

## THE POTENTIAL OF *TRANSIT ORIENTED DEVELOPMENT* CONCEPT IN REGIONAL CENTER: CASE STUDY IN MALIOBORO DISTRICT, YOGYAKARTA SPECIAL REGION, INDONESIA

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### ABSTRACT

Transit Oriented Development is a concept to reduce inter-regional mobility of the population by integrating and creating closer transportation system between regions, residential areas and centers of community activities to create an efficient area. Malioboro is one of the regional centers that plays an important role and influences the economic cycle, which acts as a supporter and activator of economic needs as well as the equitable development that has an impact on facilities and infrastructures to support life. To create a new region with Transit Oriented Development concepts is not only about the location adjacent to the transit area but also about analyzing the potentials in the area of economic and cultural activity centers, local-serving areas, and high-building density of the area. Therefore, this research discussed some potential of transit oriented development concepts in Malioboro as one of Yogyakarta's regional centers. Such results would indicate whether the area meets the criteria, indeed with various adjustments in response to Tugu Station located in Malioboro area as an orientation center for the other aspects, including regional center spatial uses, transit all modes, and regional center high density.

*Keywords:* High Density; Potential; Tugu Station; Transit Oriented Development

### 1. INTRODUCTION

The population of Yogyakarta in 2011 was about 189,375 males and 201,178 females with a total of 390,553 people, which then increased in 2012 as many as 394,012 people with 191,445 males and 202,567 females. In 2013, the total number of people reached 402,709 with 195,704 males and 207,005 females (Peraturan Walikota, 2014). The population growth in Yogyakarta has showed that the development of the region can no longer be avoided resulting in increased economic, social, and government activities that have an impact on facilities and infrastructures to support life.

On the other hand, transportation is one of the facilities that play an important role and influence the economic cycle, which act as a supporter and an activator for economic needs as well as the equitable development. The transport system is divided into three types namely land, water, and air. In this case, the intensity of land transport uses is the highest since most of the human activities are conducted on the ground.

Malioboro has a complete transportation means and proper accessibility, such as trains, buses, private vehicles, motorcycles, *becak*, and *andong* that increase the

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uniqueness of Malioboro. However, the various kinds of transport that enter Malioboro have caused new problems, such as traffic congestions, especially on special events.

The number of transportation modes in Yogyakarta reportedly increased by 1,618,457 units in 2011, 1,749,738 units in 2012, and 1,908,058 units in 2013 as an impact of economic growth. Transportation trend will otherwise continue every year and might bring many problems, such as environmental pollution and congestions. Population growth in urban areas is sometimes not in line with the development of urban infrastructures. The number of motor vehicles in D.I Yogyakarta in 2013 reached 1,908,058 units (rising 9.05% from 2012) consisting of 8.91% passenger cars, 2.78% freight cars, 0.58% buses, and 87.73% motorcycles (BPS Provinsi D.I Yogyakarta, 2014).

One of the places in Yogyakarta required by the society for traveling is the train station, and in the category of public transportation, airplanes and trains are the belle of transportation to enter or exit Yogyakarta city. In 2011, the total number of passengers was 3,051,414, 2,648,727 passengers in 2012, and in 2013, the number decreased to 2,629,513 or by 0.73% of the previous year (BPS Provinsi D.I Yogyakarta, 2014). The large number of trips to or from Tugu station requires setting up of traffic flow and land uses around the station. Population growth and limitation of land lead to transportation problems considering the region's attractiveness as a tourist and travel destination, also the accumulation of various economic, social and cultural activities. This case gives a negative effect due to the lack of availability of facilities and infrastructures that could be effective to occupy the society movement. Therefore, it requires a development to reduce inter-regional mobility of the population by integrating and creating closer transportation system between regions, residential areas and centers of community activities to create an efficient area. The aim of this study is to determine the potential of Transit Oriented Development concept as structuring city and to analyze:

- Regional Center with Dense Mix,
- Transit All Modes, and
- High Density of Regional Center

## 2. METHODOLOGY

### 2.1 Method of Data Collection

The used method to collect information related to the research and might be used in the study is as follows:

- Literature Study, a process of data collecting sourced from books, journals and other written resources, especially related to the research, which are:
  - a) Seeking literature about Transit Oriented Development (TOD)
  - b) Seeking literature about elements of Transit Oriented Development (TOD)
  - a) Seeking literature about classification of Transit Oriented Development (TOD)
- Site Observation/ Survey, a process of scanning to seek data directly from tangible objects. Observation was conducted in Malioboro around the Tugu Train Station of Yogyakarta.
- Documentation, a process of taking photographs of the transit areas and society activities center as TOD supporting elements.

