Evaluation of Total Armada Transport City Route 05B in Cianjur City

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Abstract. The transportation problem is a classic problem that occurs in almost every city in Indonesia, including the city of Cianjur which is located in the province of West Java. One focus of transportation problems in the city of Cianjur is about the number of Cianjur city transportation that is too much operating but not balanced with the number of passengers served. This condition causes the city transportation drivers to fight over passengers to catch up with deposits. The method of conducting the research was carried out by a dynamic survey, carried out in a vehicle by the method of recording the number of passengers who boarded and alighted vehicles traveling on a route, where the officer recorded the number of passengers who boarded and descended and or travel time in each segment. After analyzing, the loading factor value for rush hour and rush hour turns out to be under 50%. The average number of fleets 05B needed to be based on circulation time (K) at morning rush hour 1 unit vehicle/hour, rush hour afternoon 2 units vehicles/hour, and during the afternoon no rush hour 1 unit of vehicle/hour. While the number of trips (fleet trips) needed in the busy period and non-busy time (K ') in the morning rush hour 2 vehicle trips (trip) / hour, rush hour noon 2 Vehicle trip (trip) / hour and at no-rush hour afternoon 2 Vehicle trip (trip) / hour. Keywords: Load Factor, fleet requirements, service performance.

1. Introduction
The function of transportation is to move or move people and / or goods from one place to another using certain systems for certain purposes [1]. States that public transport services can classified into three groups based on the type of route and the journey it serves: 1. Short distance transportation, 2. City transportation, 3. Regional transportation [2]. City transportation is transportation from one place to another within the city area by using a bus car and / or public passenger car that is bound inside route [3]. The purpose of this research is to conduct a study of the Cianjur city transportation operations in an attempt to rationalize the number of Cianjur city transportation operating. Reviewing public transport fleets that have operated on these routes, to achieve efficient public transportation in terms of travel time, circulation time, headway, and fleet numbers.

2. Literature review
Public transport is a means of transportation for small and medium-sized communities to carry out their activities in line with their duties and functions in the community. States that public passenger transportation is passenger transportation carried out with a rental or pay system. It is also said that what is included in the definition of passenger public transportation is city transportation (bus, minibus, etc.), train, water transportation, and air transportation. The existence of public transportation aims to organize
good and proper transportation for the community. A good measure of service is safe, comfortable, fast and cheap service [4]

3. Research Methodology

The methodology used in this research is by conducting a survey which is divided into 2 parts of the survey namely static survey and dynamic survey

- **Static Survey:** This survey is conducted to obtain data on the number of operating fleets, load factors, service frequency, and time between headways. Static surveys are carried out at terminals and roads.
- **Dynamic Survey:** This survey is carried out on city transportation to record the ups and downs of passengers to get the total number of passengers per day, and to know the travel time to get the total time in one trip including delays and stop times for raising and lowering passengers. [5]

Through this survey, the data obtained include: loading factor, travel time, number of passengers based on various observations in the field to obtain operational aspects of public transport data [6]. Conducting this survey, it is carried out by following the vehicle from the original route to the final route with the registrar in it or by following from behind using a motorbike, to avoid reducing the passenger-carrying capacity. This research was conducted on weekdays and holidays and during peak hours and off-peak hours from 6:00 to 18:00

3.1. Retrieval of Data on Number of Passengers Above Vehicles.

Data retrieval of the number of passengers on the vehicle is done by subtracting the number of passengers who have risen against the number of passengers who have descended on each intersection segment.

What is meant by the intersection segment above is the area where one stops with the next stop. Thus if a passenger rises between the stops then it is assumed that the passenger rides at one of the closest stops.
on the number of passengers on a vehicle that has been converted into a load, factor value can be seen in graph 1.

![Number of Passengers a Day](image)

Graph 1. Number of Passengers a Day

4.2. Traveling time.
Travel time average data for public transportation 05B with majors Joglo Terminal - Advanced Terminal (Ramayana) and Advance Terminal (Ramayana) - Joglo Terminal collected in the morning, afternoon, and evening hours in this study were collected and presented in table 1.

