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The adequacy of Public Bus Fleet during the Covid-19 Pandemic (Case of The Transjakarta Corridor 1 DKI Jakarta, Indonesia)

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ABSTRACT

Indonesia entered the "New Normal" era from the Covid-19 pandemic conditions in June 2020. Transjakarta is one of the public transportation used by the people of DKI Jakarta. With the beginning of the "New Normal" condition, people will start using public transportation such as Transjakarta. The quality of service that is reflected in the adequacy level of Transjakarta modes can endanger the health of the users of the modes. This study emphasized identifying the adequacy of the public bus fleet during the Covid-19 Pandemic. The location chosen in this study is the Transjakarta Corridor 1 (Blok M - Kota) bus, DKI Jakarta Province, Indonesia. This supply-demand analysis was conducted to determine the needs of Transjakarta Corridor 1 (Blok M - Kota) buses based on several calculation scenarios. Based on the results of the analysis, when the scenario has a maximum transport capacity of 75%, the articulated bus fleet has been able to meet its needs, while the single / maxi bus has not been able to meet the needs. The results obtained suggest both government and PT Transjakarta need to address passengers' perceptions of safety, by increasing the number of bus fleets, frequency of services, and bus headway.

Keywords: adequacy, public bus fleet, covid-19 pandemic

INTRODUCTION

The Covid-19 pandemic has evenly distributed impacts on various aspects of life, one of which is the transportation sector which is marked by reduced daily mobility, including public transport modes. In DKI Jakarta, the use of public transportation has decreased during the Covid-19 pandemic. The use of public transportation in Jakarta experienced the highest decline of up to 91.9% when compared to the use of public transportation before the Covid-19 pandemic in January 2020 (Moovit 2020). In Transjakarta, the number of users has decreased quite significantly, which is approximately 83,000 people per day from March to April 2020. This is not much different from the KRL mode of transportation. In January 2020, KRL still served approximately 859,000 people every day, but until 15 April 2020, there was a decrease in passengers to 183,000 people per day, or a decrease of 78.6 percent compared to normal conditions in January 2020. For Jakarta LRT which was normally capable of serving around 3,800 passengers per day, decreased by 47.3 percent to around 2,000 people per day during March 2020. Meanwhile, in the Latest Moda Raya (MRT) service, there was a decrease in passengers by 47 percent during March 2020, which are usually MRT passengers every day. reaching around 85,000 people, decreasing to around 45,000 people (Ramli 2020b).

The decline in the use of public transportation occurred because the government made a decision regarding the existence of a new social system, namely social distancing, and physical distancing, and this was followed up with the Large-Scale Social Restriction Policy (PSBB). This certainly has an impact on changing the lifestyle and movement patterns of the people of DKI Jakarta. However, based on the Jabodetabek Transportation Management Agency (BPTJ) the decline in the use of public transportation has occurred since before the enactment of the Large-Scale Social Restrictions (PSBB) status which officially began on April 10, 2020, in DKI Jakarta (Ramli 2020b). This may be due to the perception that public transportation has a high risk of spreading Covid-19, which is caused by several reasons. First, the risk of transmission increases as the occupancy of public transportation increases, where the large number of people gathering in a limited space will increase the potential for spreading the virus. This has led to discomfort and concern for passengers being exposed to the Covid-19 virus. Second, the ability to identify passengers who may be infected with the Covid-19 virus is still limited, making it difficult to control the spread of Covid-19 in public transportation. Third, there are various surfaces on transportation, such as chairs, handrails, doors, and tickets that are also a medium for the transfer of the Covid-19 virus. Viruses move along with human movement, thus making transportation a contributor to the spread of the virus (UITP 2020).

