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Performance Analysis of Trans Jatim Corridor 3 Transportation (Mojokerto – Gresik)

Adiansyah Dwianico Nugroho[1], Risma Marleno[2], Haris Muhammadun[3]
Universitas 17 Agustus Surabaya, Indonesia
Email: 1472300056@surel.untag-sby.ac.id, rismamar@untag-sby.ac.id, haris@untag-sby.ac.id

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Abstract
This study evaluates the performance of public transportation on the Trans Jatim Corridor 3, assessing key factors such as frequency, punctuality, capacity, and passenger comfort. The research problem revolves around how public transportation services that fail to meet the community's needs may result in decreased public trust and an increased reliance on private vehicles. The objective of this study is to analyze the current performance of Trans Jatim Corridor 3 and identify areas for improvement in service delivery. A quantitative approach was used to gather data on various performance metrics, including time between buses, waiting time, loading factor, travel time, and average travel speed. The results of the analysis show that the time between buses is 14 minutes and 48 seconds, with a waiting time of 7 minutes and 24 seconds. The loading factor is 64.78%, indicating that the capacity is being utilized at a moderate level. Additionally, the travel time for Trans Jatim Corridor 3 transportation is 2.07 minutes per kilometer, and the average travel speed is 28.98 km/h. These findings suggest that while the current performance of Trans Jatim Corridor 3 meets some of the service standards, improvements in frequency and capacity may be necessary to enhance overall service efficiency. The implications of this study emphasize the need for better coordination and planning to improve the performance of public transportation and increase public satisfaction, reducing the reliance on private vehicles.

Introduction

Population growth in urban areas and increasing mobility needs are major challenges in the transportation system in Indonesia. Efficient mobility is indispensable to support economic activities and improve people's welfare (Aiyedogbon et al., 2022; Canudas-Romo et al., 2022; Gu et al., 2021; Kelly et al., 2021; Kruse-Andersen, 2023). In this context, public transport plays an important role as the backbone of urban transport. However, with the increase in private vehicles on the highway, various problems arise, such as congestion, increased air pollution, and longer travel times. Therefore, evaluation and integration of public transportation systems are needed to ensure that public transportation can function optimally and be well connected (World Bank, 2021).

Public transportation performance evaluation is a process to measure the effectiveness and efficiency of services, including frequency, punctuality, capacity, and passenger comfort (Handayani & Handalia, 2021; Haycal et al., 2022; Istianto & Djajasinga, 2021; Ushizawa et al., 2023; Zhang et al., 2020). Public transportation services that cannot meet the needs of the community will lead to a decrease in trust and encourage people to switch to private vehicles. As a result, the use of public *transportation* decreases and the burden on highways increases (JICA, 2019). Public transportation research and evaluation aim to identify existing barriers and formulate solutions in the form of route planning, fare integration, and infrastructure improvements (Cserdi & Kenesei, 2021; Fauzi et al., 2022; Kriswardhana et al., 2022; Manandhar, 2023).

The benefits of public transport evaluation and integration are not only felt in the form of increased comfort for users, but also contribute to the reduction of congestion and greenhouse gas emissions. The increased use of public transportation can reduce the number of private vehicles on the road, thereby improving air quality and reducing transportation operational costs. In addition, a good public transportation system also encourages economic growth by facilitating access to economic and social centers (World Bank, 2021).

The study by Hidayat (2017) focused on evaluating the performance of *bus rapid transit* (BRT) systems in Indonesia, particularly assessing factors such as travel time, waiting time, and loading factors. Hidayat's findings emphasized the importance of punctuality and frequency in determining customer satisfaction and trust in public transportation systems. However, the research did not address how the performance of these systems influences the decision to switch to private vehicles, which remains a significant concern in urban transportation planning.

Similarly, research by Kurniawan et al. (2019) examined the performance of public transportation systems in Jakarta, analyzing passenger comfort and system efficiency. While the study provided valuable insights into service quality, it lacked a specific focus on the regional differences between corridors like *Trans Jatim Corridor 3*. Additionally, it did not explore the influence of external factors such as the availability of private vehicles on public transportation performance.

This study bridges these gaps by focusing on *Trans Jatim Corridor 3*, specifically examining how performance factors such as waiting time, travel speed, and loading factor contribute to commuter behavior, and understanding how performance improvements can reduce reliance on private vehicles. The findings of this research will be useful for policy development in public transportation planning, helping optimize service delivery and increase trust in public transportation. Furthermore, the study's methodology can be applied to other regions for comparative analysis.

