FINAL PROJECT

PERFORMANCE EVALUATION OF TRANS JOGJA BUS (CASE STUDY: TRANS JOGJA BUS LINE K1J)

Aimed for Islamic University of Indonesia Yogyakarta to Fulfill the Requirements to Obtain a Bachelor's Degree in Civil Engineering

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VALIDATION SHEET

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ii

PLAGIARISM-FREE STATEMENT

I declare that this Final Project report that I have written as a requirement for completing the Bachelor's program in Civil Engineering Study Program, Faculty of Civil Engineering and Planning, Universitas Islam Indonesia is the result of my own work. Certain parts in this Final Project report that I have quoted from other people's work have been written in the source clearly in accordance with the norms and ethics of writing a scientific paper. If in the future it is discovered that all or part of this Final Project report is not my own work or there is plagiarism in certain parts, I am willing to accept the consequences, including revocation of the academic title I hold in accordance to the applicable law.

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iii

FOREWORD

We give thanks to Allah SWT, so that the author can complete the Final Project report entitled Performance Evaluation of Trans Jogja Bus (Case Study: Line K1J). The Final Project report is one of the requirement for completing the Undergraduate Study Program in the Department of Civil Engineering, Faculty of Civil Engineering and Planning, Universitas Islam Indonesia.

In preparing the Final Project report, the author encountered multiple obstacles during the writing process and received a lot of guidance and help from the surrounding environment, such as suggestions, criticism, and comments to complete this Final Project report with maximum results. In this occasion the author would like to express her deepest thank you to:

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Finally, the author hopes that this Final Project report will be useful for other parties and people who read it.

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TABLE OF CONTENTS

COVER i
VALIDATION SHEET ii
PLAGIARISM FREE STATEMENT iii
FOREWORD iv
TABLE OF CONTENTS v
LIST OF TABLES ix
LIST OF FIGURES x
LIST OF ATTACHMENTS xi
ABSTRACT xii
CHAPTER I INTRODUCTION 1
1.1 Background 1
1.2 Problem Statements 3
1.3 Research Aims 3
1.4 Research Benefits 3
1.5 Research Limitations 4
CHAPTER II LITERATURE REVIEW 5
2.1 General Review 5
2.2 Performance of Public Transportation 5
2.3 Vehicle Operational Costs 6
2.4 Transportation Financial Feasibility 7
2.5 Comparison of Researches Related to Performance Evaluation of Trans Jogja Bus 8
CHAPTER III THEORETICAL BASIS 11
3.1 Public Transportation Performance Parameters 11
3.2 Measurements of Public Transportation Performance Parameters 12
3.2.1 Load Factor 12
3.2.2 Headway 12
3.2.3 Speed 12
3.2.4 Passenger Waiting Time 13
3.3 Public Transportation Fares 13

3.4 Vehicle Operational Costs 14
3.5 Fare and Financial Analysis 18
CHAPTER IV RESEARCH METHODS 20
4.1 Research Type 20
4.2 Research Methods 20
4.3 Data Collecting 21
4.3.1 Primary Data Collection Schedule 22
4.3.2 Data Collecting Location 22
4.3.3 Data Collecting Equipment 24
4.4 Data Analysis 25
4.5 Research Flowchart 26
CHAPTER V DISCUSSION 28
5.1 Data Collection 28
5.1.1 Secondary Data 28
5.1.2 Primary Data 30
5.2 Data Analysis 30
5.2.1 Load Factor 30
5.2.2 Headway 37
5.2.3 Speed 45
5.2.4 Waiting Time 49
5.2.5 Vehicle Operational Costs Analysis 50
5.2.6 Fare and Financial Analysis 56
5.3 Discussion 58
5.3.1 Performance Evaluation of Trans Jogja Bus Line K1J 58
5.3.2 Vehicle Operational Costs Discussion 59
5.3.3 Fare and Feasibility Analysis Discussion 60
CHAPTER VI CONCLUSION AND RECOMMENDATIONS 61
6.1 Conclusion 61
6.2 Recommendations 61
BIBLIOGRAPHY 64
ATTACHMENT 66

LIST OF TABLES

Table 2.1	Comparison of Researches Related to Performance Evaluation of Trans Jogja Bus	9
Table 3.1	Public Transportation Indicators Based on World Bank	11
Table 3.2	Direct and Indirect Costs Components	15
Table 5.1	Line K1J Segment Division and Distance	28
Table 5.2	Line K1J Average Load Factor on Thursday and Sunday at Morning Peak Hour	31
Table 5.3	Line K1J Average Load Factor on Thursday and Sunday at Afternoon Peak Hour	34
Table 5.4	Line K1J Average Headway on Thursday, October 19th 2023 at Morning Peak Hour	38
Table 5.5	Line K1J Average Headway on Sunday, October 22nd 2023 at Morning Peak Hour	39
Table 5.6	Line K1J Average Headway on Thursday, October 19th 2023 at Afternoon Peak Hour	41
Table 5.7	Line K1J Average Headway on Sunday, October 22nd 2023 at Afternoon Peak Hour	43
Table 5.8	Speed on Thursday, October 19th 2023 at Morning Peak Hour	45
Table 5.9	Speed on Sunday, October 22nd 2023 at Morning Peak Hour	46
Table 5.10	Speed Recapitulation at Morning Peak Hour	46
Table 5.11	Speed on Thursday, October 19th 2023 at Afternoon Peak Hour	47
Table 5.12	Speed on Sunday, October 19th 2023 at Afternoon Peak Hour	48
Table 5.13	Speed Recapitulation at Afternoon Peak Hour	48
Table 5.14	Waiting Time at Morning Peak Hour	49
Table 5.15	Waiting Time at Afternoon Peak Hour	50
Table 5.16	Direct Cost Recapitulation	55
Table 5.17	Performance Evaluation Recapitulation	58

LIST OF FIGURES

Figure 4.1	Trans Jogja Bus K1J Route	24
Figure 4.2	Research Flowchart	27
Figure 5.1	Line K1J Average Load Factor at Morning Peak Hour	33
Figure 5.2	Line K1J Average Load Factor at Afternoon Peak Hour	36
Figure 5.3	Average Headway of Thursday and Sunday at Morning Peak Hour	41
Figure 5.4	Average Headway of Thursday and Sunday at Afternoon Peak Hour	45
Figure 5.5	Average Speed at Morning Peak Hour	47
Figure 5.6	Average Speed at Afternoon Peak Hour	48
Figure 5.7	Waiting Time at Morning Peak Hour	49
Figure 5.8	Waiting Time at Afternoon Peak Hour	50

LIST OF ATTACHMENTS

Attachment 1	Schedule	67
Attachment 2	Survey Form Trans Jogja Bus Line K1J	68
Attachment 3	Survey Permission Letter	69
Attachment 4	Number of Passengers	70
Attachment 5	Load Factor on Thursday	70
Attachment 6	Load Factor on Sunday	84
Attachment 7	Headway on Thursday	99
Attachment 8	Headway on Sunday	103
Attachment 9	Vehicle Operational Costs Survey	107

ABSTRACT

Yogyakarta's population only continues to grow as time goes by, the needs of public transportation escalate. Trans Jogja Bus Line K1J is a new route that reaches a wider area of Yogyakarta. The evaluation of Trans Jogja Bus performance and the vehicle operational cost has to be done in order to obtain data with the purpose of concluding its feasibility.

This research used the requirements set by World Bank to find the value of load factor, headway, speed, and waiting time. The vehicle operational costs determined based on the Decree of the Ministry of Transportation Number 251 of 2022 and the financial analysis used the Benefit Cost Ratio (BCR) method.

The results of performance evaluation obtained of load factor was 7.22%. The value of average headway was 8.95 minutes. The value of average speed was 21.89 km/hour. The value of average waiting time was 4.74 minutes. The value of vehicle operational costs was Rp 10.457,29/km. The results for financial analysis with BCR method were not feasible because the BCR < 1 with the value obtained of 0.077. The fare evaluation was carried out to find out how much fare required so that the BCR > 1, with the results of Rp 46.865,91/passenger.

Keywords: BCR, fare, performance, Trans Jogja, and vehicle operational cost

CHAPTER I
INTRODUCTION

1.1 Background

Being one of the busiest tourist destinations, it is only normal for Yogyakarta to be packed by people. Not only tourists, many immigrants and students come and live for certain periods of time in this city. As Yogyakarta's population only continues to grow as time goes by, the needs of public transportation to accommodate the people also increases.

Public transportation is a very helpful facility that is very much needed by people from all generations because of its role to move or transport people from their initial place to their destination. Public vehicle is any motorized vehicle provided to use by everyone with a fee (Directorate General of Land Transportation, 2002).

The current city of Yogyakarta, where currently much development is happening, has a significant impact on the daily routine of the people in the community. For instance, the rapidly increasing movement of people and goods, this has caused the growing demand for services.

To support the smooth running of the economic activities of the population, a suitable transportation system is one of the crucial needs, as it is the case with Yogyakarta which is a fairly developed area both in terms of regional development and economy.

The centre of Yogyakarta's daily life happens in the city center area. Though, many houses are located in the sub-district area. This has made people have to travel short or long distances with a vehicle to reach the centre where they work on a daily basis. Consequently, a mode of transportation is a crucial thing for the local people. Nonetheless, public transportation is still not much in demand by the public due to several factors such as the lack of quality in facilities and the spread of public transportation fleets. In order to move around, owning a private vehicle is a necessity for society.

Private vehicles are still one of the transportation modes that people are interested in to use to meet their daily mobility needs. This is caused by several factors, namely the faster duration, easier access, and in terms of convenience. Consequently, this will cause the increasing number of private vehicle owners.

In an effort to revive public transportations, Dinas Perhubungan of Yogyakarta City has added three new Trans Jogja route corridors, which are the K1J, K2J, and K3J routes. In addition, with the new routes covering more areas, it is possible for students to come to their schools that are located in sub-district to use the Trans Jogja Bus. The expanding of Trans Jogja Bus can be the effective solution for the public to get around from their homes to the city centre, in addition to reducing traffic.

Trans Jogja Bus Line K1J is a new route that reaches a wider area of Yogyakarta. On account of this line being recently added, the evaluation of Trans Jogja Bus performance has to be done in order to obtain data with the purpose of concluding whether or not it is suitable for use. Several studies regarding the performance of Trans Jogja Bus have been carried out in the past on other available older routes. Research done by Saputra (2020), about the operational performance evaluation of Trans Jogja Bus Line 5A was done with consideration of the long headway time that was resulting in a longer passenger waiting time. The said study was conducted with the aim of obtaining data to re-evaluate the operational performance evaluation with load factor, headway, speed, availability, and circulation time as a parameter. Another similar research is also done by Anggraeni (2018) with the title Performance Evaluation of Public Transportation in Magelang City Line 1 and Line 8.

The performance of the bus is the crucial thing that must be ensured running smoothly. The number of passengers, the inaccuracy of the bus operation time, the price of the fare, and the number of bus availability are among other things that has to be seen further. Therefore, research is done to gather data to assess the condition of Trans Jogja Bus Line K1J operational performance based on load factor, headway, speed, and passenger waiting time. In addition of the performance evaluation, a calculation of vehicle operating costs and financial

feasibility analysis will also be done to ensure more aspect of Trans Jogja Bus Line K1J.

1.2 Problem Statements

Based on the background, the problem statements that can be discussed are as follows.

1. How is the operating performance of Trans Jogja Bus in Line K1J based on load factor, headway, speed, and passenger waiting time?
2. How are the vehicle operational costs of Trans Jogja Bus in Line K1J?
3. How is the current financial feasibility of the fare of Trans Jogja Bus in Line K1J using Benefit Cost Ratio (BCR)?

1.3 Research Aims

Based on the problem statements stated, the aims of this research are as follows.

1. Evaluate the operating performance of Trans Jogja Bus in Line K1J based on load factor, headway, speed, and passenger waiting time.
2. Calculate the vehicle operational costs of Trans Jogja Bus in Line K1J.
3. Study the current financial feasibility of the fare Trans Jogja Bus in Line K1J using Benefit Cost Ratio (BCR).

1.4 Research Benefits

The results of this final project research are expected and hoped to provide more overview to researchers in the field of transportation and for society and people in general.

a. To provide advice and evaluation material as a reference for comparison of vehicle operating costs.
b. To provide input and suggestions for Dinas Perhubungan with the purpose of improving urban transportation services in Yogyakarta
c. As a support for further research.

1.5 Research Limitations

The limitations in doing this research are as follows.

1. The research area is Yogyakarta City.
2. Public transportation that is being researched is Trans Jogja Bus Line K1J.
3. Operating performance is evaluated based on World Bank (1986)
4. The calculation of vehicle operational costs using the method from Decree of the Ministry of Transportation Number 251 of 2022 and financial analysis using the Benefit Cost Ratio (BCR) method.
5. Research variables that are being studied are limited to load factor, headway, speed, and passenger waiting time.
6. Price that is being used in calculating the costs is the price that is valid in the year of research (2023)

CHAPTER II
LITERATURE REVIEW

2.1 General Review

A general review of previous research is done with the aim of finding things that have any relation and relevancy to the research that is going to be carried out by the writer. With a review being done first hand, the writer is able to make comparisons regarding the research and objectives to ensure there is no repetition taking place in the research process.

2.2 Performance of Public Transportation

The existence of public transport as a transportation service, causes changes related to the mobility of the population. The implementation and procurement of public transportation is technical; ranging from land procurement, the capital, space provision, and others (Aminah, 2018). Services in the transportation sector are important, must be continued to be assessed and developed in order to support accessibility and mobility for residents to carry out their activities (Zakiyah and Fadiyah, 2020)

Transportation performance is an illustration of how adequate or not bad public transportation services are in serving the public and in providing mobility. Consequently, it is essential to have an evaluation which can be put to use as a controlling function for the performance of public transportation services. Several studies conducted in the past include:

Anggraeni (2018) conducted a research about Performance Evaluation of Public Transportation in Magelang City with an aim to evaluate the performance of urban transportation in Magelang particularly in Line 1 and Line 8, knowing the vehicle operational costs (BOK) along with the determination of urban transportations rate in Line 1 and Line 8, and giving suggestions for improving the performance of urban transportation in Line 1 and Line 8. Based on the results, it was obtained the value of average load factor 13,42% for Line 1 and 7,89% for Line 8, the value of headway was 4,38 minutes for Line 1 and 6,05 minutes for Line 8.