However, the use of public transportation has increased since entering the 'New Normal' era or the adaptation period for new habits. In June 2020, Indonesia began to enter a new normal era or the 'New Normal. 'New Normal' is a behavior change to continue carrying out normal activities but with the addition of implementing health protocols to prevent transmission of Covid-19 (Tamtomo 2020). In DKI Jakarta, the term "New Normal" is known as the Transitional PSBB. The DKI Jakarta government issued the Governor of DKI Jakarta Regulation Number 51 of 2020 concerning the Implementation of the Transitional Period of PSBB which took effect from the beginning of June 2020, where the term 'New Normal' is defined as the application of clean and healthy living habits and accompanied by a protocol to prevent the spread of Covid-19 as an order a new life that can encourage the creation of a healthy and productive society amid a pandemic, and safe from the transmission of the Covid-19 disease. With the start of the 'New Normal' period, various activities ranging from economic activities to religious activities returned to normal activities.

Based on data from PT Transjakarta (2020), Transjakarta Corridor 1 (Blok M - City) was the most populous corridor during the Covid-19 pandemic with a percentage of 18.8%. The Harmoni and Karet Shelters which are part of Corridor 1 (Blok M - Kota) are also among the top three most densely populated Transjakarta bus stops during the Covid-19 pandemic. This corridor has the highest passenger demand compared to other corridors because it is a corridor that functions as the backbone of the Transjakarta network and is surrounded by commercial areas, offices, government, services and activity centers, and the economy of the surrounding community. In line with the high demand for passengers in this corridor, the problem of accumulating passengers often occurs, especially at busy times. This problem occurs because the number of passenger requests is higher than the availability of the bus fleet, especially after a dispute over the maximum transport capacity of 50%. When compared to the MRT, whose service route is similar to Transjakarta Corridor 1, Transjakarta Corridor 1 service is still worse because until the 'New Normal' period, maintaining physical distance has not been implemented properly, and even passenger congestion is still frequent. Then, there are still many Transjakarta Corridor 1 users who complain about the poor service delivery and implementation of health protocols. This shows that Transjakarta Corridor 1 (Blok M - Kota) services are still not optimal, so it is necessary to improve services to increase satisfaction and maintain the health of its users.

To improve services, it is necessary to review Transjakarta Corridor 1 (Blok M - Kota) services during the 'New Normal' period first. Based on the various problems above, Transjakarta Corridor 1 (Blok M - Kota) was chosen as the focus of the study area in this research. This study aims to identify the adequacy of the Transjakarta Corridor 1 (Blok M - Kota) bus fleet during the Covid-19 Pandemic.

METHODS

Transport Supply and Demand

Transportation is a service that must be utilized immediately and thus cannot be stored. Mobility must occur over transport infrastructures, providing a transport supply (Sabharwal, 2013). In several instances, transport demand is answered in the simplest means possible, notably by walking. However, in some cases, elaborate and expensive infrastructures and modes are required to provide mobility, such as for international air transportation. Transportation is a service that must be utilized immediately and thus cannot be stored. Mobility must occur over transport infrastructures, providing a transport supply. In several instances, transport demand is answered in the simplest means possible, notably by walking. However, in some cases, elaborate and expensive infrastructures and modes are required to provide mobility, such as for international air transportation (Rodrigue, Comtois, and Slack 2016).

An economic system including numerous activities located in different areas generates movements that must be supported by the transport system. Without movements, infrastructures would be useless and without infrastructures, movements could not occur or would not occur in a cost-efficient manner. This interdependency can be considered according to two concepts, transport supply and transport demand (Rodrigue, Comtois, and Slack 2016). Transport supply is defined as the capacity of transportation infrastructures and modes, generally over a geographically defined transport system and for a specific period. Therefore, supply is expressed in terms of infrastructures (capacity), services (frequency), and networks. The number of passengers, volume (for liquids or containerized traffic), or mass (for freight) that can be transported per unit of time and space is commonly used to quantify transport supply. Meanwhile, transport demand is defined as transport needs, even if those needs are satisfied, fully, partially, or not at all. Similar to transport supply, it is expressed in terms of the number of people, volume, or tons per unit of time and space (Rodrigue, Comtois, and Slack 2016).