| Day / o'clock   | Police Nomor | Terminal Joglo-Terminal Muka (Ramayana) (minute) | Terminal Muka (Ramayana)-Terminal Joglo (minute) |
|-----------------|--------------|-----------------------------------------------|-----------------------------------------------|
| Monday/06.00-10.00 | F 1909 WB    | 21.86                                         | 17.42                                         |
| Monday/10.00-14.00 | F 1909 WB    | 19.74                                         | 19.22                                         |
| Monday/14.00-18.00 | F 1909 WB    | 23.12                                         | 15.93                                         |
| Tuesday/06.00-10.00 | F 1988 YS   | 20.24                                         | 19.24                                         |
| Tuesday/10.00-14.00 | F 1988 YS/ F 1984 Y5 | 24.69 | 15.59                                         |
| Tuesday/14.00-18.00 | F 1984 Y5   | 21.09                                         | 15.79                                         |
| Wednesday/06.00-10.00 | F 1979 YY   | 16.41                                         | 19.18                                         |
| Wednesday/10.00-14.00 | F 1979 YY   | 17.09                                         | 14.50                                         |
| Wednesday/14.00-18.00 | F 1979 YY   | 20.09                                         | 14.22                                         |
| Thursday/06.00-10.00 | F 1962 YD/F 1906 YM | 20.33 | 24.72                                         |
| Thursday/10.00-14.00 | F 1992 YE   | 37.57                                         | 20.86                                         |
| Thursday/14.00-18.00 | F 1992 YE   | 45.45                                         | 16.76                                         |
| Friday/06.00-10.00 | F 1951 YE   | 19.69                                         | 13.56                                         |
| Friday/10.00-14.00 | F 1906 YY   | 19.52                                         | 13.02                                         |
| Friday/14.00-18.00 | F 1906 YY   | 18.17                                         | 17.89                                         |
| Saturday/06.00-10.00 | F 1972 YP   | 20.61                                         | 16.15                                         |
| Saturday/10.00-14.00 | F 1978 WR   | 20.31                                         | 22.66                                         |
| Saturday/14.00-18.00 | F 1922 YY   | 16.75                                         | 16.31                                         |
| Sunday/06.00-10.00 | F 1938 YD   | 17.66                                         | 15.18                                         |
| Sunday/10.00-14.00 | F 1933 YD   | 18.44                                         | 19.95                                         |
| Sunday/14.00-18.00 | F 1992 YY   | 19.06                                         | 16.92                                         |
4.3. Circulation Time.

Data of circulation time of public transportation 05B with majors of Joglo Terminal-Joglo-Advance Terminals, namely from the initial term to the end terminal back to the initial terminal, which has been taken during morning rush hour, not busy hour, and evening rush hour in this study was collected and presented at Table 2.

| Day / o'clock       | Police Nomor          | Circulation time (Minute) |
|---------------------|-----------------------|---------------------------|
| Monday/06.00-10.00  | F 1909 WB             | 45.17                     |
| Monday/10.00-14.00  | F 1909 WB             | 44.80                     |
| Monday/14.00-18.00  | F 1909 WB             | 44.91                     |
| Tuesday/06.00-10.00 | F 1988 YS             | 45.40                     |
| Tuesday/10.00-14.00 | F 1988 YS/ F 1984 Y5 | 46.32                     |
| Tuesday/14.00-18.00 | F 1984 Y5             | 42.41                     |
| Wednesday/06.00-10.00 | F 1979 YY          | 40.93                     |
| Wednesday/10.00-14.00 | F 1979 YY          | 36.33                     |
| Wednesday/14.00-18.00 | F 1979 YY            | 39.46                     |
| Thursday/06.00-10.00 | F 1962 YD/F 1906 YM | 51.81                     |
| Thursday/10.00-14.00 | F 1992 YE             | 67.19                     |
| Thursday/14.00-18.00 | F 1992 YE             | 71.54                     |
| Friday/06.00-10.00  | F 1951 YE             | 38.24                     |
| Friday/10.00-14.00  | F 1906 YY             | 37.42                     |
| Friday/14.00-18.00  | F 1906 YY             | 41.47                     |
| Saturday/06.00-10.00 | F 1972 YP            | 42.27                     |
| Saturday/10.00-14.00 | F 1978 WR             | 49.42                     |
| Saturday/14.00-18.00 | F 1922 YY             | 38.02                     |
| Sunday/06.00-10.00  | F 1938 YD             | 37.77                     |
| Sunday/10.00-14.00  | F 1933 YD             | 44.15                     |
| Sunday/14.00-18.00  | F 1992 YY             | 41.38                     |