Subsequently, the circulation time acquired for Line 1 and Line 8 was 46,48 minutes and 52,24 minutes, whereas the availability value obtained for Line 1 was 79% and for Line 8 was 88%. Next, the amount of vehicle operational costs using the load factor in existing condition was Rp. 2.081,92 for Line 1 and Rp. 2.103,75 for Line 8. Consequently, with the condition of the existing fare, annual income for Line 1 was Rp. 4.162.950.000, with that amount, obtained the Benefit Cost Ratio (BCR) > 1 which is 1,109, this means that the cooperative will get the benefit. Whereas Line 8, the annual income received was Rp. 2.557.800.000, with this amount the cooperative will experience loss because the value of BCR, which was 0.682, is less than 1. Cooperative will reach BEP condition at load factor 11,56%.

Saputra (2020) conducted a research about Operational Performance Evaluation of Public Transportation for Trans Jogja Bus in route 5A with an aim to know the average value of load factor, average headway, average circulation time needed to carry out one round of route, average speed, and the average availability of Trang Jogja Bus in route 5A. From the analysis results, the load factor is 14%. This data shows the low level of passenger occupancy. Moreover, the headway results acquired was 27 minutes, which does not fulfill the standard from the Ministry of Transportation with an average of 5 – 10 minutes of average time. Then, the value of 78 minutes from circulation time was obtained. Whereas the average speed time was already in accordance with the guidelines, with a value of 20km/hour. The availability of transportation stands at 98%, significantly higher than the indicator from World Bank Policy Study (1986) about Urban Transport with an indicator of 80%-90%.

2.3 Vehicle Operational Costs

Costs are a form of sacrifice where economic resources are expressed in units of money, whether it has occurred or may occur as a company's efforts to obtain goods or services (Purwaji et al., 2018). Kamaludin (2018), stated that vehicle operating costs can be defined as the costs of all factors relating to operating a vehicle under their normal conditions for a particular purpose.

According to Department of Transportation (2002), fare is the amount is the amount of fees charged to a each and every passenger of a public transportation vehicle expressed in rupiah. The determination of vehicle operating costs are made with the objectives of encouraging optimum use of transportation facilities and services.

Kusuma (2019) conducted a research entitled Analysis of Public Transportation Based on Vehicle Operational Costs (Study Case: Trans Lampung Bus Bandar Lampung – Bandara Inten II Route). This research was written with the objectives of analysing fare based on vehicle operating costs, evaluate the differences of costs between the operating costs and the costs existing, and to evaluate the minimal load factor. Research methods used in this paper is the analysis descriptive methods which required collecting primary and secondary data through a direct survey and an interview with related institution. The analysis resulted with the fare calculation based on vehicle operating costs on Trans Lampung Bus Bandar Lampung – Raden Inten II route has 11.43% as their factor existing and Rp38.100,00/passenger as their fare. Based on the research data that has been gathered from the Trans Lampung Bus institution on Bandar Lampung – Raden Inten II and Raden Inten II – Bandar Lampung route on (weekdays) 5, 12, 19, and 26 November 2018 and on (weekends) 4, 11, 18, and 25 November 3028 has the load factor of 12,58%, thus acquired the load factor of Rp34.700,00/passenger. Based on the data that has been collected from the Trans Lampung Bus institution on Bandar Lampung – Bandara Raden Inten II and Bandara Raden Inten II – Bandar Lampung route on weekday and weekend, acquired the average load factor of 14,46%, thus the vehicle operating costs fare was Rp30.000,00/passenger. Based on the load factor survey on September 10th 2018 – November 3rd 2018 on Monday (weekend) and Sunday (weekend), acquired load factor 21,79%, thus the vehicle operating costs was Rp20.200,00/passenger.

2.4 Transportation Financial Feasibility

Economic feasibility is carried out by analysing the costs of a project and calculating the profits results from the projects. Economic feasibility have the

objectives of finding out whether a project or an idea is economically feasible. (Salsabila, 2023). The initial aim of carrying out a financial feasibility analysis is in order to avoid excessive investment in projects that are not necessarily profitable. Financial feasibility analysis is an important tool to examine the possibility of profits.

Arifin and Khairunnisa (2018) conducted a research titled Analysis of Fares Based on Determination of Vehicle Operational Costs (Case Study: Mayasari Bakti Patas Bus Pulogadung – Kampung Rambutan Route). The objectives of this research was to calculate the vehicle operational costs, to analyse the income from the operational, calculate fares, and to evaluate the economic and financial feasibility of the Mayasari Bakti Patas Route 98A. The research was carried out in several methods, acquiring primary data from related institutions and secondary data from direct survey. The results obtained from this research was the ideal load factor gotten is 72% with the productivity amount/bus is 3.717.000 seat-km/year. The basic costs for every seat-km with load factor of 100% and 59 passengers, direct and indirect costs came to a total of Rp471.106.966,-. Transportation fare were obtained from a load factor of 70% plus 10% was Rp7.554,-. Based on the load factor of 70% and the gross income of the bus per year are Rp929.196.042,-. From the results of economic analysis in a period of 5 years, operational of the bus is feasible with an interest rate of 14% in terms of Internal Rate of Return (IRR) or Net Present Value (NPV) at a normal condition or contingency, with no decrease in income.

2.5 Comparison of Researches Related to Performance Evaluation of Trans Jogja Bus

The comparison of multiple researches related to Performance Evaluation of Trans Jogja Bus can be seen in Table 2.5 below.

Table 2.1 Comparison of Researches Related to Performance Evaluation of Trans Jogja Bus

No	Author	Anggraeni (2018)	Wijaya (2019)	Kusuma (2019)	Saputra (2020)	Arifin and Khairunnisa (2018)	Maharani (2023)
1	Title	Performance Evaluation of Public Transportation in Magelang City (Case Study Line 1 and Line 8)	Analysis of Trans Jogja Fares Based On Operational Cost, ATP, and WTP in in Route 5A	Analysis of Public Transportation Based on Vehicle Operatioal Costs (Case Study: Trans Lampung Bandar Lampung – Bandara Raden Inten II Route)	Operational Performance Evaluation of Public Transport (Case Study Trans Jogja Bus Route 5A)	Analysis of Fares Based on Determination of Vehicle Operational Costs (Case Study: Mayasari Sakti Patas Bus Pulogadung – Kampung Rambutan)	Performance Evaluation of Trans Jogja Bus (Case Study: Line K1J)
2	Location	Magelang City	Yogyakarta	Bandar Lampung	Yogyakarta	Jakarta	Yogyakarta
3	Line and Route	Line 1 and Line 8	Route 5A	Bandar Lampung – Bandara Raden Inten II	Route 5A	Route 98A (Pulogadung – Kampung Rambutan)	Line K1J
4	Variables Reserached	Load factor, headway, circulation time, speed, travel time, availability, vehicle operational costs	Vehicle operational costs, ability to pay (ATP), willingness to pay (WTP)	Load factor, vehicle operational costs	Load factor, headway, circulation time, speed, availability	Load factor, vehicle operational costs	Load factor, headway, speed, passenger waiting time, vehicle operational costs, benefit cost ratio

Source: Anggraeni (2018), Wijaya (2019), Kusuma (2019), Saputra (2020), and Arifin and Khairunnisa (2018)

Continuation of Table 2.1 Comparison of Researches Related to Performance Evaluation of Trans Jogja Bus

No	Author	Anggraeni (2018)	Wijaya (2019)	Kusuma (2019)	Saputra (2020)	Arifin & Khairunnisa (2018)	Maharani (2023)
5	Results	Line 1: LF= 13,42%, CT= 46,48 minutes, speed= 19,98 km/hour, Headway= 4,38 minutes, Availability= 79%, VOC= Rp2.081,92, BCR= 1,11. Line 8: LF= 7,89%, CT= 52,24 minutes, speed= 17,25 km/hour, Headway= 6,05 minutes, Availability= 88%, VOC-Rp2.103,75, BCR= 0,727	Vehicle operational costs= Rp169/ passenger-km, student ATP = Rp1.914, general subscription ATP= Rp2.921, general ATP= Rp3.607, student WTP= Rp1.692, general subscription WTP= Rp2.662, and general ATP= Rp3.474	Direct survey: Load factor= 11,43%, fare= Rp38.100,00 per passenger Load factor= 12,58%, vehicle operational costs= Rp34.700,00	Load factor= 15%, Headway= 27 minutes, circulation time= 78 minutes, speed= 20 km/hour, availability= 98%	Load factor= 72%, Productivity/bus= Rp3.717.000 seat-km per year, Fare= Rp7.554,-, Basic costs per seat-km= Rp471.106.966,-	Load factor= 7.2%, Headway= 8.95 minutes, Speed= 21.89 km/h, passenger waiting time= 4.74 minutes, vehicle operational cost= Rp10.457,29,-

Source: Anggraeni (2018), Wijaya (2019), Kusuma (2019), Saputra (2020), and Arifin and Khairunnisa (2018)

CHAPTER III
THEORETICAL BASIS

3.1 Public Transportation Performance Parameters

Transportation is a medium with an aim of moving people and goods from one place to another with the purpose of reaching various desired places or sending goods from the initial place to the destination (Sentiko, 2018). The process of evaluating the performance of public transportation both in terms of operational and services is very essential.

The evaluation process will be done with the aim of knowing whether the performance of the public transportation is good or bad in quality by inspecting directly in the field. Thus, parameters to describe the real condition are required. A number of parameters that are used to assess the performance of public transportation, namely: load factor, headway, speed, and waiting time.

Based on the World Bank standard, there are several prerequisites for public services namely as follows:

Table 3.1 Public Transportation Indicators Based on World Bank

Indicator	Unit	Description	World Bank
Load Factor	%		< 70
Headway	Minute	Average	5 – 10
		Maximum	10 – 20
Speed	Km/Hour	Populated Area	10 – 12
		With Bus Line	15 – 18
		Non Populated Area	25
Waiting Time	Minute	Average	5 – 10
		Maximum	10 – 20

Source: World Bank (1986)

3.2 Measurements of Public Transportation Performance Parameters

3.2.1 Load Factor

Load Factor is defined as the ratio between the number of passengers with the bus capacity that is available for one trip described in percent (Absor, et al., 2020) The calculation for load factor can be determined using the following equation.

$$L_f = \frac{P}{C}\ x\ 100\% \tag{3.1}$$

Description:

L_f = load factor,

P = number of passengers, and

C = capacity.

3.2.2 Headway

Headway has the definition of the time difference between the arrival of a vehicle and the next vehicle at the same place. The equation used for headway calculation can be seen below.

$$H\ =\ b_2\ -\ b_1 \tag{3.2}$$

Description:

H = headway (minute),

b_2 = bus 2 arrival time, and

b_1 = bus 1 arrival time.

3.2.3 Speed

As one of the determining values that influence the process of identifying the effectiveness and efficiency of the vehicle's operational performance, the travel speed of the transportation plays an important role as a parameter. Speed is defined as the ratio of the distance travelled to the time it takes to cover that distance. Speed is shown in units of km/hour or with the following equation:

$$v = \frac{s}{t} \tag{3.3}$$

Description:

v = speed (km/hour),

S = distance (km),

T = travel time (hour)

3.2.4 Passenger Waiting Time

Passenger waiting time is the time required for prospective passengers to wait for vehicles that pass a road (Morlok, 1995). The calculation for passenger waiting time can be determined using the following formula.

$$Wt = 0{,}5\ x\ H \tag{3.4}$$

Description :

Wt = waiting time (minute),

H = average headway (minute)

3.3 Public Transportation Fares

Transportation fare is defined as the amount of fees being charged to passengers of public transportation vehicle. The reference in the formation of fare policy are divided into three, which are:

1. Cost of Service Pricing

   Pricing that is determined on the production costs of transportation services with a decent profit for the developing company. Regularly, this rate is used where profits are obtained by maximizing the space for passengers and not taking into account the convenience factor with the fares applied being minimal. This system is implemented after determining the costs initially incurred which includes Direct Costs and Indirect Costs.

2. Value of Service Pricing

   Pricing that is based on the value of transportation services. It is determined by the value given by the service user. The size of the said value can be seen from the elasticity of demand for these transportation services.

3. Charging What the Traffic Will Bear

   Fare that is based on a determination in such a way that with a certain volume of transportation will be able to generate the most profitable revenue.

Fare planning is crucial for public transportation because the fare is one of the most important aspect in increasing the profit for the transportation system (Patzold et al., 2018). It can also affect the number of passengers as well as revenue for the transportations system.

In determining the initial fare, a study is needed to be done to serve as a meeting ground between the operators of public transportation and the needs of consumers. The calculation formula based on the basic fare can be seen in the following equation.

$$\text{Basic Fare} = \frac{Vehicle\ Operating\ Cost}{Load\ Factor\ x\ Capacity} \quad (3.5)$$

$$\text{Fare} = (\text{Basic Fare x Average Distance}) + 10\% \quad (3.6)$$

3.4 Vehicle Operational Costs

Vehicle operational cost is defined as the total costs spent by road users due to the operation of a vehicle to travel from one location to another (Kadarsa et al., 2019). Vehicle operational cost is divided into two according to Decree of the Ministry of Transportation Number 251 of 2022, direct costs and indirect costs.

The calculation of vehicle operational costs is dependent on multiple factors, such as the number and type of vehicle being used. The determination of vehicle operational costs is calculated as subject to the calculation from Ministry of Transportation. The following is a grouping of basic vehicle operating costs which are divided into two:

1. Direct Cost

   Direct costs are costs that is directly related to services being produced, which consists of fixed cost and variable costs. Part of the calculation can be calculated using every km of the vehicle but another is calculated per year.

2. Indirect Cost

   Indirect costs can be defined as costs that is indirectly related to services being produced, which consists of fixed costs and variable costs.

The calculation of indirect costs can't be counted per km of vehicle because the existing components are not directly related to vehicle operations. The components of each direct and indirect costs can be seen on the following Table 3.1 below.

