since it was a unification of two major settlements in Lampung, before being renamed in 1983. Bandar

Lampung or Tanjung Karang has become the third-densest city in Sumatera, after Medan and Palembang. The city's area is about 169.21 km<sup>2</sup>, with an estimated population of 1,015,910 as of 2017. Hence, the average density is 5,151 people/km<sup>2</sup>; the densest area is located in the Tanjung Karang Timur district with density of about 24,549 people/km<sup>2</sup>, while the Sukabumi district has density of 1,235 people/km<sup>2</sup>. According to these figures, the Tanjung Karang Timur district is near five times denser than the city average density and almost twenty times higher compared to the lowest figure. Tanjung Karang station itself is the terminus of the railway service from Palembang, Baturaja, Blambangan Umpu and Kotabumi although the railway track continues all the way until Panjang harbor and Tarahan coal offloading point at the southern end of the city. The research scope includes a transit station with a radius of 1 km as shown in Figure 1. Primary data collection through field observation and interview with a number stakeholder include railway operator, city bus operator, city officers, and land developers. Each country may have different ways in terms of TOD standard and how elements or attributes are set and measured. In Indonesia, the

steps undertaken by city government are based on Ministerial Regulation Act of ATR/BPN No. 16/2017 concerning Guidelines for Development of Transit-Oriented-Development which generally regulates the procedures for developing transit-oriented areas based on specific criteria and characteristics [5]. According to Calthorpe [6], the concept of TOD is simple: moderate and high-density housing, along with complementary public uses, jobs, retail and services, are concentrated in mixed-use developments at strategic points along the regional transit system. In summary, the principles of TOD are to:

- Organize growth on a regional level to be compact and transit-supportive;
- Place commercial, housing, jobs, parks, and civic uses within walking distance of transit stops;
- Create pedestrian-friendly street networks which directly connect local destinations;
- Provide a mix of housing types, densities, and costs;
- Preserve sensitive habitat, riparian zones, and high quality open spaces;
- Make public spaces the focus of building orientation and neighborhood activity; and
- Encourage infill and redevelopment along transit corridors within existing neighborhoods