5. Survey data processing

5.1 Determine Fleet Amount Based on Circulation

Data Calculation of the number of fleets needed in busy and non-busy periods is analyzed based on circulation time data.
Table 3. Number of Fleets Based on Circulation

| Day / o’clock         | Circulation Time | P (Hourly Passenger) | C (Capacity) | Lf (d) (%) | H (minute) | K (hourly vehicle) | W (minute) | K’ (hourly vehicle) |
|-----------------------|------------------|----------------------|--------------|------------|------------|-------------------|------------|---------------------|
|                       | CT ABA (minute)  | (1)                  | (2)          | (3)        | (4)        | (5)               | (6)        | (7)                 |
| Monday/06.00-10.00    | 45,17            | 10                   | 12           | 70         | 50,40      | 1,00              | 60         | 1,32                |
| Monday/10.00-14.00    | 44,80            | 12                   | 12           | 70         | 42,00      | 1,19              | 60         | 1,59                |
| Monday/14.00-18.00    | 44,91            | 10                   | 12           | 70         | 50,40      | 0,99              | 60         | 1,32                |
| Tuesday/06.00-10.00   | 45,40            | 11                   | 12           | 70         | 45,82      | 1,10              | 60         | 1,46                |
| Tuesday/10.00-14.00   | 46,32            | 10                   | 12           | 70         | 50,40      | 1,02              | 60         | 1,32                |
| Tuesday/14.00-18.00   | 42,41            | 7                    | 12           | 70         | 72,00      | 0,65              | 60         | 0,93                |
| Wednesday/06.00-10.00 | 40,93            | 5                    | 12           | 70         | 100,80     | 0,45              | 60         | 0,66                |
| Wednesday/10.00-14.00 | 36,33            | 8                    | 12           | 70         | 63,00      | 0,64              | 60         | 1,06                |
| Wednesday/14.00-18.00 | 39,46            | 5                    | 12           | 70         | 100,80     | 0,43              | 60         | 0,66                |
| Thursday/06.00-10.00  | 51,81            | 9                    | 12           | 70         | 56,00      | 1,03              | 60         | 1,19                |
| Thursday/10.00-14.00  | 67,19            | 12                   | 12           | 70         | 42,00      | 1,78              | 60         | 1,59                |
| Thursday/14.00-18.00  | 71,54            | 10                   | 12           | 70         | 50,40      | 1,58              | 60         | 1,32                |
| Friday/06.00-10.00    | 38,24            | 6                    | 12           | 70         | 84,00      | 0,51              | 60         | 0,79                |
| Friday/10.00-14.00    | 37,42            | 6                    | 12           | 70         | 84,00      | 0,49              | 60         | 0,79                |
| Friday/14.00-18.00    | 41,47            | 10                   | 12           | 70         | 50,40      | 0,91              | 60         | 1,32                |
| Saturday/06.00-10.00  | 42,27            | 10                   | 12           | 70         | 50,40      | 0,93              | 60         | 1,32                |
| Saturday/10.00-14.00  | 49,42            | 12                   | 12           | 70         | 42,00      | 1,31              | 60         | 1,59                |
| Saturday/14.00-18.00  | 38,02            | 7                    | 12           | 70         | 72,00      | 0,59              | 60         | 0,93                |
| Sunday/06.00-10.00    | 37,77            | 12                   | 12           | 70         | 42,00      | 1,00              | 60         | 1,59                |
| Sunday/10.00-14.00    | 44,15            | 10                   | 12           | 70         | 50,40      | 0,97              | 60         | 1,32                |
| Sunday/14.00-18.00    | 41,38            | 5                    | 12           | 70         | 100,80     | 0,46              | 60         | 0,66                |

Information:
- CT ABA = circulation time from A to B, back to A minute
- P = number of passengers per hour in the most populous section
- C = vehicle capacity (passenger)
- H = time between / headway (minutes)
- K = fleet requirements per circulation time (vehicle unit)
- W = time period (minutes)
- K’ = Number of fleets in Busy period (vehicle trip)
6. Research Result

Based on the analysis done in Table 3, the results of the analysis are:

6.1 That the average number of vehicles per circulation time ($K$) needed per day that departs from the joglo terminals-joglo terminals when the circulation time of the vehicle ($K$) is:

- In the morning rush hour is $0.86 \sim 1$ vehicle / hour
- During peak hours, it is $1.06 \sim 2$ units of vehicle/hour
- In the no-rush hour in the afternoon $0.80 \sim 1$ unit of vehicle / hour

6.2 While the number of trips (trips) of vehicles during peak hours and not busy periods ($K'$) after being analyzed and averaged, namely:

- During morning rush hour $= 1.19 \sim 2$ Vehicle trips/hour
- During rush hour during the day $= 1.32 \sim 2$ Vehicle trips/hour
- In the no-busy afternoon hours is $= 1.02 \sim 2$ Vehicle trips / hour

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