Materials and Methods

The analytical method used in this study is a descriptive qualitative-quantitative method. Qualitative research is carried out to provide an explanation of a phenomenon and subsequently to construct a theory related to the phenomenon. Meanwhile, quantitative research is a *research* approach that uses numerical data or numbers as a basis for answering research

questions, testing hypotheses, or understanding certain phenomena. This method focuses on objectively measuring variables and analyzing statistical data to identify patterns, relationships, or differences between variables. This research focuses on the performance of *AKDP* (Inter-City Within Province) public transportation on the Mojokerto–Batu route and its integration into *Trans East Java* transportation corridor 3.

Results and Discussions

Overview of the Study Area

a) Gresik Regency

Gresik Regency is a region in East Java, directly bordering Surabaya City. Astronomically, Gresik Regency is located between 112° – 113° East Longitude and 7° – 8° South Latitude. Geographically, Gresik Regency is bordered by:

North: Java Sea

South: Sidoarjo Regency, Mojokerto Regency, Surabaya City

West: Lamongan Regency

East: Madura Strait

Gresik Regency consists of 18 districts, covering an area of about 1,194 km².

Bunder Terminal is a Type B terminal located in Gresik Regency and serves as a stop for Trans Jatim Corridor 3 transport. The total length of national roads in Gresik Regency is recorded at 93.21 km. The provincial roads measure 24.86 km, and the county roads span 566.61 km (source: Gresik Regency in Figures 2024). Therefore, the total road length in Gresik Regency is 684.68 km.

Gresik Regency is known for both its industry and tourism. Some industrial areas in Gresik include the JIIPE Gresik, Maspion Industrial Estate, and others. Besides being an industrial city, Gresik also has several tourist spots such as Bawean Island, the tomb of Syekh Maulana Malik Ibrahim, and more.

b) Overview of Mojokerto Regency

Astronomically, Mojokerto Regency is located between 111°20'13" to 111°40'47" East Longitude and between 7°18'35" to 7°47'0" South Latitude. Geographically, Mojokerto Regency is bordered by:

North: Lamongan Regency, Gresik Regency

South: Malang Regency

West: Jombang Regency

East: Sidoarjo Regency, Pasuruan Regency

Mojokerto Regency is located on land and is surrounded by several areas. Mojokerto Regency consists of 18 districts. The total length of roads in Mojokerto Regency is 1,041.32 km. To support transportation accessibility, the Mojokerto Regency government has built 607

bridges, consisting of 240 concrete bridges, 228 composite bridges, 36 steel bridges, and 103 other types (source: Mojokerto Regency in Figures 2024).

Mojokerto is also an industrial and tourism city. Some industrial areas in Mojokerto include Ngoro Industrial Park and several other industrial zones. Tourist attractions in Mojokerto include Kayoe Putih Hill, which is near the Trans Jatim Corridor 3 route.

c) Overview of Mojokerto City

Astronomically, Mojokerto City is located between 7°28' South Latitude and 112°26' East Longitude, with an area of 20.21 km². This area consists of 3 districts and 18 villages. Based on administrative boundaries and geographic position, Mojokerto City borders Mojokerto Regency.

The total length of roads in Mojokerto City in 2023 is 188.19 km, with road conditions being: 152.08 km in good condition, 30.23 km in fair condition, and 5.89 km in light disrepair. In 2023, the number of passenger transport routes was 706,678 (source: Mojokerto City in Figures 2024).

Kertajaya Terminal is a Type B terminal located in Mojokerto City, serving as a meeting point for Mojokerto-Batu transportation and Trans Jatim Corridor 3 (Mojokerto-Gresik).