Determining the Number of Public Transportation Fleets Demand

In general, public transport users demanded a sufficient level of service, both travel time, waiting time, guaranteed safety, and comfort during the trip. This demand can be fulfilled if the provision of public transport fleets is on a balance with the demand for public transport services (Directorate General of Land Transportation 2020). The adequacy of public transportation fleets can be determined using the supply-demand equilibrium concept which was first introduced in microeconomics theory. This model has the idea that equilibrium occurs when the supply quantity (Q_s) equals the demand quantity (Q_d), or when price and quantity in the supply-demand curve intersect (Sabharwal 2013). In this context, the adequacy of public transportation fleets occurs when the provision of public transport fleets is in equilibrium with the public transport fleet's demand.

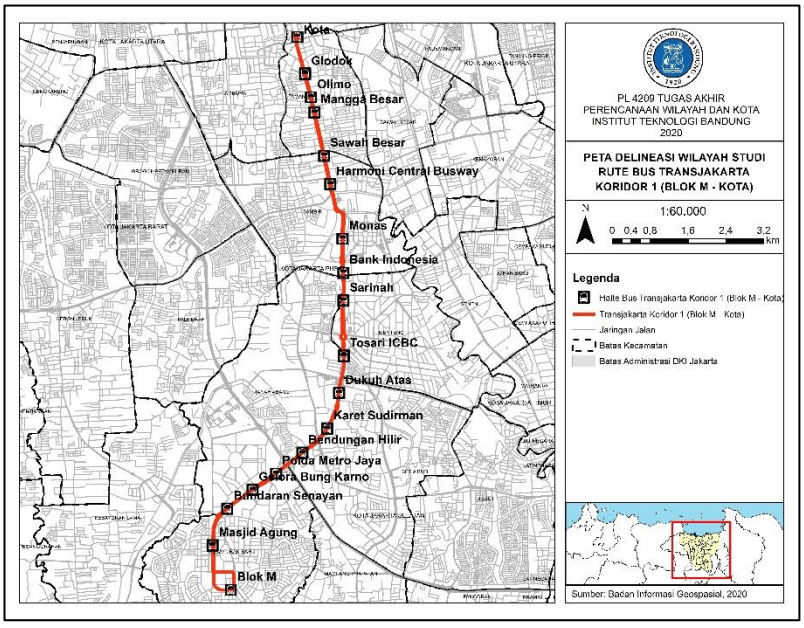
However, it is difficult to ascertain the “right” number of the fleet demand according to the needs, hence we can only determine the amount that is close to the actual demand. This uncertainty is caused by the uneven pattern of population movement over time, for example, the high demand during peak hours and low demand during non-peak hours (Directorate General of Land Transportation 2020). According to the Directorate General of Land

Transportation (2002), the following indicators are used in analyzing the public transport fleets' demand.

1. Load Factor. The load factor is a metric used to measure the percentage of available seating capacity that has been filled with passengers. The load factor is also defined as the ratio between the capacity sold and the available capacity for one trip which is usually expressed in percent (%). The load factor for public transport on each route ranges from 30% to 100%. The load factor calculation is based on the bus carrying capacity assumption as follows. In this study, the vehicle carrying capacity is defined as the percentage of the maximum number of passengers during Covid-19 compared to the maximum number of passengers under normal conditions, for example when the vehicle's maximum carrying capacity is 50%, a bus that could carry 100 passengers seated and standing before Covid-19, is now only able to carry 50 passengers.
2. Vehicle Capacity. Vehicle capacity is the passenger load capacity of each public transport vehicle. Vehicle capacity figures vary depending on the seating arrangement in the vehicle.
3. The number of public transport fleet demand on a route is determined by vehicle capacity, circulation time, vehicle stop time at the terminal, and headway.

Study Area

This study will be focused on Jakarta Province, precisely on Transjakarta Corridor 1 (Blok M - Kota). Transjakarta Corridor 1 is a Transjakarta corridor that operates with the Blok M Terminal route to the Kota Station BRT Station. Transjakarta Corridor 1 passes through three administrative city areas, namely West Jakarta, Central Jakarta, and South Jakarta. This corridor consists of 18 BRT stops, namely Kota Station, Glodok, Olimo, Mangga Besar, Sawah Besar, Harmoni Sentral, National Monument, Bank Indonesia, Sarinah, Bundaran HI, Tosari, Dukuh Atas 1, Karet Sudirman, Bendungan Hilir, Pola Metro Jaya, Gelora Bung Karno, Bundaran, Masjid Besar, and Blok M.



