

## Feasibility analysis of transferring Terboyo Terminal to Penggaron Terminal using a location theory approach

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**ABSTRACT:** The Semarang city government has designated Terboyo Terminal as a Type C Terminal, thereby making it into a parking facility for heavy vehicles. As a result of this policy, intercity bus services were moved from Terboyo Terminal to Penggaron Terminal. This study aimed to analyze the feasibility of transferring intercity bus services from Terboyo Terminal to Penggaron Terminal using a location theory approach. Descriptive analysis and analysis of user perceptions were carried out. The results of this study were: (1) Penggaron Terminal, in terms of the performance of its access road, has been crowded, and its location is far from other transit facilities, so its accessibility is poor. (2) From users' perception, reaching Penggaron Terminal is more difficult and less profitable compared to reaching Terboyo Terminal. It was concluded that the location of Penggaron Terminal is not suitable for use for bus transfers from Terboyo.

### 1 INTRODUCTION

Semarang is the largest trading city in central Java, located along the traffic corridors moving people and goods from Jakarta to Surabaya and vice versa, so it acts as the final node of the trip and as a transit node. Semarang accommodates various patterns of movement of people who have interests in the city and then return to their original location. Semarang also channels the movement of people whose final destination is outside Semarang after temporarily sheltering there. As described earlier, the role of the terminal is vital in the matter of accommodating these travelers.

The terminal serves not only as a transportation node but also as a place for loading and unloading passengers, the gathering of passengers and vehicles, resting, and even as a place to store or repair vehicles in the short term (Morlock, 1978). Since the terminal is one of the components of transportation and the place where various complex activities occur, it requires adequate space and a good location so that it does not cause traffic problems around it (Sihono, 2006).

Semarang previously had two Type A passenger terminals, i.e. Terboyo Terminal and Mangkang Terminal, and one Type B terminal in Penggaron. UU No. 23/2014 requires a division between regional and state authorities, including in terms of transportation. The authority of a Type A terminal falls to the state (Ministry of Transportation), Type B terminals come under the jurisdiction of the provincial government, and Type C terminals are governed by the regency/city government. Because in the case of transfer of terminals authority is related to regional assets, the state grants authority to the city government. The city government previously maintained all terminals, whether they were handed over to the state or the city government manage the terminals itself, as long as the terminals were classified as Type C. Therefore the Semarang city government handed authority over Mangkang Terminal to the state and ceded Penggaron Terminal to the provincial government, while Terboyo Terminal was not handed over to the state. The Semarang city government, through the mayor's Decree No. 551.22/1169 in 2016, determined Terboyo Terminal is a Type C terminal to be used as a heavy transport parking facility.

For the interests of the government, the transfer of terminals may be necessary. But what must be considered is how such a transfer affects passengers and vehicle operators. Criteria that need to be considered for passengers include consumer surplus, saving money and time, ease of moving to other modes of transportation, and ease of access. For operators, the criteria include operational costs to access the terminal location and the area for vehicle repairs (Apriyanto, 2009). Wicaksono explains that the transfer of bus terminals to suburban areas makes passengers uncomfortable because of the distance (cited in Eryana, 2002). This can cause the terminal to be quiet because passengers are reluctant to use it and prefer other places to take vehicles. Passengers' reluctance is also influenced by the purpose for their trip, the time it takes to reach their location, the proximity of the terminal to the place of origin, travel costs, and destination (Eryana, 2002).

This research was motivated by the fact that many bus passengers and operators were reluctant to move from Terboyo Terminal, so illegal activity has emerged there. This research should serve as an evaluation of the policies that have been carried out, and should help to formulate appropriate policies to overcome these problems.

## 2 METHOD

### 2.1 *Data collecting method*

The type of data in this research included secondary data and primary data. The secondary data were obtained from institutions, literature, newspapers, and other sources. The primary data were obtained from field surveys and questionnaires given to passengers and drivers around Terboyo Terminal. The respondents comprised 60 passengers and 40 drivers.

### 2.2 *Data analysis method*

The approach used in this study was a quantitative descriptive method used to identify the location of Penggaron Terminal from existing data and to analyze the results of questionnaires distributed to passengers and drivers. The descriptive method was used to examine the location of the Penggaron Terminal in terms of accessibility and road performance. User perception analysis was used to study what causes passengers and drivers to be reluctant to move to Penggaron Terminal. The questionnaire instrument was tested for validity and reliability, and the results were eligible for use.

## 3 RESULT

### 3.1 *Accessibility of the terminal*

When viewed from the position of the road, Penggaron Terminal is an off-street terminal because it is not located right on the edge of the highway. Penggaron Terminal is located approximately 600 meters from Brigjen Sudhiarto Road, which is a Class II Primary Collector's Road with Provincial Road status. This road is the main link in the flow of traffic from the city center to the outskirts of the southeastern region of Semarang (e.g., Gayamsari, Pedurungan), as well as the exit to several other areas such as Mranggen, Purwodadi, and Blora.

The road network in Semarang was developed with concentric radials, where Penggaron Terminal, which is located in the southeast, is not the main traffic meeting point. Penggaron Terminal is easier to reach by vehicles from locations in southeast Semarang, such as Purwodadi and Blora, but it is more difficult to access by vehicles or passengers coming from the east (e.g., from Demak, Kudus, Pati, and Rembang), and south (e.g., Magelang, Solo, and Salatiga), so it is quiet there.