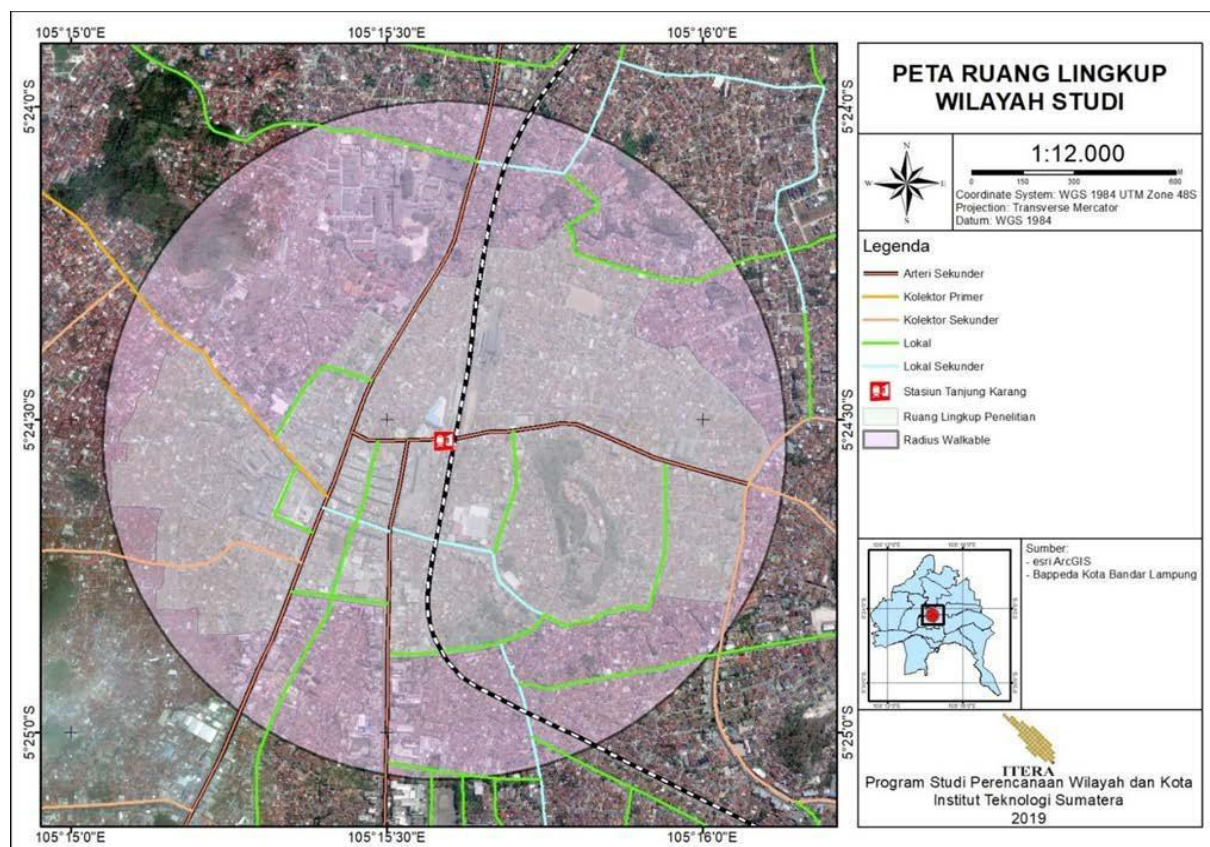


Fig. 1. Transit station and surrounding areas

Several years later after the Calthorpe's concept, the Institute for Transportation and Development Policy (ITDP) developed TOD standard regarding Principles of Urban Development for Transport in Urban Life, and identifies the key concrete objectives

that are essential to implementing these principles in urban development. Hence, the TOD standard is a unique assessment tool available to score the plans and products of urban development according to their adherence to the TOD principles and implementation

objectives [7]. Furthermore, we perform syntheses and simplification of variables and indicators and

combined into the tool for measuring TOD readiness as shown in Table 1.

Table 1 TOD-forming variables

Source	Element	Variable	Indicator
Calthorp e (1993)	function	compact and transit-supportive	planning policy
		surrounding area within walking distance of transit stops	function performs
		street networks directly connect local destinations	function performs
		mix of housing types	type of housing
		high quality open spaces	function performs
		public spaces the focus of building orientation and neighborhood activity	planning policy
		infill and redevelopment along transit corridors within existing neighborhoods	planning policy
Regulation Act of ATR/BP N No. 16/2017	location	transit	transit stop
			intramode and intermode
			transit services
		disaster	vulnerability and disaster mitigation
		directions in development	compliance with spatial development
ITDP (2017)	physical environment	walk	interference to state-owned vital installations
			walkways (3 points)
			crosswalks (3 points)
			visually active frontage (6 points)
			physically permeable frontage (2 points)
		cycle	shade & shelter (1 point)
			cycle network (2 points)
			cycle parking at transit stations (1 point)
			cycle parking at buildings (1 point)
			cycle access in buildings (1 point)
		connect	small blocks (8 points)
			prioritized connectivity (2 points)
			walk distance to transit
		transit mix	complementary uses (8 points)
			access to local services (3 points)
			access to parks and playgrounds (1)
			affordable housing (8 points)
			housing preservation (3 points)
		densify	business services preservation (2 points)
			non-residential density (7 points)
			residential density (8 points)
		compact	urban site (8 points)
			transit options (2 points)
		shift	off-street parking (8 points)
			driveway density (1points)
			roadway area (6 points)

## RESULT AND DISCUSSION

### Functions of the Surrounding Area

The function of the TOD in terms of compact and transit-supportive has been stated in the City Act document, but has not yet seen the implementation plan in the surrounding areas including the redevelopment plan of the pedestrian path to the

transit station. Though, for station areas, strategies to promote TOD could therefore focus on increasing density and improving walkability to match their already high mix. The characteristics of station areas suggest a different set of strategies. Their urban density is relatively high, but their transportation supply is relatively low, suggesting that improving the transit dimension is a more logical strategy to promote TOD there [8]. Based on field identification,



Tanjung Karang station categorized as urban TOD model, since the high-intensity commercial functions already exist around the area. This type of development includes the redevelopment site where buildings around the relatively are old and supporting facilities require a massive revitalization. In different cases, the condition of Tanjung Karang also experienced other areas relatively developed by City Region Arnhem and Nijmegen, where urban development has high TOD levels, but has poor transit connections/the TOD levels are high but train connections are further away than 800 m [9]. The street networks directly connect local destinations is not yet available in terms of length and its quality as shown in Fig. 2. Referring to case study in Brisbane, Australia, in comparison to people living in areas classified as residential TODs, people who reside in

non-TOD clusters were significantly less likely to use public transport (PT) (1.4 times), and active transport (4 times) compared to the car. People living in areas classified as potential TODs were 1.3 times less likely to use PT, and 2.5 times less likely to use active transport compared to using the car. Only a little difference in mode choice behaviour was evident between people living in areas classified as residential TODs and activity centre TODs [10]. The Brisbane experience also takes place in Washington, D.C. and Baltimore metropolitan areas: results indicate that people living in TOD areas tend to drive less, reducing their VMT by around 38% in Washington, D.C. and 21% in Baltimore, compared to the residents of the non-TOD areas even with similar land use patterns [11].