Picture 1. Map of Study Area

The roads that are traversed by Corridor 1 are along Sultan Hasanuddin Street, Trunojoyo Street, Sisingamangaraja Street, Sudirman Street, MH Thamrin Street, Medan Merdeka Barat Street, and Gajah Mada / Hayam Wuruk Street. The length of Transjakarta

Corridor 1 is 15.48 km with an average distance between BRT stations/stops of 650 m. The peak hours before and during the Covid-19 pandemic are still the same, 06.00-08.00 am and 4.00-6.00 pm.

This study area was chosen because according to data from PT Transjakarta (2020), Corridor 1 (Blok M - Kota) was the most populous corridor during the Covid-19 pandemic with a percentage of 18.8%. Then, the Harmoni and Karet Shelters are in the second and third ranks as the most populous stops during the Covid-19 pandemic (PT Transjakarta, 2020). In addition, in Corridor 1, problems related to overcrowding and sub-optimal service quality still occur.

RESULTS AND DISCUSSION

Supply Component

The supply component (availability) of the adequacy calculation of the Transjakarta bus fleet in Corridor 1 (Blok M - Kota) is defined as the number of the bus fleet itself. There are 91 Transjakarta bus fleets in Corridor 1 (Blok M - Kota) consisting of articulated buses (articulated buses) and single / maxi buses (large buses). Articulated buses (articulated buses) have a carrying capacity of up to 120 people, but during the Covid-19 pandemic, the maximum user capacity was limited to 60 people. Meanwhile, single/maxi buses (large buses) have a user capacity that can be transported up to 90 people, but during the Covid-19 pandemic, the maximum user capacity was limited to 30 people. Based on secondary data obtained from the DKI Jakarta Transportation Agency, it is known that the average number of bus fleets operating on weekdays is 76 bus fleets per day.

Based on data from the Trafi application, there is a “real-time” Transjakarta Corridor 1 (Blok M - City) bus travel time, it is known that during the 'New Normal' Covid-19 pandemic the average travel time from Blok M to the City was 43 minutes and from Kota to Blok M is 39 minutes. It is known that the average headway per day is 2.5 minutes, while the average headway at busy times at 06.00-08.00 WIB and 16.00-18.00 WIB is 1.88 minutes. The average Transjakarta bus speed on Corridor 1 (Blok M - Kota) is 20 km/hour with a maximum speed limit of up to 50 km/hour. Meanwhile, when the author made direct observations, it was known that the average arrival frequency of Transjakarta buses in Corridor 1 (Blok M - Kota) was 35 buses per hour.

Demand Component

The demand component in the adequacy analysis of the Transjakarta bus fleet in Corridor 1 (Blok M - Kota) is defined as the number of Transjakarta bus users in Corridor 1 (Blok M - Kota). Based on data obtained from the DKI Jakarta Central Statistics Agency, it is known that the number of Transjakarta Corridor 1 (Blok M - Kota) bus users has increased over the last five years. In 2015, the number of Transjakarta Corridor 1 (Blok M - Kota) bus users was 22,991,996 users per year or around 64,585 users per day. In 2016, there was an increase in the number of Transjakarta Corridor 1 (Blok M - Kota) bus users by 4.3%, which is 23,980,423 users per year or around 67,361 users per day. In 2017, there was an increase in the number of Transjakarta Corridor 1 (Blok M - Kota) bus users by 3.71%, which was 24,870,678 users per year or around 69,862 users per day. In 2018, there was an increase in the number of Transjakarta Corridor 1 (Blok M - Kota) bus users by 7.7%, which is 26,786,970 users per year or around 75,245 users per day. And the latest data is that in 2019, there was an increase in the number of Transjakarta Corridor 1 (Blok M - Kota) bus users by 7.15%, which is 28,703,262 users per year or around 80,627 users per day. A depiction of the number of visitors over the past five years is shown in the graph below.