Overview of Trans Jatim Corridor 3

Trans Jatim Corridor 3 is a public transport service that operates using the Buy The Service (BTS) system. It uses the Bus Rapid Transit (BRT) mechanism, a mass transit system based on buses that provides fast, comfortable, and low-cost mobility services for urban transportation. According to the Trans Jatim Corridor 3 route permit data, the vehicles used for Trans Jatim Corridor 3 operations are as follows:

Table 1. Trans Jatim Corridor 3 Fleet

NO	Vehicle Number			Vehicle Type	Fire	Capacity	Year of Manufacture
1	W	7028	UQ	Bus Cars	MITSUBISHI	1	W
2	W	7029	UQ	Bus Cars	MITSUBISHI	2	W
3	W	7030	UQ	Bus Cars	MITSUBISHI	3	W
4	W	7031	UQ	Bus Cars	MITSUBISHI	4	W
5	W	7032	UQ	Bus Cars	MITSUBISHI	5	W
6	W	7033	UQ	Bus Cars	MITSUBISHI	6	W
7	W	7034	UQ	Bus Cars	MITSUBISHI	7	W
8	W	7035	UQ	Bus Cars	MITSUBISHI	8	W
9	W	7036	UQ	Bus Cars	MITSUBISHI	9	W
10	W	7037	UQ	Bus Cars	MITSUBISHI	10	W
11	W	7038	UQ	Bus Cars	MITSUBISHI	11	W
12	W	7039	UQ	Bus Cars	MITSUBISHI	12	W
13	W	7042	UQ	Bus Cars	MITSUBISHI	13	W
14	W	7043	UQ	Bus Cars	MITSUBISHI	14	W
15	W	7044	UQ	Bus Cars	MITSUBISHI	15	W
16	W	7045	UQ	Bus Cars	MITSUBISHI	16	W
17	W	7046	UQ	Bus Cars	MITSUBISHI	17	W

NO	Vehicle Number			Vehicle Type	Fire	Capacity	Year of Manufacture
18	W	7047	UQ	Bus Cars	MITSUBISHI	18	W
19	W	7048	UQ	Bus Cars	MITSUBISHI	19	W
20	W	7049	UQ	Bus Cars	MITSUBISHI	20	W
21	W	7040	UQ	Bus Cars (Cad)	MITSUBISHI	21	W
22	W	7041	UQ	Bus Cars (Cad)	MITSUBISHI	22	W

Source: East Java Provincial Transportation Office

The Trans East Java fleet service corridor 3 which serves the Mojokerto-Gresik route has a route length of 51.3 km. The passenger capacity that can be transported by the East Java Corridor 3 trans fleet is as many as 21 passengers in one way. From January 2024 to November 2024, Trans East Java Corridor 3 has transported 578,545 general passengers, 782 passengers from students and 41,959 passengers from students and provided Regional Original Revenue (PAD) for the East Java Provincial Government of Rp 2,993,879,810.00 (two billion nine hundred ninety-three million eight hundred and seventy-nine thousand eight hundred ten rupiah). When depicted in the diagram it will look like the following.

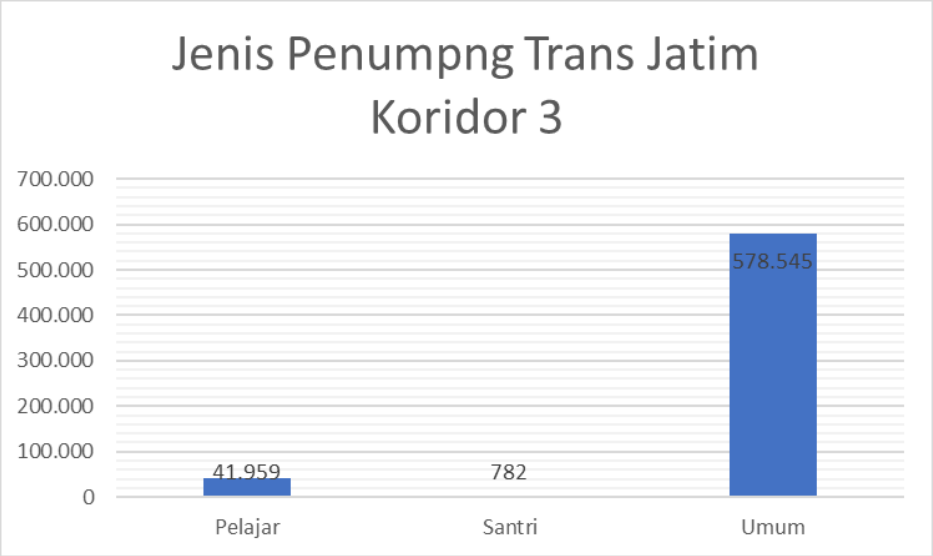

Figure 1. Graph of Passenger Type of Trans East Java Corridor 3

From figure 1 above, it appears that the majority of Trans Jatim Corridor 3 bus passengers are the general public, namely 578,545 passengers, and the second is from students as many as 41,959 passengers and the last is from students as many as 782 passengers.