Table 3.2 Direct and Indirect Costs Components

Direct Costs	Indirect Costs
1. Productive vehicle depreciation 2. Productive vehicle capital interest 3. Bus Crew a. Wages b. Work operation allowance c. Benefits 4. Fuel 5. Tires 6. Small service 7. Big service 8. Inspection (Overhaul) 9. Oil 10. Spare parts & Body 11. Bus cleaning 12. Terminal levy 13. Vehicle registration certificate / vehicle tax	1. Employee costs a. Wages b. Overtime c. Benefits 2. Management fees a. Office depreciation b. Pool and repair depreciation c. Inventory depreciation d. Repair shop depreciation e. Office administration cost f. Office maintenance cost g. Pool and repair maintenance cost

Source: Ministry of Transportation (2022)

Continuation of Table 3.1 Direct and Indirect Costs Components

Direct Costs	Indirect Costs
14. KIR 15. Insurance a. Vehicle insurance b. Bus crew insurance	h. Electricity and water cost i. Telephone cost j. Business travel expenses k. Corporate tax l. Route permit m. Business permit n. Marketing costs o. Others

Source: Ministry of Transportation (2022)

Below are the components of vehicle operational costs:

1. Direct Cost Components
   a. Vehicle Depreciation

   $$\text{Depreciation per year} = \frac{vehicle\ price - salvage\ value}{depreciation\ period} \quad (3.8)$$

   with description:

   Bus salvage value is 20% of the vehicle price

   b. Capital Interest

   $$\text{Capital Interest} = \frac{\frac{nx1}{2}\ x\ capital\ value/year}{depreciation\ period} \quad (3.9)$$

   with description:

   n = Loan repayment period

   c. Bus crew cost

   $$\text{Bus crew per bus/km} = \frac{bus\ crew\ fee}{bus\ production - \text{km/year}} \quad (3.10)$$

   d. Fuel cost

Fare per bus/day = $\frac{bus\ fuel\ cost\ /\ day}{km\ traveled\ /\ day}$ (3.11)

e. Tire usage cost

Tire usage per bus/km = $\frac{amount\ of\ tire\ usage\ x\ tire\ price}{endurance\ km\ of\ tire}$ (3.12)

f. Small service

Small service cost per bus/km = $\frac{small\ service\ cost}{km}$ (3.13)

g. Big service

Big service cost per bus/km = $\frac{big\ service\ cost}{km}$ (3.14)

h. General overhaul cost

Overhaul cost per year = $\frac{km\ per\ year}{km\ overhaul}$ x overhaul cost (3.15)

General overhaul cost/bus/km = $\frac{overhaul\ cost\ per\ year}{bus\ production\ km\ per\ year}$ (3.16)

i. Engine oil addition cost

Engine oil cost/bus km = $\frac{oil\ added\ per\ day\ x\ oil\ price\ per\ litre}{km\ traveled\ /\ day}$ (3.17)

j. Bus cleaning cost

Bus cleaning cost per bus-km = $\frac{cleaning\ cost\ per\ month}{bus\ production\ km\ per\ month}$ (3.18)

k. Terminal retribution

Terminal retribution cost = $\frac{terminal\ retribution\ per\ day}{bus\ production\ km\ per\ day}$ (3.19)

l. Vehicle registration certificate / Vehicle tax cost

Registration certificate cost = $\frac{certificate\ cost}{bus\ production\ km\ pr\ year}$ (3.20)

m. KIR cost

KIR cost per bus-km = $\frac{KIR\ cost}{bus\ production\ km\ per\ year}$ (3.21)

n. Insurance cost

Insurance cost per bus-km = $\frac{insurance\ cost\ per\ year}{bus\ production\ km\ per\ year}$ (3.22)

2. Indirect Cost Components

d. Employee costs other than bus crew

e. Management costs

1) Office depreciation
2) Pool and repair depreciation
3) Inventory depreciation
4) Repair shop depreciation
5) Office administration cost
6) Office maintenance cost
7) Pool and repair maintenance cost
8) Electricity and water cost
9) Telephone cost
10) Office tax
11) Route permit
12) Business permit
13) Marketing cost
14) Others

f. Indirect cost per bus/year = $\frac{indirect\ cost\ per\ bus\ per\ year}{number\ of\ buses}$ (3.23)

g. Direct cost per bus-km = $\frac{indirect\ cost\ per\ bus\ per\ year}{bus\ production\ per\ km\ per\ year}$ (3.24)

h. Basic cost per bus-km = Direct costs + Indirect costs (3.25)

3.5 Fare and Financial Analysis

Financial analysis is done to determine and explain further whether or not an activity is financially feasible. With its high cost and its long-term impact, a systematic and thorough analysis is required to be done. Several methods are available to evaluate financial feasibility.

This research will be using Benefit Cost Ratio (BCR) method for the financial analysis. The analysis results from B/C Ratio can be considered feasible if the value of B/C Ratio > 1 (one), this value is applied to evaluate the fare feasibility by comparing total income with total expenses based on vehicle operational cost. Benefit Cost Ratio method can be formulated as follows:

$$\text{BCR} = \frac{Benefit\ (B)}{Cost\ (C)} \quad (3.26)$$

Descriptions:

BCR = Benefit Cost Ratio,

Benefit (B) = fare x number of passengers/day, and

Cost = vehicle operational cost x distance/day x number of vehicles

BCR with a value of more than 1 (one) shows profitable economic investments, whereas BCR with a value of less than 1 (one) shows unprofitable economic investments.

CHAPTER IV
RESEARCH METHODS

4.1 Research Type

Research method is the main method used in a research by researchers to achieve goals and determine answers to identify problems (Arikunto, 2019), while according to Sugiyono (2019), research method is a way of doing something using the mind carefully to achieve a goal. Quantitative research method is one type of research method. According to Ali et al. (2022), quantitative research is the type of research that produces findings that can be obtained or achieved using statistical procedures or other means of qualification or measurement.

This research on the performance of Trans Jogja Bus is a quantitative type of research because this uses data in the form of numbers. In addition, the method used to obtain data in this research is by conducting a survey which then will be identified to obtain conclusions.

4.2 Research Methods

In this research, survey and analytical methods are used. The purpose of the survey method is to acquire data to input, while the analytical method is used to obtain the desired performance result from the transportation work analysis. The steps in accomplishing the urban transportation work analysis are as follows.

1. Preparation stage, which consists of the preparation of literature studies on matters that are related with the performance of a public transportation.
2. Data collection stage, which consists of the process of collecting data by direct survey and collecting the data obtained from related institutions, namely the number of available vehicles, the number of operating vehicles and the number of stops.
3. Analysis stage, which consists of analysing the collected data from the previous stages. Microsoft Excel and Microsoft Word are used in this stage of the research.

4.3 Data Collecting

The process of collecting the research data will be done in two parts, one for the primary data and one for the secondary data.

1. Primary Data

   Primary data are data taken directly through a survey in the field. To obtain primary data, there are two surveys that will be done, namely:

   a. Dynamic Survey

      Dynamic surveys are surveys that are done in an operating vehicle. This will be done by writing done data variables that was predetermined on a form, those variables are

      1) Number of boarding passenger,
      2) Number of leaving passengers,
      3) Number of total passengers, and
      4) Travel time.

   b. Static Survey

      Static Survey is a survey that is done in the bus terminal. This will be done by writing down data variables, which are

      1) Vehicle departure time,
      2) Vehicle arrival time,
      3) Vehicle identification number, and
      4) Vehicle line code.

2. Secondary Data

   Secondary Data are data collected from associated institutions and applicable regulations. Secondary data consists of:

   a. Vehicle Operational Cost Components, such as:
      1) Oil price
      2) Fuel price
      3) Tire price
      4) Spare parts price
   b. Vehicle Price
   c. Vehicle Operational

1) Number of vehicles
2) Number of bus crews and employees
3) Waiting time
4) Routes
5) Capacity

d. Indirect Cost
1) Employee wages
2) Vehicle registration certificate cost

4.3.1 Primary Data Collection Schedule

This survey will be completed by 10 surveyors every day. Survey will be done by two teams which consists of 10 people for Line K1J. Survey will be done in 2 days, Thursday to represent the weekdays and Sunday to represent the weekend. 2 people will be deployed in each bus in 5 vehicles for line K1J. Survey will start on 07.30 - 09.30 WIB and 15.30 - 17.30 WIB.

This was decided based on the results of a pre-survey that has been done by the author beforehand. Trans Jogja Bus line K1J had notable differences in terms of the number of passengers on peak hours and normal hours, accordingly, the data collection process will be done on the peak hour time range.

4.3.2 Data Collecting Location

The survey location being observed and the area that the Trans Jogja Bus Line K1J served are through the route:

Line K1J : Terminal Bus Condong Catur - Shelter Affandi Susteran Novisiat - Halte TJ Sanata Dharma - Halte TJ Colombo Samirono - Halte TJ Colombo Panti Rapih - Halte TJ Kaliurang Pertanian UGM - TPB Fakultas Peternakan UGM - Halte TJ RSUP Sardjito - TPB MM EP UGM - Halte Vidi Jalan Kaliurang - Halte Superindo Kaliurang - Halte Pasar Kolombo - Halte Terminal Bangunan - Halte Simpang Kaliurang Palem Raya - Halte Kantor Camat Ngaglik - Halte Puskesmas Ngaglik 1 - Halte SMPN 2 Ngaglik - Halte Warung Sego Penyetan Banyuwangi - Halte Wedangan Kampoeng - Halte Pusat Rehabilitasi YAKKUM - Halte Raminten Boutique and Cafe 1 - Halte RS Panti Nugroho K1J - Terminal Pasar Pakem - Halte

SMPN 4 Pakem - Halte Raminten Boutique and Cafe 2 - Halte Pusat Rehabilitasi YAKKUM 2 - Halte Wedangan Kampoeng 2 - Halte SPBU Kaliurang - Halte SMPN 2 Ngaglik 2 - Halte Puskesmas Ngaglik 2 - Halte TK Bias Kaliurang - Halte Simpang Kaliurang Palem Raya 2 - Halte PLN Gardu Induk Kentungan - Halte Pasar Kolombo 2 - Halte Superindo Kaliurang 2 - TPB Graha ASUS Jalan Kaliurang - TPB Fakultas Biologi UGM - Halte TJ Fak UGM - TPB Fak UGM - Halte TJ Kaliurang KOPMA UGM - Halte TJ Colombo Kosudgma - Halte TJ Colombo UNY - Halte TJ UNY - Halte Grand Tjokro Yogyakarta - Halte SPBU Gejayan - Terminal Bus Condongcatur

The route passed by K1J bus as illustrated in the following picture

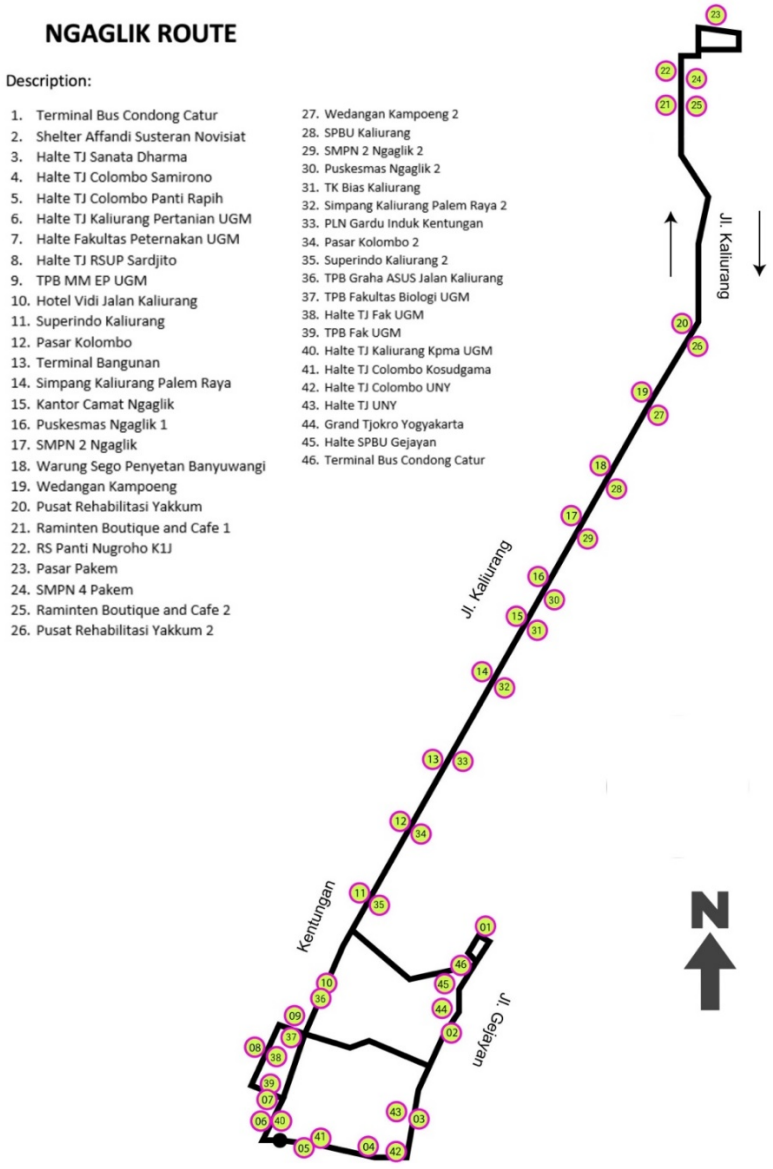

Figure 4.1 Trans Jogja Bus K1J Route

4.3.3 Data Collecting Equipment

The equipment needed in order to obtain the data for this research are as follows:

1. Stopwatch,
2. Stationery,
3. Survey form paper, and
4. Clipboard.

4.4 Data Analysis

Following the steps after obtaining the data from the survey directly on the survey including data collected from the related institutions, the acquired data will be analysed. Data analysis is done with the purpose of gaining and calculating the performance parameters for this research which are the passenger waiting time, availability, and speed.

Technical Guidelines used for the implementation of public transportation in the Decree of the Ministry of Transportation Number 251 of 2022 is the basis for the analysis in this research. Concurrently, Benefit Cost Ratio (BCR) method will be applied as the base for the economic analysis. Data that will be used to calculate direct costs components for vehicle operational costs are as follows:

1. Vehicle depreciation
2. Capital interests
3. Bus crew cost
4. Fuel cost
5. Tire usage cost
6. Minor service
7. Major service
8. General overhaul cost
9. Engine oil addition cost
10. Bus cleaning cost
11. Vehicle registration certificate / vehicle tax
12. Terminal levy cost
13. KIR cost
14. Insurance costs

Data that will be used to calculate indirect costs components for vehicle operational costs are as follows:

1. Employee costs (other than bus crew)
2. Management costs
3. Bus indirect cost per year

4. Bus indirect cost/bus-km
5. Basic cost/bus-km

4.5 Research Flowchart

In this research, a flowchart is made to exhibit the steps of work that will be done. The research flowchart can be seen on Figure 4.1 below.