## 2.2 Method of Analysis

The method of analyzing used for the observation was the descriptive qualitative method. The collected data were then classified and identified to obtain conclusion about potential results and issues as a phase of data processing. Then, the conclusion could be a solution for the analyzed problems.

Table 1. Table of Analysis

No	Indicator	Variable	Benchmarks
1.	Regional Center with Dense Mix ( <i>Reconnecting America, 2007</i> )	Primary Center of economic and cultural activity	Zoning employments area (1/4 miles)
			Zoning residential area (1/2 miles)
			Zoning retails area (1/4 miles)
2.	Transit All Modes (Land Transportation) ( <i>Reconnecting America, 2007</i> )	Support the activity Centers	The number of rail users to the center of TOD
			The number of <i>Trans Jogja</i> users to the center of TOD
			The number of public transportation users to the center of TOD
			The number of <i>Becak</i> users to the center of TOD
		The number of <i>Andong</i> users to the center of TOD	
		Station Area Total Units Target	8,000-30,000
3.	High Density of Regional Center ( <i>Reconnecting America, 2007</i> )	High-density mix of residential, commercial, employment, and civic/cultural uses.	<b>Mid-Rise Residential over Commercial</b> - 40-90 du/acre - 3-6 stories with apartments - Single or double-sided corridors with lobby entrance - Off-street parking
			<b>High-Rise Residential over Commercial</b> - +60 du/acre - 7+ stories, usually with base and point Tower - Single or double-sided corridors with lobby entrance - Off-street parking
			<b>Low-Rise Office/Commercial</b> - 0.5 – 2.5 FAR - 1 – 3 stories, with lobby entrance to



			<ul style="list-style-type: none"> <li>upper floors</li> <li>Retail, office, or mixed-use with mix of tenant types, including limited large-footprint retail uses</li> <li>Parking in structure or below grade</li> </ul>
			<p><b>Mid-Rise Office/Commercial</b></p> <ul style="list-style-type: none"> <li>2.0 – 5.0 FAR</li> <li>3 – 7 stories, with lobby entrance to upper floors</li> <li>Office with potential retail ground floor</li> <li>Parking in structure or below grade</li> </ul>
			<p><b>High-Rise Office/Commercial</b></p> <ul style="list-style-type: none"> <li>4.0+ FAR</li> <li>6+, with lobby entrance to upper floors sometimes with point tower over base</li> <li>Office with potential retail ground floor</li> <li>Parking in structure or below grade</li> </ul>
			<p><b>Institutional/Other Employment</b></p> <ul style="list-style-type: none"> <li>Schools, civic uses, stadia, hospitals, and other entertainment uses</li> <li>Densities and size range</li> <li>Parking often in structures or below Grade</li> </ul>
		Net Project Density (New Housing)	75-300 du/acre or 303,514 m <sup>2</sup> - 121,406,000 m <sup>2</sup>

### 3. DISCUSSION AND RESULTS

#### 3.1 Description of the Object

##### 3.1.1 Location



Figure 1. Location of Tugu Station, Yogyakarta

The location of the potential object of Transit Oriented Development in this research is around Tugu Station. This is one of the dense population areas and high-density commercial activities. Tugu station is also one of the gates to influx immigrants and tourists from inside and outside Yogyakarta city.



### 3.2 Potential of TOD at Malioboro area

#### 3.2.1 Primary Centers of Economic and Cultural Activity (Dense Mix)



Figure 2. Space Utilization Patterns Plan of Malioboro

Figure 3 shows the area around Tugu station that has zoning of land use divided into three zones, which are the area of retail and commercial consisting of shops and hotels, the employment area consisting of offices complex, and residential area consisting of several villages that also become a commercial area.