Time Between (headway) Trans East Java Corridor 3

The departure of the Trans East Java Corridor 3 fleet has been scheduled and orderly. Thus, the time between (headway) between the Trans East Java fleet corridor 3 is more orderly. In accordance with the Decree of the Director General of Land Transportation number 687 of 2002, the standard time between (headway) public transportation services is as follows:

Table 2. Standard Table of Public Transportation Performance Assessment in terms of Time Between (headway) Trans East Java Corridor 3

No.	Service Indicators	Unit	Assessment Standards (minutes)		
			Less	Keep	Good
1	Time Between (Headway)	minute	>15	10 – 15	<10

Source : Decree of the Director General of Hubdat No. 687 of 2002

Based on the results of the static survey that has been carried out by the Trans East Java Corridor 3 headway is as follows:

Table 3. Time Between (Headway) Trans East Java Corridor 3

No.	Survey Date	Direction	Headway
1	November 30, 2024	Mojokerto-Gresik	00:14:48
		Gresik-Mojokerto	00:14:52
2	December 1, 2024	Mojokerto-Gresik	00:14:50
		Gresik-Mojokerto	00:14:52
3	December 2, 2024	Mojokerto-Gresik	00:14:43
		Gresik-Mojokerto	00:14:44
4	December 3, 2024	Mojokerto-Gresik	00:14:48
		Gresik-Mojokerto	00:14:43
Average			00:14:48

Source: Analysis Results

From the data above, it is known that the average time between *the* Trans Jatim Corridor 3 (headway) is 14 minutes 48 seconds or when converted into minutes then the headway of the East Java Corridor 3 Trasn transportation is 14.8 minutes. By paying attention to the Decree of the Director General of Land Transportation no. 687 of 2002 as a standard for public transportation services, the average transportation headway of Trans East Java Corridor 3 is included in the medium category.

Lay *Over Time* Trans East Java Corridor 3

The wait time (*lay over time*) of Trans East Java Corridor 3 is shorter when compared to Mojokerto-Batu transportation because *of the shorter headway*. The standard waiting time in accordance with the Decree of the Director General of Hubdat no. 687 of 2002 is as follows:

Table 4. Standard Table of Waiting Time for East Java Trasn Vehicles Corridor 3

No.	Service Indicators	Unit	Assessment Standards (minutes)		
			Less	Keep	Good
1	Waiting time	minute	>30	20 - 30	<20

Source : Decree of the Director General of Hubdat No. 687 of 2002

Based on the results of the survey that has been carried out and based on the calculation of the waiting time formula, the waiting time for Trans East Java Corridor 3 transportation is as follows:

Vehicle Waiting Time = 0.5 x headway

= 0.5 x 14.8 minutes
= 7.4 minutes

Or when displayed in the waiting time table, it will look like the Trans *East Java Corridor 3* transportation lay over time data table below.

Table 5. Trans East Java Corridor 3 Waiting Time

No.	Survey Date	Direction	Waiting Time
1	November 30, 2024	Mojokerto-Gresik	00:07:24
		Gresik-Mojokerto	00:07:26
2	December 1, 2024	Mojokerto-Gresik	00:07:25
		Gresik-Mojokerto	00:07:26
3	December 2, 2024	Mojokerto-Gresik	00:07:22
		Gresik-Mojokerto	00:07:22
4	December 3, 2024	Mojokerto-Gresik	00:07:24
		Gresik-Mojokerto	00:07:21
Average			00:07:24

Source : Analysis Results

From the table above, it can be seen that the average wait time *(lay over time)* of Trans East Java Corridor 3 is 7 minutes 24 seconds or when converted into minutes is 7.4 minutes. Based on the Decree of the Director General of Land Transportation no. 687 of 2002, the average waiting time for Trans East Java Corridor 3 transportation is in the good category.