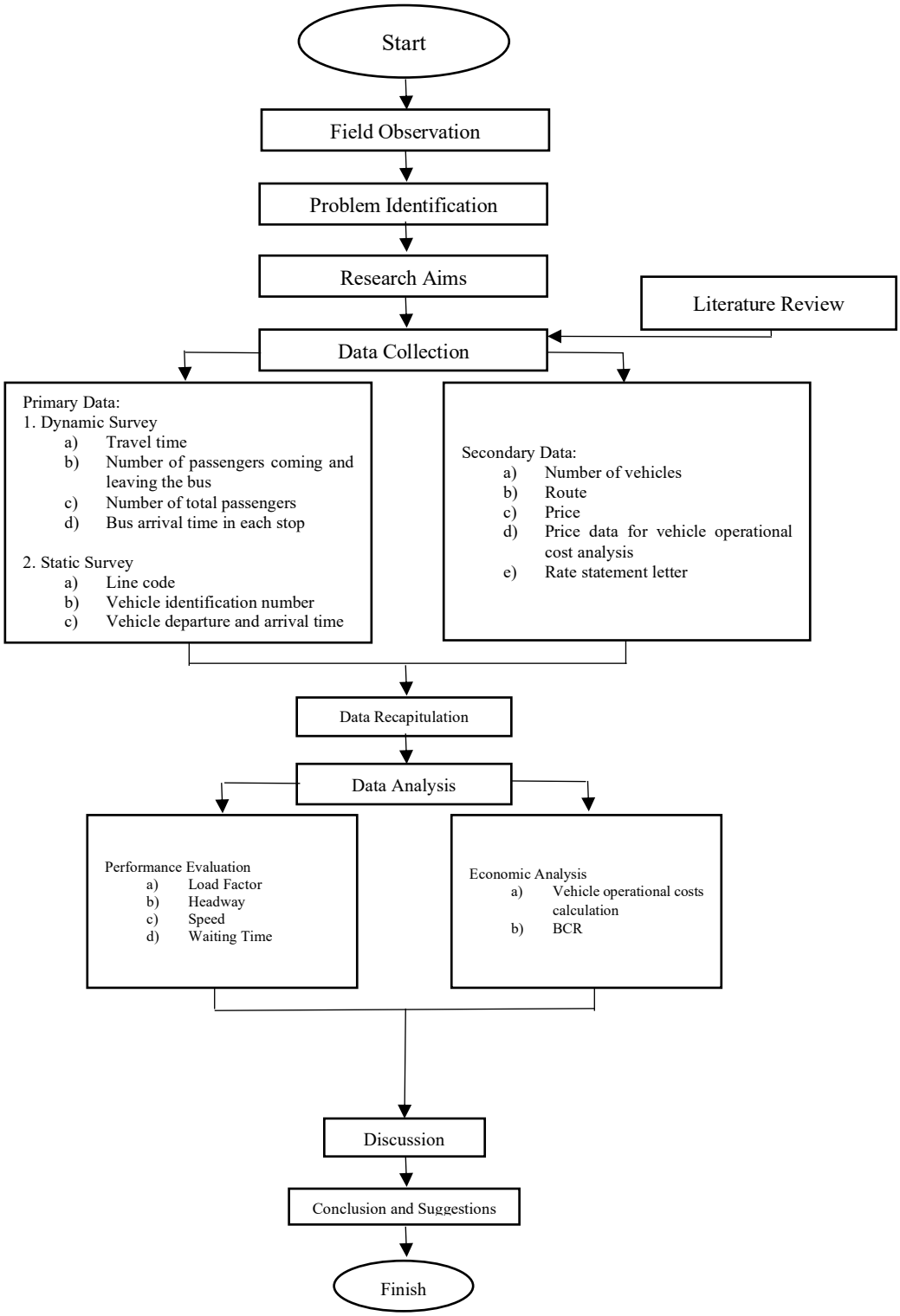

Figure 4.2 Research Flowchart

CHAPTER V
DISCUSSION

5.1 Data Collection

The data required in this research analysis consisted of primary and secondary data. Primary data consisted of data obtained directly from field observation, whereas secondary data consisted of multiple data obtained from related institutions. Institutions related to this research are PT. Jogja Tugu Trans as the institution who holds every data regarding the Trans Jogja Bus Line K1J operational and Department of Transportation

5.1.1 Secondary Data

Secondary data that is obtained from institutions and regulations that has relation to this research. Secondary data are as follows.

1. The number of licensed fleets of Line K1J is 15
2. Trans Jogja Bus Line K1J route map.
3. Line K1J are divided into 48 segments, the segment divisions can be seen on the table below.

Table 5.1 Line K1J Segment Division and Distance

No.	Stop Name	Distance (Km)
1	Terminal Bus Condong Catur	0
2	Shelter Affandi Susteran Novisiat	1.5
3	Halte TJ Sanata Dharma	1.1
4	Halte TJ Colombo Samirono	0.45
5	Halte TJ Colombo Panti Rapih	1
6	Halte TJ Kaliurang Pertanian UGM	0.6
7	TPB Fakultas Peternakan UGM	0.45
8	Halte TJ RSUP Sardjito	0.6
9	TPB MM EP UGM	0.55
10	Hotel Vidi Jalan Kaliurang	1.1
11	Superindo Kaliurang	0.65
12	Pasar Kolombo	0.95

Source: PT. Jogja Tugu Trans (2023)

Continuation of Table 5.1 Line K1J Segment Division and Distance

No.	Stop Name	Distance (Km)
13	Terminal Bangunan	0.80
14	Simpang Kaliurang Palem Raya	1.1
15	Kantor Camat Ngaglik	0.8
16	Puskesmas Ngaglik 1	0.27
17	SMPN 2 Ngaglik	0.80
18	Warung Sego Penyetan Banyuwangi	0.65
19	Wedangan Kampoeng	1
20	Pusat Rehabilitasi Yakkum	0.95
21	Halte Kampus UII 1	1
22	Raminten Boutique and Cafe 1	1.30
23	RS Panti Nugroho K1J	0.75
24	Pasar Pakem	0.55
25	SMPN 4 Pakem	0.65
26	Raminten Boutique and Cafe 2	0.70
27	Halte Kampus UII 2	1.40
28	Pusat Rehabilitasi Yakkum 2	0.95
29	Wedangan Kampoeng 2	0.95
30	SPBU Kaliurang	1
31	SMPN 2 Ngaglik 2	0.65
32	Puskesmas Ngaglik 2	0.75
33	TK Bias Kaliurang	0.28
34	Simpang Kaliurang Palem Raya 2	0.80
35	PLN Gardu Induk Kentungan	1.10
36	Pasar Kolombo 2	0.85
37	Superindo Kaliurang 2	0.95
38	TPB Graha ASUS Jalan Kaliurang	1.30
39	TPB Fakultas Biologi UGM	0.65
40	Halte TJ Fak UGM	0.50
41	TPB Fak UGM	0.60
42	Halte TJ Kaliurang Kopma UGM	0.45
43	Halte TJ Colombo Kosudgama	0.70
44	Halte TJ Colombo UNY	0.90
45	Halte TJ UNY	0.55

Source: PT. Jogja Tugu Trans (2023)

Continuation of Table 5.1 Line K1J Segment Division and Distance

No.	Stop Name	Distance (Km)
46	Grand Tjokro Yogyakarta	1
47	Halte SPBU Gejayan	0.70
48	Terminal Bus Condong Catur	1.10
Total Distance		38.4
Average Distance		0.80

Source: PT. Jogja Tugu Trans (2023)

Based on the Table 5.1 above, it can be seen that the total distance travelled by Trans Jogja Bus Line K1J is 38.4 km with an average distance of 0.8 km.

5.1.2 Primary Data

Primary data was obtained by direct survey on the Trans Jogja Bus Line K1J. Primary data required are as follows:

1. Number of passengers of Trans Jogja Bus Line K1J.
2. Departure and arrival time of Trans Jogja Bus Line K1J.
3. Vehicle identification number.

5.2 Data Analysis

5.2.1 Load Factor

5.2.1.1 Load Factor Morning Peak Hour

Load factor calculation is carried out based on survey data obtained from Thursday, October 19th 2023 to represent weekdays and Sunday, October 22nd 2023 to represent weekends. The calculation for load factor is done using the following formula.

$$L_f = \frac{P}{C} \; x \; 100\% \qquad (3.1)$$

Formula 3.1 is then utilized for each bus and then averaged over each rotation. For instance, the obtained load factor value of bus number 1 on segment 5 (TJ Colombo Panti Rapih - TJ Kaliurang Pertanian UGM) is 12.821%, load factor value of bus number 2 on segment 5 is 5.128%, load factor value of bus number 3 on segment 5 is 0%, load factor value of bus number 4 on segment 5 is 12.821%,

and load factor value of bus number 5 on segment 5 is 0%. Each load factor value from each bus is then averaged resulting in 6.154% in total.

Then, Formula 3.1 is also used for the Sunday, October 22nd 2023 at morning peak hour. The obtained load factor value of bus number 1 on segment 5 (TJ Colombo Panti Rapih - TJ Kaliurang Pertanian UGM) is 0%, load factor value of bus number 2 on segment 5 is 10.256%, load factor value of bus number 3 on segment 5 is 5.128%, load factor value of bus number 4 on segment 5 is 5.128%, and load factor value of bus number 5 on segment 5 is 5.128%. Each load factor value from each bus is then averaged resulting in 5.128% in total. The calculation results of average load factor on Thursday, October 19th 2023 and Sunday, October 22nd 2023 at morning peak hour can be seen on Table 5.2.

Table 5.2 Line K1J Average Load Factor on Thursday and Sunday at Morning Peak Hour

Segment	Thursday Load Factor (%)	Sunday Load Factor (%)	Average Load Factor (%)
1	4.103	3.590	3.846
2	4.359	3.590	3.974
3	4.615	3.590	4.102
4	4.872	3.590	4.231
5	5.641	5.128	5.385
6	6.154	5.641	5.898
7	6.410	5.641	6.026
8	8.718	8.205	8.462
9	8.718	8.205	8.462
10	8.974	8.205	8.590
11	8.974	8.205	8.590
12	8.205	8.205	8.205
13	7.179	7.692	16.154
14	6.410	6.154	14.102
15	6.154	6.154	13.333
16	6.410	6.154	12.051
17	6.923	6.154	12.051
18	6.667	5.641	11.539
19	5.897	5.641	9.487
20	5.128	5.128	8.718

Continuation of Table 5.2 Line K1J Average Load Factor on Thursday and Sunday at Morning Peak Hour

Segment	Thursday Load Factor (%)	Sunday Load Factor (%)	Average Load Factor (%)
21	4.359	4.615	7.949
22	4.359	4.615	7.949
23	3.590	4.103	6.154
24	2.564	2.564	2.821
25	4.359	4.103	4.615
26	5.128	4.103	4.872
27	5.897	5.128	5.641
28	5.128	6.154	6.666
29	5.128	6.154	6.666
30	5.385	6.667	6.923
31	5.641	6.667	6.923
32	6.410	7.179	7.179
33	6.667	7.692	7.692
34	6.667	7.692	7.692
35	7.179	8.718	7.948
36	7.436	8.718	7.948
37	6.923	7.692	6.410
38	6.923	7.692	6.923
39	6.667	7.179	6.667
40	4.872	5.641	5.641
41	4.103	5.641	5.385
42	4.103	5.641	5.128
43	3.846	5.128	4.872
44	3.846	4.615	4.615
45	3.590	4.103	4.103
46	3.590	4.103	3.846
47	0.000	0.000	0.000

Based on the Table 5.3 shown above, the value of average load factor line K1J each segment on Thursday, October 19th 2023 and Sunday, October 22nd 2023 at the morning peak hour can be seen on Figure 5.1.

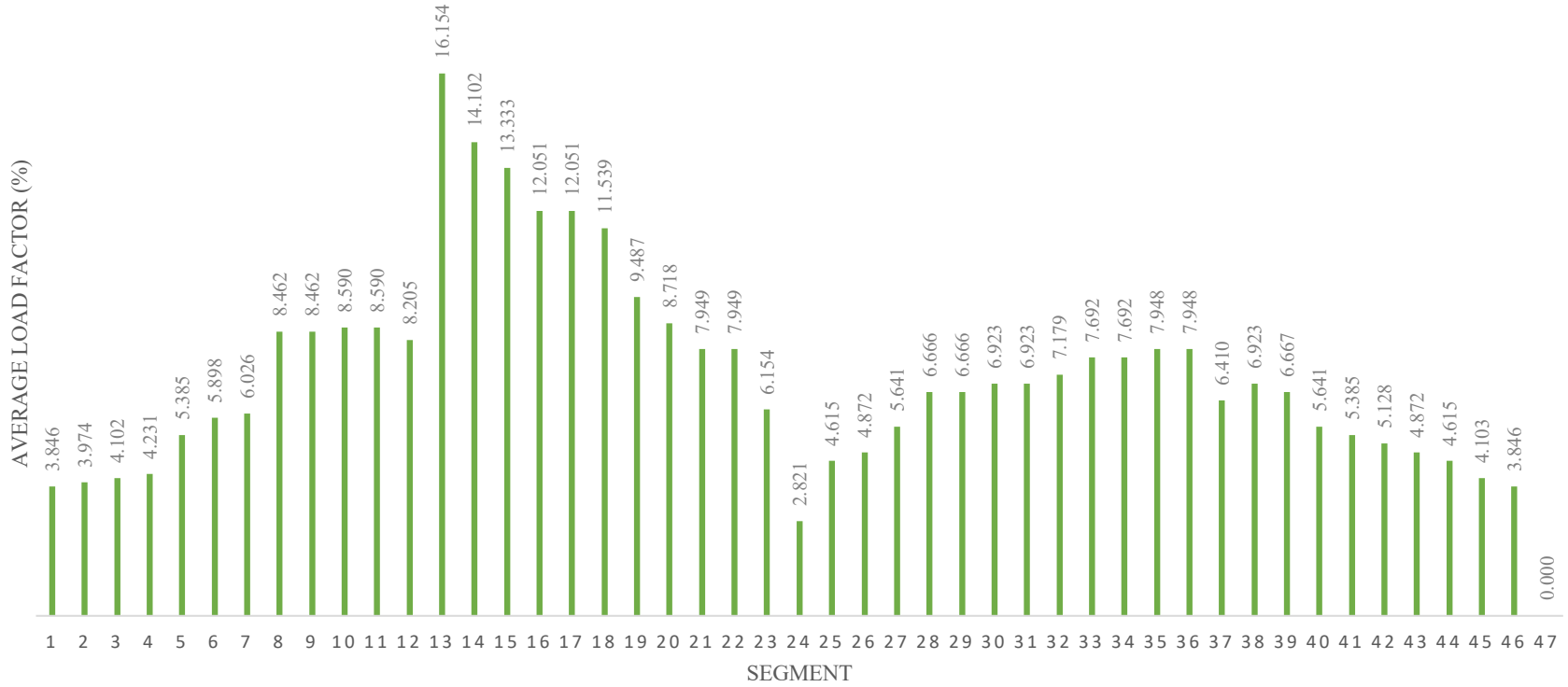

Figure 5.1 Line K1J Average Load Factor at Morning Peak Hour

Based on Figure 5.1, the highest load factor value were in segment 13 (Terminal Bangunan - Simpang Kaliurang Palem Raya) with a value of 16.154%. The lowest load factor value were in segment 24 (Pasar Pakem – SMPN 4 Pakem) with a value of 2.821%.