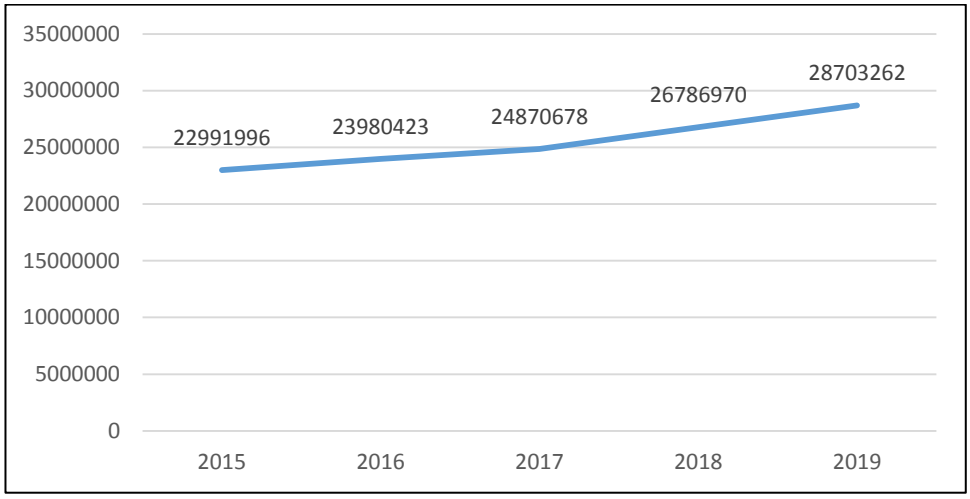


Figure 2. Number of Transjakarta Corridor 1 (Blok M - City) Bus Users in 2015-2019

In the conditions of the Covid-19 pandemic, the number of users of public transportation, including Transjakarta, experienced a drastic decline. Based on data from the DKI Jakarta Transportation Agency in Kompas.com, it is known that the number of Transjakarta Corridor 1 (Blok M - Kota) bus users at the beginning of the Transitional PSBB or 'New Normal' Covid-19 pandemic at the beginning of June 2020 was 17,302 users per day on weekdays. However, the reintroduction of the odd-even policy in DKI Jakarta at the end of July 2020 has increased the number of Transjakarta users as a whole by 7% (DKI Jakarta Transportation Agency in Tempo, 2020). Due to data limitations, by adjusting the growth rate of Transjakarta bus users as a whole per month until August 2020, it is estimated that the number of Transjakarta Corridor 1 (Blok M - Kota) bus users in August 2020 is around 32,755 users per day on weekdays. Then, it is known that currently Transjakarta Corridor 1 operates from 05.00-22.00 WIB, or for 17 hours. Thus, the estimated number of Transjakarta Corridor 1 (Blok M - Kota) bus users per hour is as follows.

$$\text{Number of users per hour} = \frac{32.755\ users\ per\ day}{17\ hours\ per\ day}$$
$$= 1.926{,}76\ users\ per\ hour \cong 1927\ users\ per\ day\ hour \quad \ldots(1)$$

This amount will be used as a reference as a component of demand (demand).

Supply and Demand Analysis of Transjakara Bus Fleet Corridor 1 (Blok M - City)

Based on the 'Avoid-Shift-Improve' strategy which is used as a basic framework in efforts to prevent the spread of Covid-19 on public transportation while achieving the goal of sustainable transportation, one of the things that are important to do by public transportation managers and the government at the Improve stage is to do demand management of passengers to prevent overcrowding while maintaining continuity of physical distancing. The adequacy of the bus fleet is important to know to ensure there is no accumulation of passengers, given the limitation of the maximum passenger carrying capacity in one bus to 50% due to government regulations to control the prevention of the spread of Covid-19. Later, the maximum passenger carrying capacity in one bus will be increased to 75% (Ramli 2020a). The adequacy of the Transjakarta bus fleet is focused on busy times to maintain continuity of physical distancing and management of passenger crowds. Thus, the adequacy of the Transjakarta bus fleet is based on the peak hour scenario when the maximum passenger

capacity is 50%, as well as the peak hours scenario when the maximum passenger capacity is 75%. In this calculation, the assumption of limiting the maximum passenger carrying capacity is made at the value of capacity (C), not at the value of the load factor (load factor).