Figure 3. Primary Center of Activity in Tugu Stations Area

The figure also shows that this region has been in accordance with the determinants of TOD for the primary center of activity within the areas of retails and employments of about  $\frac{1}{4}$  miles and residential of about  $\frac{1}{2}$  Miles from the center of TOD (Tugu Stations).

#### 3.2.2 Analysis of Primary Center of Economic and Cultural Activity

This area has conformed with *Peraturan Walikota Nomor 25 Tahun 2013* which is a conservation area for the development of trade and service activities, employment, retail and entertainment area with the scale of commerce and services that has been planned in national, regional, and local levels and developed horizontally and vertically, so it can be directly adjacent to the residential area. In addition, the author has analyzed the development planning of Tugu Station area as follows:



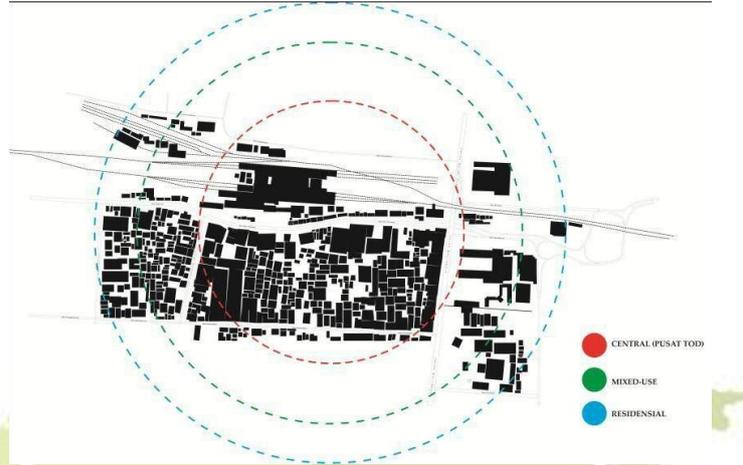


Figure 4. Analysis of Transit Oriented Development in Tugu Stations Area

**3.2.3 Transit All Modes**

Malioboro, precisely around Tugu Station, has a circulation scheme between public transport transit points as follows:



Figure 5. Transit All Modes Scheme

- = Road-Based Public Transport (Bus, Taxi, Private Vehicle)
- = Heavy Rail-Based Public Transport (Train)
- = Light Road-Based Public Transport (Bus Rapid Transit)
- 1. = First Order Center (All Modes of Transportation)
- 2. = Second Order Center (Mixed Transportation: Taxi, Private Vehicle, Walk)
- 3. = Local Order Center (Bus Rapid Transit)

Table 2 shows the result of the author’s observation on Tugu Station at 10.30am – 11.30am to see the linkage between the users and all types of transport with Tugu Station.



Table 2. Identification of users on Transportation Types to Tugu Station

No.	Transportation Types	Number of users
1.	Private Vehicle	56
2.	Motorcycle	86
3.	<i>Becak</i>	24
4.	<i>Trans Jogja</i>	3
5.	<i>Andong</i>	5
6.	Taxi	6
7.	Expedition Truck	7
8.	<i>GoJek</i>	1
9.	Walk	23

Source: Primary Data, 2015

### 3.2.4 Analysis of Transit All Modes

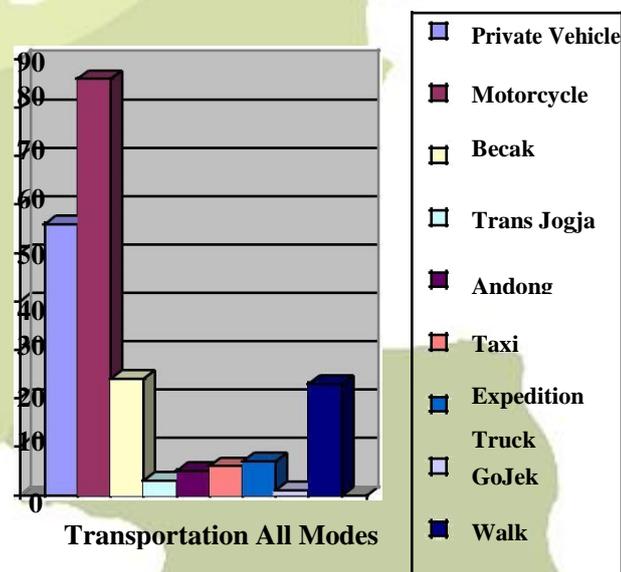


Figure 6. Identification of users on Transportation Types to Tugu Station

Based on the graph data, the author analyzed that the reality in Indonesia, precisely in Yogyakarta, especially in Tugu station, is much different from other countries that give priority to public transportation instead of private vehicles. Although the existing circulation has been able to form and direct the spatial structure of a region, it has not been able to regulate the activity pattern in this region. This leads to congestion and parking density along Malioboro street and Tugu station area.