5.2.1.1 Load Factor Afternoon Peak Hour

The same calculation is used to calculate the afternoon peak hour average load factor value on Thursday, October 19th 2023 and Sunday, October 22nd 2023 as the afternoon peak hour. The value of load factor for Thursday, October 19th 2023 and Sunday, October 22nd 2023 at afternoon peak hour can be seen on Table 5.3.

Table 5.3 Line K1J Average Load Factor on Thursday and Sunday at Afternoon Peak Hour

Segment	Thursday Load Factor (%)	Sunday Load Factor (%)	Average Load Factor (%)
1	4.615	1.026	2.821
2	4.615	1.026	2.821
3	7.179	2.564	4.872
4	7.692	2.564	5.128
5	14.872	5.128	10.000
6	20.000	6.667	13.333
7	22.051	6.667	14.359
8	24.615	7.692	16.154
9	28.718	9.231	18.974
10	28.205	10.256	19.231
11	29.231	11.795	20.513
12	26.154	11.795	18.974
13	24.615	11.795	18.205
14	22.051	11.795	16.923
15	20.513	11.795	16.154
16	17.949	11.795	14.872
17	17.949	10.769	14.359
18	17.436	10.769	14.103
19	13.333	6.667	10.000
20	12.308	5.641	8.974
21	11.282	5.128	8.205
22	11.282	5.128	8.205
23	8.205	4.103	6.154
24	3.077	3.590	3.333
25	5.128	4.103	4.615
26	5.641	4.615	5.128

Continuation of Table 5.3 Line K1J Average Load Factor on Thursday and Sunday at Afternoon Peak Hour

Segment	Thursday Load Factor (%)	Sunday Load Factor (%)	Average Load Factor (%)
27	6.154	8.205	7.179
28	7.179	8.718	7.949
29	7.179	7.692	7.436
30	7.179	7.692	7.436
31	7.179	7.692	7.436
32	7.179	8.205	7.692
33	7.692	8.205	7.949
34	7.692	7.692	7.692
35	7.179	7.692	7.436
36	7.179	8.205	7.692
37	5.128	5.641	5.385
38	6.154	5.641	5.897
39	6.154	5.641	5.897
40	5.641	4.615	5.128
41	5.128	4.615	4.872
42	4.615	2.051	3.333
43	4.615	1.538	3.077
44	4.615	1.538	3.077
45	4.103	1.026	2.564
46	3.590	1.026	2.308
47	0.000	0.000	0.000

Based on the Table 5.4 shown above, the value of average load factor line K1J each segment on Thursday, October 19th 2023 and Sunday, October 22nd 2023 at the afternoon peak hour can be seen on Figure 5.2. The highest load factor value were in segment 11 (Superindo Kaliurang – Pasar Kolombo) with a value of 20.513%. The lowest load factor value were in segment 46 (Grand Tjokro Yogyakarta - SPBU Gejayan) with a value of 2.308%. Figure 5.2 shown the overall value of all load factor on afternoon peak hour.

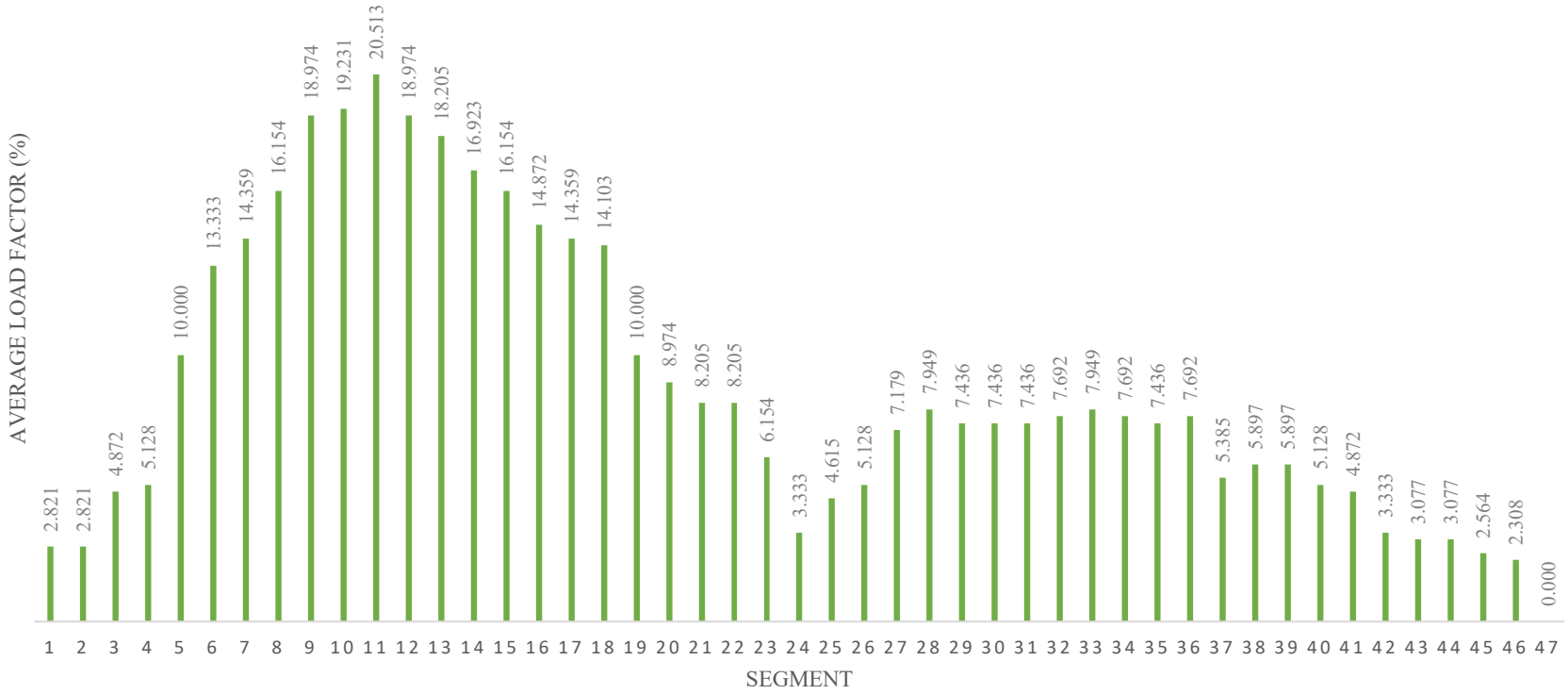

Figure 5.2 Line K1J Average Load Factor at Afternoon Peak Hour

5.2.2 Headway

The value of headway are obtained by calculating the time from the arrival point until the destination point on the same route. Headway value is obtained from field survey that was done on Thursday, October 19th 2023 and Sunday, October 22nd 2023, the data gotten then calculated using the headway formula, Formula 3.2.

5.2.2.1 Headway Morning Peak Hour

The example of calculation to obtain the headway value is done by finding the time difference of the previous and next bus at the same point. An example of the calculation used to find the value of headway of route K1J on Thursday, October 19th 2023 at morning peak hour, bus 1 arrives at Shelter Affandi Susteran Novisiat at 08:42 WIB, bus 2 arrives at the Shelter Affandi Susteran Novisiat at 08:47 WIB, WIB, bus 3 arrives at the Shelter Affandi Susteran Novisiat at 09:00 WIB, bus 4 arrives at the Shelter Affandi Susteran Novisiat at 09:12 WIB, and bus 5 arrives at the Shelter Affandi Susteran Novisiat at 09:23 WIB.

The time difference between bus 1 and bus 1 is 5 minutes, the time difference between bus 2 and bus 3 is 13 minutes, the time difference between bus 3 and bus 4 is 12 minutes, and the time difference between bus 4 and bus 5 is 11 minutes. The difference values then averaged and the headway value at Shelter Affandi Susteran Novisiat was 10 minutes 15 seconds.

The value then calculated using the following formula with xi value the average of all headway values which was 10.25 minutes. The total number of data is 47, therefore the calculation goes as follows.

$$h = \frac{n}{\Sigma(\frac{1}{xi})} = \frac{47}{4{,}929} = 9.6 \text{ minutes} \quad (5.1)$$

The analysis results for headway obtained from every segment on Line K1J on Thursday, October 19th 2023 at morning peak hour can be seen in the Table 5.4 below.

Table 5.4 Line K1J Average Headway on Thursday, October 19th 2023 at Morning Peak Hour

Segment	Stop	1/xi (minute)
1	Terminal Bus Condong Catur - Shelter Affandi Susteran Novisiat	0.10
2	Shelter Affandi Susteran Novisiat - Halte TJ Sanata Dharma	0.10
3	Halte TJ Sanata Dharma - Halte TJ Colombo Samirono	0.10
4	Halte TJ Colombo Samirono - Halte TJ Colombo Panti Rapih	0.10
5	Halte TJ Colombo Panti Rapi h- Halte TJ Kaliurang Pertanian UGM	0.11
6	Halte TJ Kaliurang Pertanian UGM - TPB Fakultas Peternakan UGM	0.11
7	TPB Fakultas Peternakan UGM - Halte TJ RSUP Sardjito	0.11
8	Halte TJ RSUP Sardjito - TPB MM EP UGM	0.11
9	TPB MM EP UGM - Hotel Vidi Jalan Kaliurang	0.11
10	Hotel Vidi Jalan Kaliurang - Superindo Kaliurang	0.11
11	Superindo Kaliurang - Pasar Kolombo	0.11
12	Pasar Kolombo - Terminal Bangunan	0.10
13	Terminal Bangunan - Simpang Kaliurang Palem Raya	0.10
14	Simpang Kaliurang Palem Raya - Kantor Camat Ngaglik	0.10
15	Kantor Camat Ngaglik - Puskesmas Ngaglik 1	0.10
16	Puskesmas Ngaglik 1 - SMPN 2 Ngaglik	0.10
17	SMPN 2 Ngaglik - Warung Sego Penyetan Banyuwangi	0.10
18	Warung Sego Penyetan Banyuwangi - Wedangan Kampoeng	0.10
19	Wedangan Kampoeng - Pusat Rehabilitasi Yakkum	0.10
20	Pusat Rehabilitasi Yakkum - Halte Kampus UII 1	0.10
21	Halte Kampus UII 1 - Raminten Boutique and Cafe	0.10
22	Raminten Boutique and Cafe - RS Panti Nugroho K1J	0.10
23	RS Panti Nugroho K1J - Pasar Pakem	0.10
24	Pasar Pakem - SMPN 4 Pakem	0.10
25	SMPN 4 Pakem - Raminten Boutique and Cafe 1	0.10
26	Raminten Boutique and Cafe 1 - Halte Kampus UII 2	0.10
27	Halte Kampus UII 2 - Pusat Rehabilitasi Yakkum 2	0.10
28	Pusat Rehabilitasi Yakkum 2 - Wedangan Kampoeng 2	0.10
29	Wedangan Kampoeng 2 - SPBU Kaliurang	0.10
30	SPBU Kaliurang - SMPN 2 Ngaglik 2	0.10
31	SMPN 2 Ngaglik 2 - Puskesmas Ngaglik 2	0.10
32	Puskesmas Ngaglik 2 - TK Bias Kaliurang	0.10

Continuation of Table 5.4 Line K1J Average Headway on Thursday, October 19th 2023 at Morning Peak Hour

Segment	Stop	1/xi (minute)
33	TK Bias Kaliurang - Simpang Kaliurang Palem Raya 2	0.10
34	Simpang Kaliurang Palem Raya 2 - PLN Gardu Induk Kentungan	0.11
35	PLN Gardu Induk Kentungan - Pasar Kolombo 2	0.11
36	Pasar Kolombo 2 - Superindo Kaliurang 2	0.11
37	Superindo Kaliurang 2 - TPB Graha ASUS Jalan Kaliurang	0.11
38	TPB Graha ASUS Jalan Kaliurang - TPB Fakultas Biologi UGM	0.11
39	TPB Fakultas Biologi UGM - Halte TJ Fak UGM	0.11
40	Halte TJ Fak UGM - TPB Fak UGM	0.11
41	TPB Fak UGM - Halte TJ Kaliurang Kpma UGM	0.11
42	Halte TJ Kaliurang Kopma UGM - Halte TJ Colombo Kosudgama	0.11
43	Halte TJ Colombo Kosudgama - Halte TJ Colombo UNY	0.12
44	Halte TJ Colombo UNY - Halte TJ UNY	0.12
45	Halte TJ UNY - Grand Tjokro Yogyakarta	0.11
46	Grand Tjokro Yogyakarta - Halte SPBU Gejayan	0.12
47	Halte SPBU Gejayan - Terminal Bus Condong Catur	0.11
Total (minute)		4.93
Headway (minute)		9.54

The analysis results for headway obtained from every segment on Line K1J on Sunday, October 22nd 2023 at morning peak hour can be seen in the Table 5.5 below.