In Transjakarta Corridor 1 (Blok M - Kota) there are two types of bus fleets serving this corridor, namely articulated buses and singe/maxi buses (large buses). However, due to data limitations, it is not known how many buses are based on their type, so the calculation will be done twice in each scenario. First of all, the adequacy of the bus fleet will be calculated if it is assumed that the entire bus fleet is a single / maxi bus, then the adequacy of the bus fleet will be calculated if it is assumed that the entire bus fleet is an articulated bus. Meanwhile, the assumptions for the maximum passenger carrying capacity are as follows:

1. In the scenario of a maximum passenger capacity of 50%, the articulated bus capacity is 60 people, while the single/maxi bus capacity (large bus) is 30 people. This determination follows the current Transjakarta policy.
2. In the scenario of a maximum passenger capacity of 75%, it is assumed that the capacity of the articulated bus is 90 people, while the capacity of a single/maxi bus (large bus) is 60 people.

Scenario 1: Peak Hours with a maximum passenger carrying capacity of 50%

In the scenario of a maximum carrying capacity of 50%, the capacity of articulated buses is 60 passengers and single / maxi buses (large buses) is 30 people.

1. Calculation of the need for single / maxi bus (big bus)

   Based on the collection of secondary data, several things have been identified, consist of:

   a. The highest number of passengers (P) = 1927 passengers
   b. The type of transportation means is a large bus with a capacity (C) = of 30 passengers
   c. Load Factor using the Ministry of Transportation standard (2002) of 0.7
   d. Travel time from Blok M bus stop to Kota and vice versa is
      - TTA = 43 minutes
      - TTB = 39 minutes

   Then, the circulation time from Blok M to Kota returns to Blok M

   $$CT\ ABA = (TAB + TBA) + (\sigma AB + \sigma BA) + (TTA + TTB) \quad \ldots(2)$$

   σAB : Deviation of travel time from Blok M to Kota
   : 5% ×43= 2,15
   σBA : Deviation of travel time from Kota to Blok M
   : 5% ×39= 1,95
   TTA : 10% ×43=4,3
   TTB : 10% ×39=3,9

   So that,

   $CT\ ABA$ = (43 + 39) + (2,15 + 1,95) + (4,3 +3,9) = 94,3 minutes …(3)

   Determined the time between (headway)

   $$H = \frac{60 \times C \times Lf}{P}$$

   $$H = \frac{60 \times 30 \times 0{,}7}{1927} \quad \ldots(4)$$

   $$H = 0{,}65\ minutes$$

   The number of vehicles needed per circulation time

$$K = \frac{CT}{H \times fA}$$

$$= \frac{94,3}{0,65 \times 1} = 50,42 \cong 154 \text{ unit } single/maxi\ bus \quad \ldots(5)$$

Need for the number of fleets in a busy period = K between 06.00-08.00 or 16.00-18.00 (W) = 2 hours = 120 minutes. Then,

$$K' = K \times \frac{W}{CT\ ABA}$$

$$K' = 154 \times \frac{120}{94,3} \quad \ldots(6)$$

$$K' = 195,97 \cong 196 \text{ single vehicle trip / maxi bus}$$

Based on the above calculations, it is known that the need for a bus fleet with the type of single/maxi bus (large bus) during the busy period in the scenario of the maximum passenger capacity of 50% is 196 single vehicle/maxi bus trips (large buses) with an effective headway of 0.65 minutes.