Load Factor Trans East Java Corridor 3

The load factor is a comparison between the number of passengers and the available capacity. The passenger capacity of Trans East Java Corridor 3 is 21 people, Based on the Decree of the Director General of Hubdat number 687 of 2002, the standard load factor for public transportation is as follows:

Table 6. Standard Table of Public Transportation Performance Assessment for Trans East Java Corridor 3

No.	Service Indicators	Unit	Assessment Standards		
			Less	Keep	Good
1	Load Factor	%	>100	70 - 100	<70

Source : Decree of the Director General of Hubdat No. 687 of 2002

So based on the analysis of the survey data, the average loading factor of Trans East Java Corridor 3 is as follows:

Table 7. Load *Factor* Trans East Java Corridor 3

No.	Survey Date	Direction	Load Factor
1	November 30, 2024	Mojokerto-Gresik	77,58%
		Gresik-Mojokerto	75,22%
2	December 1, 2024	Mojokerto-Gresik	71,43%
		Gresik-Mojokerto	74,57%

No.	Survey Date	Direction	Load Factor
3	December 2, 2024	Mojokerto-Gresik	58,22%
		Gresik-Mojokerto	53,40%
4	December 3, 2024	Mojokerto-Gresik	55,32%
		Gresik-Mojokerto	52,50%
	Average		64,78%

Source : Analysis Results

From the results of the analysis in the table above, it is known that there is *a significant difference in load factor* between holidays and working days. This is because the Trans East Java Corridor 3 route passes through several tourist attractions on the Mojokerto -Gresik route, including Intan Abah Tani Tourism Park, Kayoe Putih Hill and Brantas Indah Park. The average loading factor of Trans East Java Corridor 3 is 64.78%. If you pay attention to the Decree of the Director General of Land Transportation number 687 of 2002, the average load factor of Trans East Java Corridor 3 transportation is included in the good category.

Frequency of Trans East Java Corridor 3

The frequency of Trans East Java transportation vehicles corridor 3 is calculated by the unit of hours. The number of vehicles per hour is one of the indicators of the performance of a public transportation service based on the Decree of the Director General of Hubdat No. 687 of 2002.

Table 8. Standard Table for Performance Assessment of Trans East Java Public Transportation Corridor 3 in terms of Vehicle Frequency

No.	Service Indicators	Unit	Assessment Standards (kend/hour)		
			Less	Keep	Good
1	Vehicle frequency	Kend/hour	<4	4 – 6	>6

Source : Decree of the Director General of Hubdat No. 687 of 2002

Based on the results of the survey that has been carried out and based on the calculation of the frequency formula, the frequency of public transportation Trans East Java Corridor 3 is as follows:

F = 60 / Headway (Kend/jam)
= 60 / 14.8
= 4,054 kend/hour

Or when displayed in the table the survey results will look like the following table:

Table 9. Frequency of Trans East Java Corridor 3

No.	Survey Date	Direction	Frequency
1	November 30, 2024	Mojokerto-Gresik	4,05
		Gresik-Mojokerto	4,04

No.	Survey Date	Direction	Frequency
2	December 1, 2024	Mojokerto-Gresik	4,05
		Gresik-Mojokerto	4,04
3	December 2, 2024	Mojokerto-Gresik	4,08
		Gresik-Mojokerto	4,07
4	December 3, 2024	Mojokerto-Gresik	4,05
		Gresik-Mojokerto	4,08
Average			4,06

Source: Analysis Results

From the table of analysis results above, it can be seen that the frequency of Trans East Java Corridor 3 transportation vehicles is 4.06 vehicles/hour. By paying attention to the Decree of the Director General of Hubdat number 687 of 2002, the frequency indicator of Trans East Java Corridor 3 vehicles is included in the Medium category.

Trans East Java Corridor 3 Travel Time

Based on data from the East Java Provincial Transportation Office, the distance of the Trans East Java Corridor 3 transportation route is 51.3 km. Data on the travel time of Trans East Java Corridor 3 transportation was obtained by conducting a dynamic survey / on bus. The following are the travel time standards published by the Ministry of Transportation:

Table 10. Standard Table for Assessing the Performance of Trans Java Transportation Corridor 3 in terms of Travel Time

No.	Service Indicators	Unit	Assessment Standards (minutes/km)		
			Less	Sedang	Baik
1	Travel Time	Km/min	>12	1	Travel Time

Source : Decree of the Director General of Hubdat No. 687 of 2002

With a distance of 51.3 km, the length of travel time taken by Trans East Java Corridor 3 transportation is as follows.