Table 5.5 Line K1J Average Headway on Sunday, October 22nd 2023 at Morning Peak Hour

Segment	Stop	1/xi (minute)
1	Terminal Bus Condong Catur - Shelter Affandi Susteran Novisiat	0.11
2	Shelter Affandi Susteran Novisiat - Halte TJ Sanata Dharma	0.11
3	Halte TJ Sanata Dharma - Halte TJ Colombo Samirono	0.10
4	Halte TJ Colombo Samirono - Halte TJ Colombo Panti Rapih	0.11
5	Halte TJ Colombo Panti Rapi h- Halte TJ Kaliurang Pertanian UGM	0.10
6	Halte TJ Kaliurang Pertanian UGM - TPB Fakultas Peternakan UGM	0.10
7	TPB Fakultas Peternakan UGM - Halte TJ RSUP Sardjito	0.10
8	Halte TJ RSUP Sardjito - TPB MM EP UGM	0.10
9	TPB MM EP UGM - Hotel Vidi Jalan Kaliurang	0.10
10	Hotel Vidi Jalan Kaliurang - Superindo Kaliurang	0.10

Continuation of Table 5.5 Line K1J Average Headway on Sunday, October 22nd 2023 at Morning Peak Hour

Segment	Stop	1/xi (minute)
11	Superindo Kaliurang - Pasar Kolombo	0.10
12	Pasar Kolombo - Terminal Bangunan	0.10
13	Terminal Bangunan - Simpang Kaliurang Palem Raya	0.10
14	Simpang Kaliurang Palem Raya - Kantor Camat Ngaglik	0.10
15	Kantor Camat Ngaglik - Puskesmas Ngaglik 1	0.09
16	Puskesmas Ngaglik 1 - SMPN 2 Ngaglik	0.09
17	SMPN 2 Ngaglik - Warung Sego Penyetan Banyuwangi	0.09
18	Warung Sego Penyetan Banyuwangi - Wedangan Kampoeng	0.09
19	Wedangan Kampoeng - Pusat Rehabilitasi Yakkum	0.09
20	Pusat Rehabilitasi Yakkum - Halte Kampus UII 1	0.09
21	Halte Kampus UII 1 - Raminten *Boutique and Cafe*	0.09
22	Raminten *Boutique and Cafe* - RS Panti Nugroho K1J	0.09
23	RS Panti Nugroho K1J - Pasar Pakem	0.09
24	Pasar Pakem - SMPN 4 Pakem	0.09
25	SMPN 4 Pakem - Raminten *Boutique and Cafe 1*	0.09
26	Raminten *Boutique and Cafe 1* - Halte Kampus UII 2	0.09
27	Halte Kampus UII 2 - Pusat Rehabilitasi Yakkum 2	0.09
28	Pusat Rehabilitasi Yakkum 2 - Wedangan Kampoeng 2	0.09
29	Wedangan Kampoeng 2 - SPBU Kaliurang	0.09
30	SPBU Kaliurang - SMPN 2 Ngaglik 2	0.09
31	SMPN 2 Ngaglik 2 - Puskesmas Ngaglik 2	0.09
32	Puskesmas Ngaglik 2 - TK Bias Kaliurang	0.09
33	TK Bias Kaliurang - Simpang Kaliurang Palem Raya 2	0.09
34	Simpang Kaliurang Palem Raya 2 - PLN Gardu Induk Kentungan	0.09
35	PLN Gardu Induk Kentungan - Pasar Kolombo 2	0.09
36	Pasar Kolombo 2 - Superindo Kaliurang 2	0.09
37	Superindo Kaliurang 2 - TPB Graha ASUS Jalan Kaliurang	0.09
38	TPB Graha ASUS Jalan Kaliurang - TPB Fakultas Biologi UGM	0.09
39	TPB Fakultas Biologi UGM - Halte TJ Fak UGM	0.09
40	Halte TJ Fak UGM - TPB Fak UGM	0.09
41	TPB Fak UGM - Halte TJ Kaliurang Kopma UGM	0.09
42	Halte TJ Kaliurang Kopma UGM - Halte TJ Colombo Kosudgama	0.09
43	Halte TJ Colombo Kosudgama - Halte TJ Colombo UNY	0.09
44	Halte TJ Colombo UNY - Halte TJ UNY	0.09
45	Halte TJ UNY - Grand Tjokro Yogyakarta	0.09
46	Grand Tjokro Yogyakarta - Halte SPBU Gejayan	0.09
47	Halte SPBU Gejayan - Terminal Bus Condong Catur	0.09
Total (minute)		4.37
Headway (minute)		10.76

The value of average headway on Sunday, October 22nd 2023 at morning peak hour was 10.76 minutes. The average headway for both Thursday, October 19th 2023 and Sunday, October 22nd 2023 at morning peak hour can be seen on Figure 5.3.

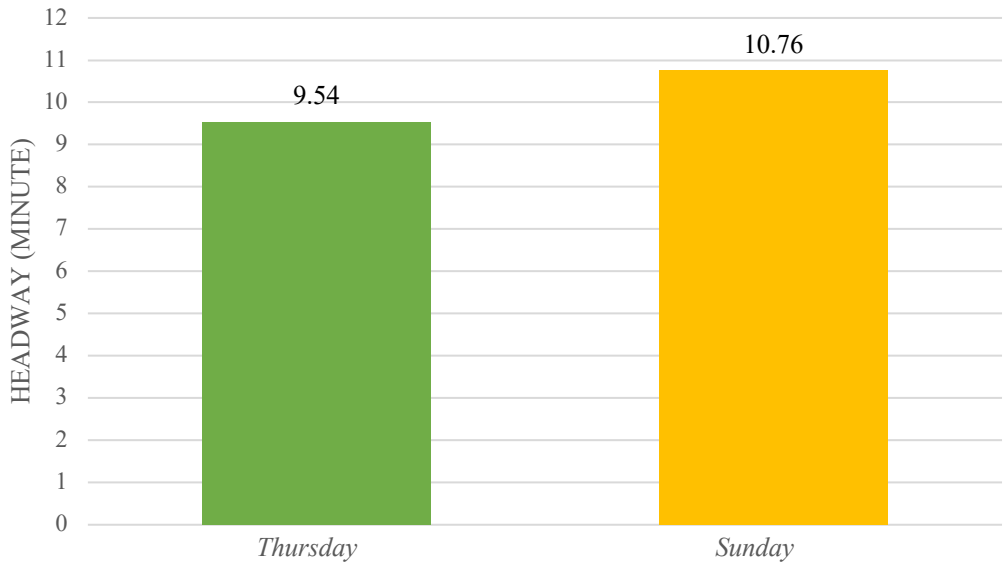

Figure 5.3 Average Headway of Thursday and Sunday at Morning Peak Hour

5.2.2.2 Headway Afternoon Peak Hour

The analysis results for headway obtained from every segment on Line K1J on Thursday, October 19th 2023 and Sunday, October 22nd 2023 at afternoon peak hour can be seen in the Table 5.6 below.

Table 5.6 Line K1J Average Headway on Thursday, October 19th 2023 at Afternoon Peak Hour

Segment	Stop	1/xi (minute)
1	Terminal Bus Condong Catur - Shelter Affandi Susteran Novisiat	0.09
2	Shelter Affandi Susteran Novisiat - Halte TJ Sanata Dharma	0.10
3	Halte TJ Sanata Dharma - Halte TJ Colombo Samirono	0.10
4	Halte TJ Colombo Samirono - Halte TJ Colombo Panti Rapih	0.10
5	Halte TJ Colombo Panti Rapih- Halte TJ Kaliurang Pertanian UGM	0.10
6	Halte TJ Kaliurang Pertanian UGM - TPB Fakultas Peternakan UGM	0.10

Continuation of Table 5.6 Line K1J Average Headway on Thursday, October 19th 2023 at Afternoon Peak Hour

Segment	Stop	1/xi (minute)
7	TPB Fakultas Peternakan UGM - Halte TJ RSUP Sardjito	0.10
8	Halte TJ RSUP Sardjito - TPB MM EP UGM	0.11
9	TPB MM EP UGM - Hotel Vidi Jalan Kaliurang	0.11
10	Hotel Vidi Jalan Kaliurang - Superindo Kaliurang	0.11
11	Superindo Kaliurang - Pasar Kolombo	0.11
12	Pasar Kolombo - Terminal Bangunan	0.11
13	Terminal Bangunan - Simpang Kaliurang Palem Raya	0.11
14	Simpang Kaliurang Palem Raya - Kantor Camat Ngaglik	0.11
15	Kantor Camat Ngaglik - Puskesmas Ngaglik 1	0.11
16	Puskesmas Ngaglik 1 - SMPN 2 Ngaglik	0.11
17	SMPN 2 Ngaglik - Warung Sego Penyetan Banyuwangi	0.11
18	Warung Sego Penyetan Banyuwangi - Wedangan Kampoeng	0.11
19	Wedangan Kampoeng - Pusat Rehabilitasi Yakkum	0.11
20	Pusat Rehabilitasi Yakkum - Halte Kampus UII 1	0.11
21	Halte Kampus UII 1 - Raminten Boutique and Cafe	0.11
22	Raminten Boutique and Cafe - RS Panti Nugroho K1J	0.11
23	RS Panti Nugroho K1J - Pasar Pakem	0.11
24	Pasar Pakem - SMPN 4 Pakem	0.11
25	SMPN 4 Pakem - Raminten Boutique and Cafe 1	0.11
26	Raminten Boutique and Cafe 1 - Halte Kampus UII 2	0.11
27	Halte Kampus UII 2 - Pusat Rehabilitasi Yakkum 2	0.11
28	Pusat Rehabilitasi Yakkum 2 - Wedangan Kampoeng 2	0.11
29	Wedangan Kampoeng 2 - SPBU Kaliurang	0.13
30	SPBU Kaliurang - SMPN 2 Ngaglik 2	0.12
31	SMPN 2 Ngaglik 2 - Puskesmas Ngaglik 2	0.13
32	Puskesmas Ngaglik 2 - TK Bias Kaliurang	0.13
33	TK Bias Kaliurang - Simpang Kaliurang Palem Raya 2	0.13
34	Simpang Kaliurang Palem Raya 2 - PLN Gardu Induk Kentungan	0.13
35	PLN Gardu Induk Kentungan - Pasar Kolombo 2	0.13
36	Pasar Kolombo 2 - Superindo Kaliurang 2	0.13
37	Superindo Kaliurang 2 - TPB Graha ASUS Jalan Kaliurang	0.15
38	TPB Graha ASUS Jalan Kaliurang - TPB Fakultas Biologi UGM	0.14
39	TPB Fakultas Biologi UGM - Halte TJ Fak UGM	0.14
40	Halte TJ Fak UGM - TPB Fak UGM	0.14
41	TPB Fak UGM - Halte TJ Kaliurang Kpma UGM	0.14
42	Halte TJ Kaliurang Kopma UGM - Halte TJ Colombo Kosudgama	0.14
43	Halte TJ Colombo Kosudgama - Halte TJ Colombo UNY	0.15
44	Halte TJ Colombo UNY - Halte TJ UNY	0.15
45	Halte TJ UNY - Grand Tjokro Yogyakarta	0.15
46	Grand Tjokro Yogyakarta - Halte SPBU Gejayan	0.15

Continuation of Table 5.6 Line K1J Average Headway on Thursday, October 19th 2023 at Afternoon Peak Hour

Segment	Stop	1/xi (minute)
47	Halte SPBU Gejayan - Terminal Bus Condong Catur	0.15
Total (minute)		5.62
Headway (minute)		8.36

The value of average headway on Thursday, October 19th 2023 at afternoon peak hour was 8.36 minutes. The analysis results for headway obtained from every segment on Line K1J on Sunday, October 22nd 2023 at afternoon peak hour can be seen in the Table 5.7 below.

Table 5.7 Line K1J Average Headway on Sunday, October 22nd 2023 at Afternoon Peak Hour

Segment	Stop	1/xi (minute)
1	Terminal Bus Condong Catur - Shelter Affandi Susteran Novisiat	0.11
2	Shelter Affandi Susteran Novisiat - Halte TJ Sanata Dharma	0.11
3	Halte TJ Sanata Dharma - Halte TJ Colombo Samirono	0.11
4	Halte TJ Colombo Samirono - Halte TJ Colombo Panti Rapih	0.11
5	Halte TJ Colombo Panti Rapih- Halte TJ Kaliurang Pertanian UGM	0.11
6	Halte TJ Kaliurang Pertanian UGM - TPB Fakultas Peternakan UGM	0.10
7	TPB Fakultas Peternakan UGM - Halte TJ RSUP Sardjito	0.10
8	Halte TJ RSUP Sardjito - TPB MM EP UGM	0.10
9	TPB MM EP UGM - Hotel Vidi Jalan Kaliurang	0.11
10	Hotel Vidi Jalan Kaliurang - Superindo Kaliurang	0.11
11	Superindo Kaliurang - Pasar Kolombo	0.11
12	Pasar Kolombo - Terminal Bangunan	0.11
13	Terminal Bangunan - Simpang Kaliurang Palem Raya	0.11
14	Simpang Kaliurang Palem Raya - Kantor Camat Ngaglik	0.11
15	Kantor Camat Ngaglik - Puskesmas Ngaglik 1	0.11
16	Puskesmas Ngaglik 1 - SMPN 2 Ngaglik	0.11
17	SMPN 2 Ngaglik - Warung Sego Penyetan Banyuwangi	0.11
18	Warung Sego Penyetan Banyuwangi - Wedangan Kampoeng	0.11
19	Wedangan Kampoeng - Pusat Rehabilitasi Yakkum	0.11
20	Pusat Rehabilitasi Yakkum - Halte Kampus UII 1	0.11
21	Halte Kampus UII 1 - Raminten Boutique and Cafe	0.11
22	Raminten Boutique and Cafe - RS Panti Nugroho K1J	0.11
23	RS Panti Nugroho K1J - Pasar Pakem	0.11
24	Pasar Pakem - SMPN 4 Pakem	0.11

Continuation of Table 5.7 Line K1J Average Headway on Sunday, October 22nd 2023 at Afternoon Peak Hour

Segment	Stop	1/xi (minute)
25	SMPN 4 Pakem - Raminten Boutique and Cafe 1	0.12
26	Raminten Boutique and Cafe 1 - Halte Kampus UII 2	0.11
27	Halte Kampus UII 2 - Pusat Rehabilitasi Yakkum 2	0.12
28	Pusat Rehabilitasi Yakkum 2 - Wedangan Kampoeng 2	0.12
29	Wedangan Kampoeng 2 - SPBU Kaliurang	0.11
30	SPBU Kaliurang - SMPN 2 Ngaglik 2	0.11
31	SMPN 2 Ngaglik 2 - Puskesmas Ngaglik 2	0.11
32	Puskesmas Ngaglik 2 - TK Bias Kaliurang	0.11
33	TK Bias Kaliurang - Simpang Kaliurang Palem Raya 2	0.11
34	Simpang Kaliurang Palem Raya 2 - PLN Gardu Induk Kentungan	0.11
35	PLN Gardu Induk Kentungan - Pasar Kolombo 2	0.11
36	Pasar Kolombo 2 - Superindo Kaliurang 2	0.11
37	Superindo Kaliurang 2 - TPB Graha ASUS Jalan Kaliurang	0.11
38	TPB Graha ASUS Jalan Kaliurang - TPB Fakultas Biologi UGM	0.11
39	TPB Fakultas Biologi UGM - Halte TJ Fak UGM	0.10
40	Halte TJ Fak UGM - TPB Fak UGM	0.10
41	TPB Fak UGM - Halte TJ Kaliurang Kopma UGM	0.10
42	Halte TJ Kaliurang Kopma UGM - Halte TJ Colombo Kosudgama	0.10
43	Halte TJ Colombo Kosudgama - Halte TJ Colombo UNY	0.10
44	Halte TJ Colombo UNY - Halte TJ UNY	0.10
45	Halte TJ UNY - Grand Tjokro Yogyakarta	0.11
46	Grand Tjokro Yogyakarta - Halte SPBU Gejayan	0.11
47	Halte SPBU Gejayan - Terminal Bus Condong Catur	0.11
Total (minute)		5.09
Headway (minute)		9.24

The value of average headway on Sunday, October 22nd 2023 at afternoon peak hour was 9.24 minutes. The recapitulation data of value for average headway for both Thursday, October 19th 2023 and Sunday, October 22nd 2023 at afternoon peak hour can be seen on Figure 5.4. From Figure 5.4, it can be seen that the value of average headway of Thursday, 19th October 2023 at afternoon peak hour is higher than the obtained value of average headway of on Sunday, 22nd October 2023, also at afternoon peak hour.