2. Calculation of the need for articulated buses

Based on the collection of secondary data, several things have been identified, consist of:

a. The highest number of passengers (P) = 1927 passengers
b. The type of transportation means is a large bus with a capacity (C) = of 30 passengers
c. Load Factor using the Ministry of Transportation standard (2002) of 0.7
d. Travel time from Blok M bus stop to Kota and vice versa is
   - TTA = 43 minutes
   - TTB = 39 minutes

Then, the circulation time from Blok M to Kota returns to Blok M is carried out using formula (2), followed by the calculation of CT ABA using formula (3). The result of the CT ABA is the same as the previous section, which is 94,3 minutes. The next step is calculating the time between (headway) using formula (4).

$$H = \frac{60 \times 60 \times 0,7}{1927}$$

$$H = 1,3 \text{ minutes} \quad \ldots(7)$$

The number of vehicles needed per circulation time is also calculated using the formula (5).

$$K = \frac{94,3}{1,3 \times 1} = 72,53 \cong 73 \text{ unit } articulated\ bus \quad \ldots(8)$$

Need for the number of fleets in a busy period = K between 06.00-08.00 or 16.00-18.00 (W) = 2 hours = 120 minutes (formula 6).

$$K' = 73 \times \frac{120}{94,3}$$

$$K' = 92,89 \cong 93 \text{ } vehicle \text{ trip} \quad \ldots(9)$$

Based on the above calculations, it is known that the need for a bus fleet with the type of articulated bus (articulated bus) during the busy period in the scenario of a

maximum passenger capacity of 50% is as many as 93 trips of articulated bus vehicles (articulated buses) with an effective headway of 1.35 minutes.

Scenario 2: Peak Hours with maximum passenger 75%

In the scenario of a maximum carrying capacity of 50%, it is assumed that the maximum carrying capacity of an articulated bus (articulated bus) is 90 passengers and a single/maxi bus (large bus) is 60 people.

1. Calculation of the need for single/maxi bus (large bus)
   a. Based on the collection of secondary data, several things have been identified, consist of:
   b. The highest number of passengers (P) = 1927 passengers
   c. The type of transportation means is a large bus with the assumption that the capacity (C) = 60 passengers
   d. Load Factor using the Ministry of Transportation standard (2002) of 0.7
   e. Travel time from Blok M bus stop to Kota and vice versa is
      - TTA = 43 minutes
      - TTB = 39 minutes

   Then, the circulation time from Blok M to Kota returns to Blok M is carried out using formula (2), followed by the calculation of CT ABA using formula (3). The result of the CT ABA is the same as the two previous sections, which is 94,3 minutes. The next step is calculating the time between (headway) using formula (4).

$$H = \frac{60 \times 60 \times 0{,}7}{1927}$$
$$H = 1{,}3 \text{ minutes} \quad \ldots(10)$$

   The number of vehicles needed per circulation time is also calculated using the formula (5).

$$K = \frac{CT}{H \times fA} = \frac{94{,}3}{1{,}3 \times 1} = 72{,}53 \cong 73 \text{ units } articulated\ bus$$

   Need for the number of fleets in a busy period = K between 06.00-08.00 or 16.00-18.00 (W) = 2 hours = 120 minutes (formula 6).

$$K' = 73 \times \frac{120}{94{,}3}$$
$$K' = 92{,}89 \cong 93 \text{ vehicle trip} \quad \ldots(11)$$

   Based on the above calculations, it is known that the need for a bus fleet with a single/maxi bus type (articulated bus) during a busy period in the scenario of a maximum passenger capacity of 75% is as many as 93 single vehicle trips/maxi bus (articulated bus) with an effective headway of 1,3 minutes.