### 3.2.5 High-building Density in Malioboro Region



Figure 7. Observation site of high-density in Malioboro Area

The identified region will be along Gandekan Lor road. This region is the midpoint of the block that has been determined as an observation object and a region with quite high intensity of space utilization.



Figure 8. Building Panorama in Gandekan Lor street

There are 35 buildings in Gandekan Lor road, including 3 large hotels, a mosque, and also 2 shopping centers. The figure below is an example of buildings that are grouped according to the extent of the group specified by the Government:



Figure 9. Building in Gandekan Lor street

Based on the existing data in the field, only 8% of the buildings have used nearly half of the height limit of buildings established by the Government of Yogyakarta city, so that the BCR and FAR are not maximized. The rest has a height of 2-3 floors in average, with a floor height only about 3 meters for residential and shop-houses.

### 3.2.6 High-building Density in Malioboro Region

The high-building density of the location referred in *Peraturan Pemerintah Yogyakarta* is shown in the picture below:



Figure 14. Observation site of high-density in Malioboro Area

<b>2</b>	Kawasan Penyangga Alam dan Budaya Perdagangan dan Jasa F.2.1. Intensitas Pemanfaatan Ruang Agak Tinggi (Blok)	<b>LT</b>	<b>TB</b>	<b>KDB</b>	<b>KLB</b>
		40 – 100	16	90	1,8
		101 – 200	18	90	2,7
		201 – 400	18	80	2,4
		401 – 1000	18	80	2,4
> 1000	20	80	3,0		

Figure 15. Density Grouping based on *Peraturan Pemerintah Kota Yogyakarta*

Based on figure 15, the criteria of development for different groups of land area have been determined by *Peraturan Pemerintah Yogyakarta* (which will be explained in Table 2). In fact, many buildings in Gandekan Lor street do not fully optimize the high-building capacity that has been determined by the Yogyakarta City Government.

Table 2. The Calculation Result of Building Stories Number and Building Height Each Floor

Size (m <sup>2</sup> )	Building Height (m)	BCR (%)	FAR	Building Stories Number	Building Each Floor (m)
40-100	16	90	1,8	<b>2</b>	<b>8</b>
101-200	18	90	2,7	<b>3</b>	<b>6</b>
201-400	18	80	2,4	<b>3</b>	<b>6</b>
400-1000	18	80	2,4	<b>3</b>	<b>6</b>
>1000	20	80	3	<b>4</b>	<b>5</b>

Source: Primary Data, 2015

The calculation results of the number of floors that can be used in Table 2 show the criteria that can be utilized in the development of this region. After that, a recommendation from the author is one alternative example that can be used to construct a building and still within the criteria based on which group that has been established by *Peraturan Pemerintah Kota Yogyakarta*.