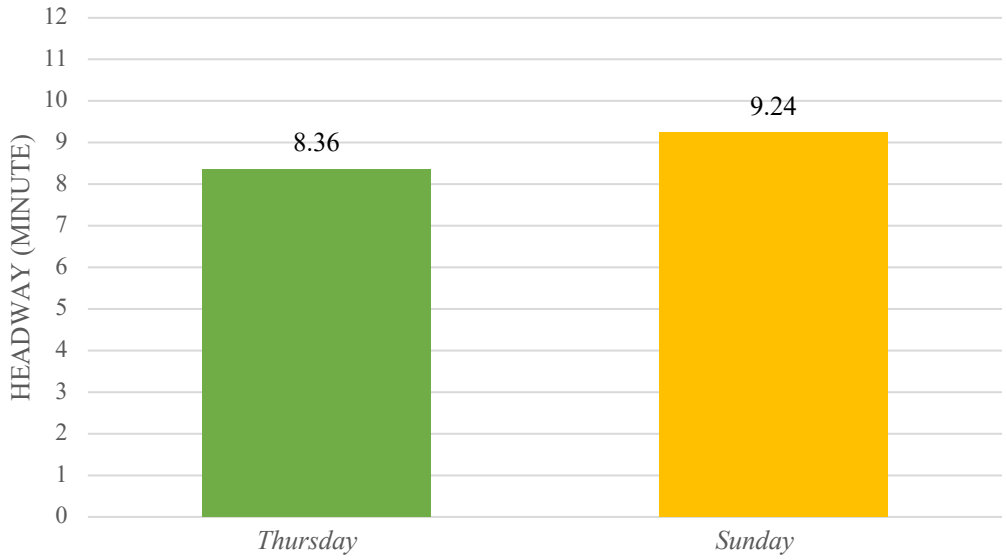

Figure 5.4 Average Headway of Thursday and Sunday at Afternoon Peak Hour

5.2.3 Speed

5.2.3.1 Speed Morning Peak Hour

The analysis of average speed used the Formula 3.3. The calculation example, the data for line K1J on Thursday, October 19th 2023 at morning peak hour, the first bus obtained a speed value (xi) of 22.370 km/hour by dividing the travel time and distance. The 1/xi value obtained is 0.045. The value of travel speed using the equation can be calculated as follows.

$$v = \frac{38{,}40}{1{,}72} = 33.27 \text{ km/h}$$

The results of the analysis of the average speed for line K1J on Thursday, October 19th 2023 at morning peak hour can be seen on Table 5.8 below.

Table 5.8 Speed on Thursday, October 19th 2023 at Morning Peak Hour

Thursday, October 19th 2023				
No.	Bus Number	Distance (km)	Time (hour)	Speed (km/h)
				Xi
1	1	38.40	1.72	22.37

Continuation of Table 5.8 Speed on Thursday, October 19th 2023 at Morning Peak Hour

Thursday, October 19th 2023				
No.	Bus Number	Distance (km)	Time (hour)	Speed (km/h)
				Xi
2	2	38.40	1.72	22.37
3	3	38.40	1.57	24.51
4	4	38.40	1.73	22.15
5	5	38.40	1.62	23.75
Average Speed (km/h)				22.99

The results of calculation for the speed of Trans Jogja Bus Line K1J on Sunday, October 22nd 2023 at morning peak hour are shown on Table 5.9.

Table 5.9 Speed on Sunday, October 22nd 2023 at Morning Peak Hour

Sunday, October 22nd 2023				
No.	Bus Number	Distance (km)	Time (hour)	Speed (km/h)
				Xi
1	1	38.40	1.52	25.32
2	2	38.40	1.72	22.37
3	3	38.40	1.58	24.25
4	4	38.40	1.58	24.25
5	5	38.40	1.67	23.04
Average Speed (km/h)				23.80

The speed data recapitulation for morning peak hour can be seen on the Table 5.10.

Table 5.10 Speed Recapitulation at Morning Peak Hour

No.	Date	Distance (km)	Average Speed (km/hour)
1	Thursday, October 19th 2023	38.40	22.99
2	Sunday, October 22nd 2023	38.40	23.80
Average Speed (km/hour)			23.40

The average speed for Thursday, 19 October 2023 and Sunday, October 22nd 2023 at morning peak hour can be seen in Figure 5.5 below.

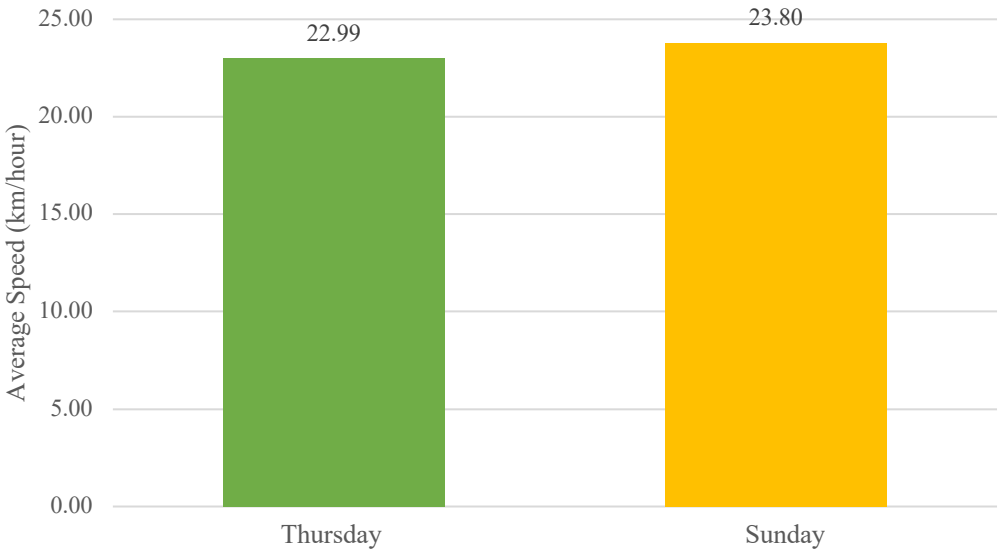

Figure 5.5 Average Speed at Morning Peak Hour

Based on Figure 5.5, the speed at morning peak hour on Thursday, October 19th 2023 was 22.99 km/hour, on Sunday, October 22nd 2023 was 23.80 km/hour, and the average speed for morning peak hour obtained was 23.40 km/hour.

5.2.3.2 Speed Afternoon Peak Hour

The travel speed are calculated using the same formula. The analysis results of speed for afternoon peak hour on Thursday, October 19th 2023 can be seen on Table 5.11 below.

Table 5.11 Speed on Thursday, October 19th 2023 at Afternoon Peak Hour

Thursday, October 19th 2023				
No.	Bus Number	Distance (km)	Time (hour)	Speed (km/h)
				Xi
1	1	38.40	2.52	15.26
2	2	38.40	2.47	15.57
3	3	38.40	2.20	17.45
4	4	38.40	2.33	16.46
5	5	38.40	2.10	18.29
Average Speed (km/h)				16.53

The results of calculation for the speed of Trans Jogja Bus Line K1J on Sunday, October 22nd 2023 at afternoon peak hour are shown on Table 5.12.

Table 5.12 Speed on Sunday, October 19th 2023 at Afternoon Peak Hour

Sunday, October 22nd 2023				
No.	Bus Number	Distance (km)	Time (hour)	Speed (km/h)
				Xi
1	1	38.40	1.82	21.14
2	2	38.40	1.77	21.74
3	3	38.40	1.77	21.74
4	4	38.40	1.88	20.39
5	5	38.40	1.80	21.33
Average Speed (km/h)				21.25

The speed data recapitulation for morning peak hour can be seen on the Table 5.13.

Table 5.13 Speed Recapitulation at Afternoon Peak Hour

No.	Date	Distance (km)	Average Speed (km/hour)
1	Thursday, October 19th 2023	38.40	16.53
2	Sunday, October 22nd 2023	38.40	21.25
Average Speed (km/hour)			18.89

The average speed for Thursday, October 19th 2023 and Sunday, October 22nd 2023 at afternoon peak hour can be seen in Figure 5.6.

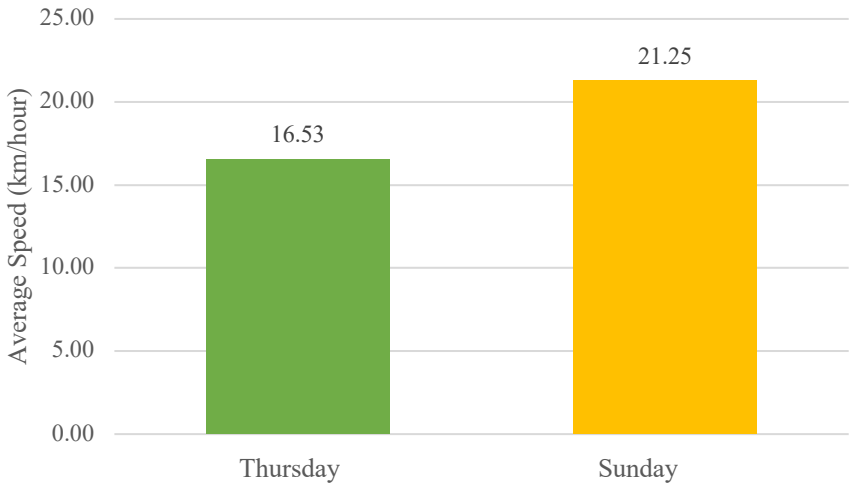

Figure 5.6 Average Speed at Afternoon Peak Hour

Based on Figure 5.6, the speed at afternoon peak hour on Thursday, October 19th 2023 was 16.53 km/hour, on Sunday, October 22nd 2023 was 21.25 km/hour, and the average speed for morning peak hour obtained was 18.89 km/hour.

5.2.4 Waiting Time

5.2.4.1 Waiting Time Morning Peak Hour

The analysis of average waiting used the Formula 3.4. The calculation for waiting time is done by multiplying the headway value with 0.5. The results of calculation for the waiting time value of Trans Jogja Bus Line K1J on Thursday, October 19th 2023 and Sunday, October 22nd 2023 at morning peak hour are shown on Table 5.14.

Table 5.14 Waiting Time at Morning Peak Hour

No.	Date	Headway (minutes)	Waiting Time (minutes)
1	Thursday, October 19th 20232	9.54	4.77
2	Sunday, October 22nd 2023	10.76	5.38

The average speed for Thursday, October 19th 2023 and Sunday, October 22nd 2023 at morning peak hour can be seen in Figure 5.7.

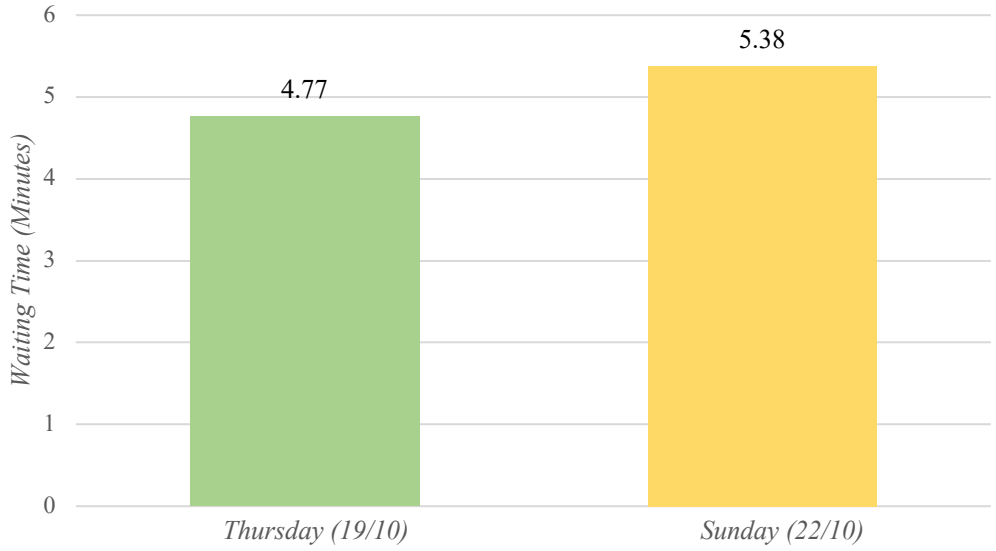

Figure 5.7 Waiting Time at Morning Peak Hour

5.2.4.2 Waiting Time Afternoon Peak Hour

The results of calculation for the waiting time value of Trans Jogja Bus Line K1J on Thursday, October 19th 2023 and Sunday, October 22nd 2023 at afternoon peak hour are shown on Table 5.15.

Table 5.15 Waiting Time at Afternoon Peak Hour

No.	Date	Headway (minutes)	Waiting Time (minutes)
1	Thursday, October 19th 20232	8.36	4.18
2	Sunday, October 22nd 2023	9.24	4.62

The average waiting time for Thursday, October 19th 2023 and Sunday, October 22nd 2023 at afternoon peak hour can be seen in Figure 5.8 below.