2. Calculation of the need for articulated buses
   Based on the collection of secondary data, several things have been identified, consist of:
   a. The highest number of passengers (P) = 1927 passengers
   b. The type of transportation means is an articulated bus with the assumption that the capacity (C) = 90 passengers
   c. Load Factor using the Ministry of Transportation standard (2002) of 0.7
   d. Travel time from Blok M bus stop to Kota and vice versa is
      - TTA = 43 minutes
      - TTB = 39 minutes

Then, the circulation time from Blok M to Kota returns to Blok M is carried out using formula (2), followed by the calculation of CT ABA using formula (3). The result of the CT ABA is the same as the three previous sections, which is 94,3 minutes. The next step is calculating the time between (headway) using formula (4).

$$H = \frac{60 \times 90 \times 0,7}{1927}$$
$$H = 1,96 \text{ minutes} \quad \ldots(12)$$

The number of vehicles needed per circulation time is also calculated using the formula (5).

$$K = \frac{CT}{H \times fA} = \frac{94,3}{1,96 \times 1} = 48,11 \cong 49 \text{ units } articulated\ bus \quad \ldots(13)$$

Need for the number of fleets in a busy period = K between 06.00-08.00 or 16.00-18.00 (W) = 2 hours = 120 minutes (formula 6).

$$K' = 73 \times \frac{120}{94,3}$$
$$K' = 62,35 \cong 63 \text{ vehicle trip} \quad \ldots(14)$$

Based on the above calculations, it is known that the need for a bus fleet with the type of articulated bus (articulated bus) during the busy period in the 75% maximum passenger capacity scenario is 63 trips of articulated bus vehicles (articulated buses) with an effective headway of 1,96 minutes.

CONCLUSION

Based on the calculation of the two scenarios above, it is known that in the scenario the maximum number of passengers in one bus is 50%, and it takes as many as 93 articulated bus vehicle trips (articulated buses) with an effective headway of 1,3 minutes and 198 single vehicle/maxi bus trips with an effective headway of 0,65 minutes. Meanwhile, in the scenario the maximum number of passengers in one bus is 75%, it takes 63 trips of articulated bus vehicles (articulated buses) with an effective headway of 1,96 minutes and 93 trips of a single vehicle/maxi bus with an effective headway of 1,3 minute. Meanwhile, the results of the calculation of bus fleet requirements in busy periods are shown in the Table below.

Table 1. Calculation Results of Transjakarta Bus Fleet Needs in Busy Periods Based on Scenarios

Scenario	Jenis Bus	CT ABA	P	C	H	K	W	K'
Scenario 1 (50%)	Articulated bus	94,3	1927	60	1,3	73	120	**93**
	Large Bus	94,3	1927	30	0,65	154	120	**198**
Scenario 2 (75%)	Articulated bus	94,3	1927	90	1,96	49	120	**63**
	Large bus	94,3	1927	60	1,3	73	120	**93**

It can be concluded that if it is assumed that the availability of the Transjakarta Corridor 1 bus fleet currently available is 91 units, all of them are single/maxi buses (large buses), then this availability cannot meet the demand or demand for a busy period of 198 vehicles in the transport capacity scenario. maximum of 50%, and as many as 93 vehicles in the scenario of a maximum carrying capacity of 75%.

The results obtained suggest both government and PT Transjakarta, as the transport operator, need to ensure public transportation systems have the resources to maintain reliability standards while simultaneously catering to passengers' perceptions of safety, through social distancing measures. This might include increasing the number of bus fleets, frequency of services, bus headway, and publishing real-time data on bus fleets' occupancy to allow commuters to travel in relatively less crowded vehicles. Besides, to avoid the possibility of bus delays, it is necessary to make efforts to sterilize the Transjakarta busway lanes.

Meanwhile, if it is assumed that the currently available Transjakarta Corridor 1 bus fleet totals 91 units, all of which are articulated buses, then the availability cannot meet the demand or demand for the busy period of 93 vehicles in the scenario of a maximum carrying capacity of 50%. However, this availability has met the needs or demand (demand) of a busy period of 63 vehicles in a scenario of a maximum carrying capacity of 75%. In general, it is concluded that in the scenario of a maximum carrying capacity of 50%, the availability of single/maxi buses (large buses) and articulated bus fleets has not been able to meet the demand for passengers to prevent passenger buildup. Then, in the scenario of a maximum transport capacity of 75%, the availability of a single/maxi bus (large bus) fleet has not been able to meet passenger demand to prevent passenger build-up, but articulated bus (articulated bus) buses are sufficient.

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