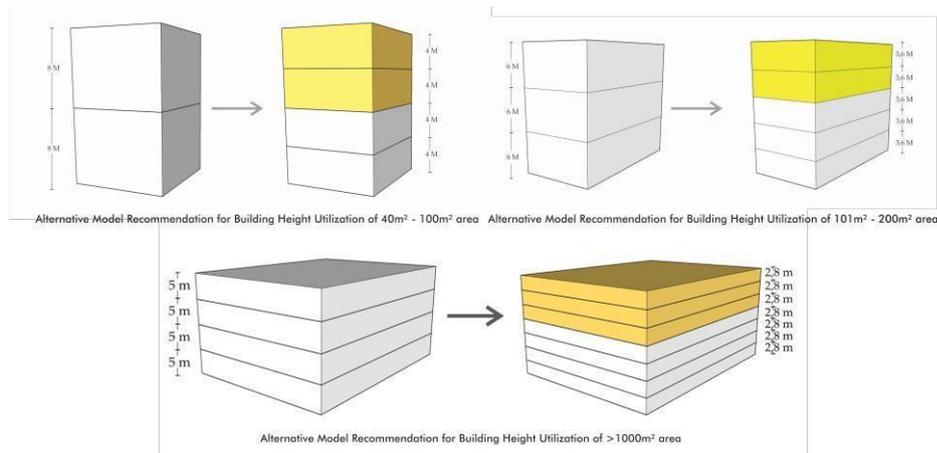


Figure 16. Alternative Model Recommendation for Building Height Utilization

The building height of each floor can be minimized according to the function on the building so that each floor gets the efficient height. Then, the rest maximum heights can still be used for the following floor. So, the building can maximize the number of stories and minimize heights on each floor of the building.

#### 4. CONCLUSIONS

According to the previous research result which has been done in Malioboro Region and theory seeking based on some aspects related to the study, it can be concluded as follows:

##### 1. Dense mix at activity center area

A good neighborhood is built by a good plan. Malioboro Region is an area with TOD development proposal for Tugu Station as the TOD center itself. This area serves into the center of the orientation to transportation mode movements existing for high intensity at the zone. Subsequently, the medium intensity is used as a mixed-use and the low one as residential and settlement.

##### 2. Pasar Kembang street as the center of TOD (Tugu Station Area)

The access around Pasar Kembang that is close to Tugu Station (Transit Center) and Trans Jogja (bus as public transportation) shelter becomes one of the main factors to reach TOD Center. Furthermore, the sorts and number of the transports that pass through the area are sufficiently calculated.

##### 3. Lack of Government Regulation Implementation about the Building Height

The buildings in Malioboro Region are excessively less implementing the regulation appointed by the Yogyakarta City Government especially for the 40m<sup>2</sup> 100m<sup>2</sup> and 101- 200 m<sup>2</sup> areas. This is due to the high number of un-optimal BCR and FAR applications as the possible invested spaces are wasted especially for the building area in the region that is mainly useless. Therefore, the author recommends a building height utilization alternative model for every building story so that investors may utilize small spaces to create a larger one (>1000m<sup>2</sup>) for commercial to increase the investment value.

## 5. REFERENCES

- BPS Provinsi D.I Yogyakarta. (2014). *Daerah Istimewa Yogyakarta dalam Angka*. Yogyakarta: BPS Provinsi D.I Yogyakarta .
- Guidelines for Human Settlement Planning and Design. (2000). In *Spatial and Structural Principles for Settlement-Making* (Vol. I, pp. 1-2). Pretoria: CSIR Building and Construction Technology.
- Pemerintah Kota Yogyakarta. (2010). *Rencana Peraturan Daerah tentang Rencana Tata Ruang Wilayah Kota Yogyakarta Tahun 2010 - 2029*. Yogyakarta.
- Peraturan Walikota Yogyakarta. (2013). *Penjabaran Rencana Pola Ruang dan Intensitas Pemanfaatan Ruang Kota Yogyakarta Tahun 2010 – 2029*. Yogyakarta.
- Peraturan Walikota Yogyakarta. (2014). *Rencana Kerja Pembangunan Daerah*. Dipetik pada 1 September, 2015, dari Pemerintah Kota Yogyakarta: <http://www.jogjakota.go.id/app/modules/upload/files/2015/RKPD-2015-PRINT.pdf>
- Peterson, R. (2002). Perencanaan Tata Ruang Kota dan Transportasi Pekotaan. *Transportasi Berkelanjutan: Panduan Bagi Pembuat Kebijakan di Kota - kota Berkembang*.
- Planning and Economic Development Department. (2010). *Transit oriented Development Guidelines for Hamilton* (Vol. II). Hamilton.
- Reconnecting America. (2007). *Station Area Planning Manual*. San Francisco: Metropolitan Transportation Commission.
- Yacobson, H. (2015). Peremajaan Kawasan Berdasarkan Transit Oriented Development Pada Stasiun Rawa Buntu Tangerang Selatan. 19.
- Zimbabwe, S., & Anderson, A. (2011). *TOD 204 Planning for TOD at the Regional Scale: The Big Picture*. (G. Ohland, Ed.) Washington DC: The Center for Transit-Oriented Development.