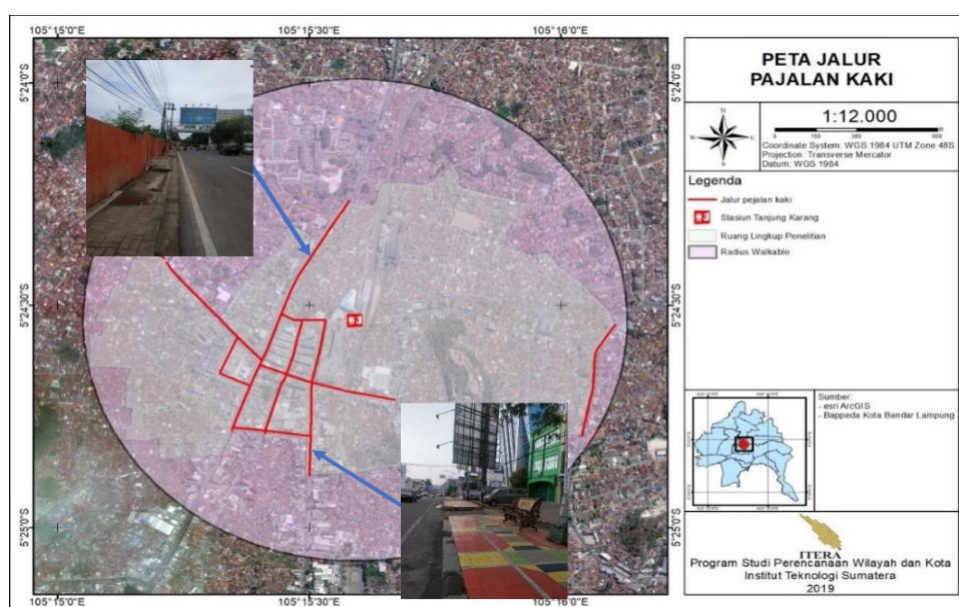


Fig. 2 Pathway network

Related to the existence of mix of housing types in the study area has not been seen and not yet available a high quality open spaces around the station. According to available documents and interview with city officials the redevelopment along transit corridors within existing neighborhoods does not include a priority plan for the next few years. Referring to Carlton and Fleissig [12], because TOD planning is so often formulaic and based on templates, land use plans may describe visions that do not match market conditions. Unsophisticated landowners may hold onto land in spite of reasonable purchase offers because they expect impending development will increase their value.

Then, unrealistic prices can lead to frozen land markets, an inability to accumulate lots necessary for development, and stalled TOD investment. On the other hand, delaying longer implementations can result in higher land prices, such as other city experiences where TOD projects tend to cause an increase in land value leading to gentrification and

displacement. As a result, prioritizing social equity as a key component of TOD implementation is an essential pathway for achieving equitable solutions to such projects [13]. Table 2 shows the readiness level of Tanjung Karang station referring to Calthorpe scheme.

Table 2 Readiness level (Calthorpe)

Variable & Indicator	Readiness level	
	yes	no
1. transit-supportive		x
2. walking distance to transit stops		x
3. street connect destinations		x
4. mix housing		x
5. high quality open space		x
6. building orientation		x
7. redevelopment along transit corridor		x

## TOD Location

As stated by Ministerial Regulation Act of ATR/BPN No. 16/2017, the location or surrounding area of TOD required satisfy the criteria and meet the requirements. They are transit, disaster, direction in development, and secure, respectively. Transit variable means that the Tanjung Karang has been designated as a transit station in the city Act document even though it is not fully ready to run its functions due to various supporting facilities as a transit station is very limited after ten years of initial planning. In the opinion of related stakeholders, the station is relatively safe against possible disaster and secure against criminality. As mentioned previously the Tanjung Karang station has been designated as a transit-oriented development area in the city Act document. This means that land developers and railway operators must follow the instructions in the document when developing projects around the station. Referring to experiences in other cities, centralizing housing and jobs along transitway corridors is the best strategy to follow if increasing regional accessibility is the goal. Particularly a strategy that focuses on targeted jobs centralization along transitway corridors would have significant payoffs. With a joint population and jobs centralization along transitway corridors, increases in accessibility as large as 7% are possible; by focusing on jobs centralization alone gains of 4.5% can be achieved [14]. Since those variables the readiness of TOD are widespread application, the end result is as seen in Table 3.