Based on the analysis of the performance of the main road to Penggaron Terminal, i.e. Brigjen Sudhiarto, traffic from the direction of the city shows a high level of saturation ( $VCR > 0.75$ ),



Table 1. Analysis of VCR and level of service of Brigjen Sudhiarto Road (from exit tolls to Penggaron).

Location	Time	V	C	VCR	LOS	Survey taken
Node 1	Morning	4,681.8	5,559.84	0.84	D	Wednesday
	Afternoon	4,498.2	5,559.84	0.81	D	
	Evening	4,924.2	5,559.84	0.89	E	
Node 2	Morning	4,705	5,957	0.79	D	Monday
	Afternoon	2,965	5,957	0.50	C	
	Evening	4,593	5,957	0.77	D	
	Night	2,104	5,957	0.35	B	
Node 3	Morning	1,342	3,675	0.37	B	Saturday
	Afternoon	3,006	3,675	0.82	D	
	Evening	2,838	3,675	0.77	D	
	Night	1,625	3,675	0.44	B	

Table 2. Linkages between Penggaron Terminal and other transit facilities.

Transit facility	Distance km	Reaching*	Cost Rp	Travel time hour
Harbor	18.5	2 times	3,500	2.33
		1 time	7,000	2.00
Airport	18.5	2 times	3,500	2.75
Railway Station	17.5	2 times	7,000	2.16
		1 time	3,500	1.75
Terminal A	26	1 time	3,500	2.58

\* by using BRT

especially during peak hours in the morning and evening. Such conditions have the potential to cause congestion on the road, which of course will result in prolonging travel time for a bus to reach Penggaron Terminal. The road performance based on the results of a study conducted by Mudiyo and Anindyawati (2017) and on a study from Laporan Andalalin Transmart Penggaron (2018) are shown in Table 1.

The location of the terminal is ideally easy to use to access other transit facilities in the city. This will make it easier to move between modes so that users will be better able to save time and travel costs. The location of Penggaron Terminal is still considered unable to accommodate intermodal transfers with other transit facilities in the city of Semarang because it is far away, so it takes a long time to reach it. The linkage between the location of Penggaron Terminal and other transit facilities can be seen in Table 2.

### 3.2 User perception

From the survey results, it can be seen that several factors cause passengers to still use Terboyo Terminal.

#### 3.2.1 Habit

Of the respondents, 42% were passengers who use the terminal more than twice a week, while 55% of the respondents use the terminal twice a week and the remaining 3% use the terminal fewer than twice a week. From this, it can be seen that many respondents are passengers whose daily activities are close to Terboyo Terminal so that the pattern of their trips has been formed there. Of course, it would be very difficult to move these passengers.

### 3.2.2 Proximity of the location to passengers' origin

The location of Penggaron Terminal is less strategic for passengers from the east. The survey results revealed that passengers with an eastward destination prefer using Terboyo Terminal over Penggaron Terminal. Distance also affected passengers' decisions when determining where to wait for transportation.

### 3.2.3 Travel time

The passengers were mostly students and workers who are required to be on time in starting their activities. This will influence their choice in where to wait for transportation.

### 3.2.4 Travel cost

The cost factor will affect passengers in determining where to wait for transportation. The majority of respondents who are students who use public transportation/buses will choose a place that can be accessed at a lower cost.

### 3.2.5 Ease of reaching

Terboyo Terminal's location is more strategic than Penggaron Terminal's location, making it easier to reach.

### 3.2.6 Ease of getting transportation

In terms of safety and comfort, at this time, the Terboyo Terminal location was very unsupportive as a place to wait for a bus. But the location is still busy as if guaranteeing that there will be convenient transportation.

The survey results from the drivers revealed some things that made them reluctant to move to Penggaron Terminal.

- (1) The AKDP and AKAP bus services are separated.

Most drivers felt that the separation of AKAP bus services to Mangkang Terminal and AKDP bus services to Penggaron Terminal made it difficult for them to exchange passengers due to the distance between Penggaron Terminal and Mangkang Terminal.

- (2) AKAP buses that are supposed to go to Mangkang Terminal are still operating around Terboyo Terminal.

According to the drivers, many buses still operate around Terboyo Terminal because they were left out by authorized officers. This is a cause of mistrust of the new rules.

- (3) Road access is more difficult.

According to the drivers, the access road to Penggaron Terminal is more difficult because it is further from the toll gate, there are many red lights, and the traffic is crowded.

- (4) Travel time is increased.

Most drivers consider that the travel time to Penggaron Terminal is longer due to more difficult access. Bus drivers from locations to the east such as Rembang, Pati, and Kudus, felt this especially hard because they have to go further to reach Penggaron Terminal.

- (5) Rest time is reduced.

Most drivers consider that their rest time will be reduced because of the longer travel time to Penggaron Terminal.

- (6) Income is reduced.

According to the drivers, the transfer to Penggaron Terminal has caused their income to decrease because passengers are reluctant and the cost of fuel is increasing.

## 4 CONCLUSIONS

The location of Penggaron Terminal is currently not suitable to be used as a place to transfer intercity buses from Terboyo Terminal. This is because (1) the accessibility of Penggaron Terminal is not good, as indicated by poor road performance and distance from other transit facilities. (2) Passengers are reluctant to move to Penggaron Terminal because the location of

Terboyo Terminal is more strategic and closer, so it is cheaper to use and easier to reach. Drivers are reluctant to move to Penggaron Terminal because the passengers are hesitant and access is difficult, resulting in increased travel time, increased fuel costs, and reduced driver rest time.

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