Table 11. Trans East Java Travel Time Corridor 3

No.	Survey Date	Direction	Location Point		Minute Difference	Min/km
			Leave	Arrive		
1	November 30, 2024	Mojokerto-Gresik	11:30	13:13	103	2,01
		Gresik-Mojokerto	14:30	16:18	108	2,11
2	December 1, 2024	Mojokerto-Gresik	11:32	13:18	106	2,07
		Gresik-Mojokerto	14:36	16:22	106	2,07
3	December 2, 2024	Mojokerto-Gresik	11:32	13:20	108	2,11
		Gresik-Mojokerto	14:32	16:19	107	2,09
4	December 3, 2024	Mojokerto-Gresik	11:32	13:14	102	1,99
		Gresik-Mojokerto	14:31	16:22	111	2,16

No.	Survey Date	Direction	Location Point		Minute Difference	Min/km
			Leave	Arrive		
		Average			106,38	2,07

Source : Analysis Results

From the results of the analysis above, it appears that the travel time for Trans East Java Corridor 3 transportation is 1 hour 46 minutes or when converted into minutes then the travel time is 106 minutes. The travel time of Trans Jatim Corridor 3 is 2.07 min/km. The travel time of Trans East Java Corridor 3 transportation is in the good category.

Speed of Trans East Java Corridor 3

The average speed of Trans East Java corridor 3 vehicles is influenced by the distance and travel time. Travel speed is the average speed of a public transportation fleet, calculated from the beginning of the departure point to the end of the route. With a mileage of 51.3 km, the average speed standard in accordance with the Decree of the Director General of Hubdat no. 687 of 2002 is as follows:

Table 12. Standard Table of Performance Assessment of Trans East Java Transportation Corridor 3 in terms of Travel Speed

No.	Service Indicators	Unit	Rating Standards (km/h)		
			Less	Keep	Good
1	Travel Speed	km/h	<5	5 - 10	>10

Source : Decree of the Director General of Hubdat No. 687 of 2002

The speed data of the Trans East Java Corridor 3 Mojokerto-Gresik public transportation when done in accordance with the calculation of the speed formula can be done as in the calculation below:

$$V = \frac{S}{T}$$

$$= \frac{51{,}3\ km}{1.77\ jam}$$

$$= 28.98 \text{ km/h}$$

Or based on the data of the results of the dynamic / on bus survey that has been carried out, it is known as the following data:

Table 13. Average Speed of Trans East Java Corridor 3

No	Survey Date	Direction	Location Point		Speed (km/h)
			Leave	Tiba	
1	30 November 2024	Mojokerto-Gresik	11:30	13:13	29,83
		Gresik-Mojokerto	14:30	16:18	28,50
2	1 December 2024	Mojokerto-Gresik	11:32	13:18	29,15
		Gresik-Mojokerto	14:36	16:22	29,15
3	2 December 2024	Mojokerto-Gresik	11:32	13:20	28,50

		Gresik-Mojokerto	14:32	16:19	28,82
4	3 December 2024	Mojokerto-Gresik	11:32	13:14	30,18
		Gresik-Mojokerto	14:31	16:22	27,73
	Average				28,98

Source : Analysis Results

From the data in the table above, it is known that the average speed of Trans East Java Corridor 3 transportation vehicles is 28.98 km/h. If you pay attention to the Decree of the Director General of Land Transportation number 687 of 2002, the travel speed indicator is in the good category.

Conclusion

In accordance with the results of the analysis of the performance of *Trans East Java Corridor 3* transportation, the findings are as follows: (1) The average time between vehicles (*headway*) on *Trans Jatim Corridor 3* is 14 minutes 48 seconds, which is categorized as medium. (2) The average wait time (*lay over time*) of *Trans East Java Corridor 3* is 7 minutes 24 seconds, which is included in the good category. (3) The average loading factor of *Trans East Java Corridor 3* is 64.78%, which is considered good. (4) The frequency of *Trans East Java Corridor 3* transportation vehicles is 4.06 vehicles per hour, which falls into the medium category. (5) The travel time of *Trans East Java Corridor 3* transportation is 2.07 minutes per kilometer and is considered good. (6) The average speed of *Trans East Java Corridor 3* transportation vehicles is 28.98 km/h, which is included in the good category. Given these findings, it is suggested that increasing vehicle frequency and reducing *headway* could further enhance the overall performance and passenger satisfaction of *Trans Jatim Corridor 3*.

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