Table 3 Readiness level related location

Variable & Indicator	Readiness level	
	yes	no
1. transit		
a. Transit stop	√	
b. intramode and intermode		x
c. transit services		x
2. disaster	√	
3. directions in development	√	
4. secure	√	

## Physical Environment

The ITDP method relatively easier to implement since most of variables can be measured and observed in the TOD region although the final value set is not fully objective depend on the observation of someone which can differ from others for the same variable. Table 4 shows the results of the TOD assessment readiness referring to the ITDP method that emphasizes the physical environment element.

Table 4 Readiness level of TOD (ITDP)

Variable	Indicator	Score	Max Score	Readiness Level	
				yes	no

1. Walk	a. walkways	0	3	x
	b. crosswalks	0	3	x
	c. visually active frontage	2	6	x
	d. physically permeable frontage	0	2	x
	e. shade & shelter	0	1	x
2. Cycle	a. cycle network	0	2	x
	b. cycle parking at transit stations	0	1	x
	c. cycle parking at buildings	0	1	x
	d. cycle access in buildings	0	1	x
3. Connect	a. small blocks	0	10	x
	b. prioritized connectivity	1	5	x
4. Transit to transit	a. walk distance			
5. Mix	a. complementary uses	3	8	x
	b. access to local services	1	3	x
	c. access to parks & playgrounds	0	1	x
	d. affordable housing	1	8	x
	e. housing preservation	0	3	x
	f. business services preservation	0	2	x
6. Density	a. non-residential density	3	7	x
	b. residential density	2	8	x
7. Compact	a. urban site	1	8	x
	b. transit options	1	2	x
8. Shift	a. off-street parking	2	8	x
	b. driveway density	1	1	√
	c. roadway area	3	6	x
Total		21	100	

As seen in table 4, there are no variables in the study area that meet the requirements if TOD readiness measured based on the ITDP scheme. The city bus services are already available since a few years ago and pass the transit station, but service quality of the bus is not reliable and without timetable. Ideally, as Pavneet stated, comprehensive planning funded through the program must examine ways to improve economic development and ridership, foster multimodal connectivity and accessibility, improve transit access for pedestrian and bicycle traffic, engage the private sector, identify infrastructure needs, and enable mixed-use development near transit stations [15]. Moreover, as the project was launched as a bicycle lane, cyclists were expecting permanent infrastructure in the city center, while the purpose of the project was leisure rather than transport. City officials tend to use the apparent a-political technical solutions in order to gain legitimacy, placate social demands and minimize political debates, as experienced by Curitiba [16].

## CONCLUSION

This paper explores a number of variable in order to measure the TOD readiness of Tanjung Karang transit station using Calthorpe method, Indonesian guidelines and ITDP scheme. As the result of measurements vary, although the conclusion is the same: Tanjung Karang Transit station not yet functioning as TOD based on ITDP standard as measurement tool commonly used in many countries. The main variables i.e. walk, cycle, connect, transit, mix, densify, compact, and shift has been stated in the city Act, but there is no implication in the field within surrounding area after almost ten years planned. Issues related to land -use and transport integration are one of critical issues due to rapid motorization and as suggested by Papa and Bertolini [17], strengthening the relationship between the railway network and land uses is an effective measure for increasing cumulative rail-based accessibility; improving railway network connectivity is also important, but just increasing densities is not. A key role is played by the correlation between railway system connectivity values and land use densities, what we term the TOD degree of the urban structure. Planners wishing to enhance the cumulative rail-based accessibility of an urban area should primarily focus on transport and land use interventions that improve this correlation. The condition of Tanjung Karang station was experienced by Beijing several years ago, related to policy at a higher level of government which several aspects of urban planning and development policies in Beijing still prevent TOD from reaching a higher potential. First, station orientation cannot be detected among land parcels leased before station construction, partially because developers tend to avoid the risk associated with station location change. In addition, station impacts are not significant in the new suburbs, partially because of the municipal government's under-investment in transit and social services in suburbs. Furthermore, the Beijing city government does not have an explicit policy statement to encourage higher density around transit stations [18].

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