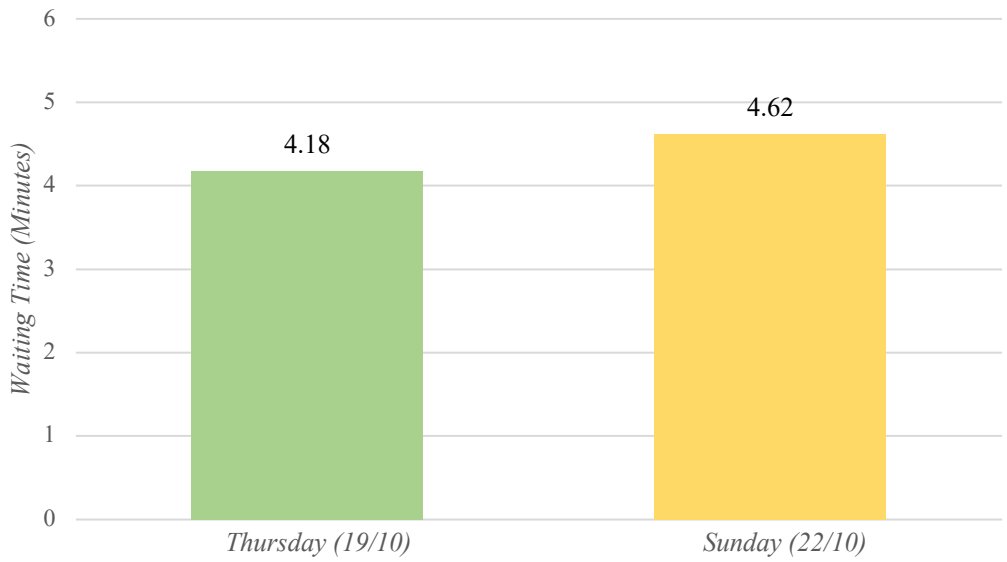

Figure 5.8 Waiting Time at Afternoon Peak Hour

5.2.5 Vehicle Operational Costs Analysis

5.2.5.1 Direct Costs

Direct costs are costs that is directly related to services being produced, which can be calculated per year or per kilo meter of vehicle. Below are the calculation of indirect costs for line K1J.

1. Vehicle Characteristics

   a. Type = HINO Sasis FB 130

b. Capacity = 19 Seat & 20 Handgrip = 39

2. Production/Bus

a. Km travelled/route = 38.4 km

b. Frequency = 6

c. Km travelled/day = 230.4 km

d. Operation day/month = 25 days

e. Km travelled/month = 5760 km/month

f. Km travelled/year = 69120 km/year

3. Costs/Bus/Km

a. Depreciation Cost

Depreciation cost is influenced by several things, the price of vehicle, depreciation period, and residual value. A depreciation period of 5 years and a residual value of 20% of the initial vehicle price, the average vehicle depreciation costs can be obtained as follows.

1) Vehicle price = Rp 380.000.000 ,-

2) Depreciation period = 5 years

3) Residual value = 20%

4) Depreciation = Rp 5.497,69/bus/km

b. Bus Crew Cost

There was only 1 driver placed in each vehicle in Trans Jogja Bus line K1J. Below are the calculation for the bus crew cost.

1) Driver = 1 person

2) Wage = Rp 4.300.000 ,-

3) Allowance = Rp 675.000 ,-

4) Insurance = Rp 488.412,-

5) Uniform = Rp 250.000 ,- / uniform (4/year)

= Rp 83.333,33 ,-

6) Total = Rp 5.546.745,33 .-

7) Bus crew cost/bus/km $= \frac{bus\ crew\ fee}{bus\ production - \text{km/year}}$

$= \frac{Rp\ 5.546.745{,}33\ x\ 12\ months}{69120\ km}$

= Rp 962, 977 ,-/bus/km

c. Fuel Cost

1) Fuel usage/bus/day (liter) = 61.44 liter

2) Km travelled/day = 230.4 km/day

3) Fuel consumption = 3.75 km/liter

4) Fuel price/liter = Rp 6.800 (Solar)

5) Fuel cost/bus/day $= \frac{bus\ fuel\ cost\ /\ day}{km\ traveled\ /\ day}$

$= \frac{Rp\ 417.792/day}{230{,}4\ km/day}$

= Rp 1.813,33 ,- /bus/km

d. Tire Cost

The average tire cost and placement calculation for Trans Jogja Bus Line K1J are as follows.

1) Tire usage/bus = 6 pieces

2) Tire durability = 24000 km

3) Tire price/piece = Rp 3.500.000

4) Tire cost/bus/km $= \frac{6\ x\ Rp\ 3.500.000/pc}{24.000\ km}$

= Rp 875 ,- /bus/km

e. Small Service

Small service is the service which is done with kilometers travelled as benchmark. Approximately every 5000 km small service is done with multiple changes and addition to the vehicle which are shown below.

1) Components

a) Engine oil = 6 liter x Rp 45.000/liter

= Rp 270.000 ,-

b) Brake fluid = 1 liter x Rp 70.000/liter

= Rp 70.000 ,-

c) Grease = 3 kg x Rp 45.000/kg

= Rp 135.000 ,-

2) Service Pay = Rp 400.000 ,-

3) Total = Rp 535.000 ,-

4) Small service cost/bus/km $= \frac{Rp\ 535.000}{5000\ km}$

= Rp 175 ,-/bus/km

f. Big Service

Big service is the service which is done after 10000 km. Several changes, checking, and additions are added to the vehicle which are shown below.

1) Components

a) Engine oil = 6 liter x Rp 45.000/liter

= Rp 270.000 ,-

b) Brake fluid = 1 liter x Rp 70.000/liter

= Rp 70.000 ,-

c) Grease = 3 kg x Rp 45.000/kg

= Rp 135.000 ,-

d) Axle oil = 4,5 liter x Rp 35.000/liter

= Rp 157.500 ,-

e) Oil filter = Rp 60.000 ,-

2) Service Pay = Rp 1.000.000 ,-

3) Total = Rp 1.692.500 ,-

4) Big service cost/bus/km $= \frac{Rp\ 1.692.500}{10000\ km}$

= Rp 169,25 ,-/bus/km

g. Additional Engine Oil

1) Additional engine oil/day = 0,25 liter

2) Km travelled/day = 230,4 km/day

3) Engine oil price/liter = Rp 45.000 ,- / liter

4) Additional oil cost $= \frac{0{,}25\ liter\ x\ Rp\ 45.000/liter}{230{,}4\ km/day}$

= Rp 48,828 ,- /bus/km

h. Bus Cleaning Cost

1) Bus cleaning price/bus/day = Rp 40.000

2) Bus cleaning price/bus/day = 25 x Rp 40.000

= Rp 1.000.000 ,-/month

3) Bus cleaning cost/bus/km $= \frac{Rp\ 1.000.000\ ,-}{5760\ km/month}$

= Rp 173,611 ,- /bus/km

i. Terminal Retribution

Trans Jogja Bus line K1J has a terminal retribution fee to be paid to Condong Catur Terminal with Rp 36.000/day. The calculations for terminal retribution cost are shown below.

1) Terminal retribution/day = Rp 36.000/day

2) Terminal retribution/bus/km $= \frac{Rp\ 36.000\ ,-}{230{,}4\ km}$

= Rp 156,25 ,-/bus/km

j. Vehicle Registration / Vehicle Tax

1) Vehicle registration/bus = Rp 600.000 ,-/bus/year

2) Vehicle registration/bus/km $= \frac{Rp\ 600.000}{69.120\ km}$

= Rp 8,681 ,-/bus/km

k. KIR / KEUR

KIR has the function to monitor the readiness of vehicles to provide technical safety guarantees, as well as providing public services to community which must be paid every 6 months. The average KIR costs are calculated with these formulas.

1) KIR frequency/bus/year = 2 times

2) KIR cost = Rp 300.000

3) KIR cost/bus/year = 2 x Rp 300.000

= Rp 600.000 ,-

4) KIR cost/bus/km $= \frac{Rp\ 600.000\ ,-}{69.120\ km}$

= Rp 8,681 ,-/bus/km

l. Insurance Cost

1) Insurance/year = 2,5% x Rp 380.000.000

= Rp 9.500.000 ,-/year

2) Insurance/bus/km $= \frac{Rp\ 9.500.000}{69.120\ km}$

= Rp 137,442 ,- /bus/km

Direct costs recapitulation every bus/km for Trans Jogja Bus line K1J can be seen on Table 5.16.

Table 5.16 Direct Cost Recapitulation

No.	Components	Costs/bus/km (Rupiah)
1	Depreciation	5.497,69 ,-
2	Bus crew	962,977 ,-
3	Fuel	1.813,33 ,-
4	Tires	875,00 ,-
5	Small service	175,00 ,-
6	Big service	169,25 ,-
7	Additional engine oil	48,83 ,-
8	Bus cleaning	173,61 ,-
9	Terminal retribution	156,25 ,-
10	Vehicle registration / Vehicle tax	8,68 ,-
11	KIR / KEUR	8,68 ,-
12	Insurance	137,44 ,-
Total (Rupiah)		Rp 10.026,74 ,-

5.2.5.2 Indirect Costs

Indirect costs consist of components that are not directly related to operations that is calculated every kilo meter per vehicle. The following are the components of indirect costs and their calculations.

1. Indirect costs every business segment / year

a. Employee Wages

1) Wages = Rp 3.500.000 ,- /month

2) Overtime = Rp 600.000 ,- /month

3) Allowance = Rp 500.000 ,- /month

4) Subtotal = Rp 4.600.000 ,- / month

5) Employee = 2

Total (a) = Rp 110.400.000 ,-

b. Management Cost

1) Office depreciation = Rp 158.000.000 ,-

2) Pool and workshop depreciation = Rp 100.000.000 ,-

3) Office maintenance = Rp 32.000.000 ,-

4) Pool and workshop maintenance = Rp 21.000.000 ,-

5) Water and electricity = Rp 10.000.000 ,-

6) Route permit = Rp 15.000.000 ,-

Total (b) = Rp 336.000.000 ,-

c. Indirect Costs Total per business segment / year

Total (a) + Total (b) = Rp 110.400.000 + Rp 336.000.000

= Rp 446.400.000 ,-

2. Indirect Costs per bus / year

a. Total bus / business segment = 15

b. Indirect cost/bus/year = $\frac{Rp\ 446.400.000}{15}$

= Rp 29.760.000/bus/year

3. Indirect Costs per bus/km

a. Indirect cost/bus/year = $\frac{Rp\ 29.760.000}{69.120\ km}$

= Rp 430,56 ,- /bus/km

5.2.5.3 Vehicle Operational Costs Calculation

Vehicle operational costs are the costs of all factors related to operating a vehicle under normal conditions. Calculating vehicle operational costs is done by adding up direct costs and indirect costs. The calculations of vehicle operational costs for Trans Jogja Bus line K1J is done as follows.

Vehicle Operational Cost = Direct costs + Indirect cost

= Rp 10.026,74 + Rp 430,56

= Rp 10.457,29 ,- /km

5.2.6 Fare and Financial Analysis

5.2.6.1 Financial Analysis

Based on the obtained vehicle operational costs, it is necessary to assess the financial feasibility using the Benefit Cost ratio (BCR) method where if BCR > 1 then the business is feasible to run and if the BCR <1 then the business is not worth

running. The calculation for the financial analysis for Trans Jogja Bus line K1J is done as follows.

1. Income

Income = Fare x Number of passengers / day

= Rp 3.600 x 777 passengers

= Rp 2.797.200 /day

2. Expenses

Expenses = VOC/BOK x distance/day x number of buses

= Rp 10.457,29 x 230.4 km x 15

= Rp 36.140.394,2 / day

3. Benefit Cost Ratio

BCR $= \frac{Income}{Expenses}$

$= \frac{2.797.200}{36.140.394,2}$

= 0.077

Based on the results of financial feasibility calculation using BCR method for Trans Jogja Bus line K1J. This route is still not feasible because the value of BCR < 1.

5.2.6.2 Fare Analysis

Fare analysis for public transportation is obtained by multiplying the basic fare and the average distance of one route or trip and adding a 10% for company service profit. The fare analysis for Trans Jogja Bus line K1J for every passenger are determined using this formula.

Basic Fare $= \frac{Vehicle\ operational\ costs}{Load\ factor\ x\ seat}$

1. Load Factor

a. Average passenger/day = 777 passengers

b. Load Factor $= \frac{777}{3510}$ x 100%

= 22.14 %

2. Fare Analysis

a. Basic fare/km $= \frac{Rp\ 10.457,29}{22.14\%\ x\ 39}$

= Rp 1.211,09 ,-

b. Fare = (Basic fare x Average distance) + 10% fare

= (Rp 1.211,09 x 38.4 km) + 10% fare

= Rp 46.865,91 ,- / passenger

5.3 Discussion

5.3.1 Performance Evaluation of Trans Jogja Bus Line K1J

Recapitulation of analysis results of performance evaluation of Trans Jogja Bus Line K1J are shown on Table 5.17 below.

Table 5.17 Performance Evaluation Recapitulation

Indicator	Unit	Result	Standard	
Load Factor	%	7.22	< 70	Below standard
Headway	minutes	8.95	5 – 10	Adequate
Speed	km/h	21.89	< 25	Adequate
Waiting time	minutes	4.74	5 – 10	Below standard

Based on the analysis and calculation done, the average load factor value obtained from Thursday, October 19th 2023 and Sunday, October 22nd 2023 during morning and afternoon peak hours was 7.22%. This value meets the standard specified by World Bank (1986) which was 70%. But that value is still far below standard. The condition inside the bus is considered not optimal enough, Saputra (2020) stated that the load factor founded in their research was 14% with the same 70% standard, and therefore it is considered not optimal because it has small demand and passengers going departing and arriving are only dominant in several stops.

The average headway value obtained from Thursday, October 19th 2023 and Sunday, October 22nd 2023 during morning and afternoon peak hours was 8.95 minutes. This value meets the standard specified by World Bank (1986) which was 5 – 10 minutes in average and 10 - 20 minutes in maximum. In the research for Trans Jogja Bus Line 4A and 4B done by Pratomo et. al. (2015), it was founded that the headway for 4A was 8,331 minutes for and 4B was 10.649 minutes,

concluding that it meets the 5 – 10 minutes and 10 – 20 minutes standard from World Bank (1986). This shows that the headway value is optimal and adequate.

The average speed value obtained from Thursday, October 19th 2023 and Sunday, October 22nd 2023 during morning and afternoon peak hours was 21.89 km/h. This value meets the standard specified by World Bank (1986) which was 25 minutes maximum. But it is not very optimal because this standard is for non-populated area, this means the demand for Trans Jogja Bus Line K1J is very low that the vehicle can drive fast around a fairly populated city. Saputra (2020) stated that the value obtained for their research was 20 km/hour, which meets the standard specified by the guide book from PT. Anindya Mitra Internasional with 13 – 30 km/hour standard.

The average waiting time value obtained from Thursday, October 19th 2023 and Sunday, October 22nd 2023 during morning and afternoon peak hours was 4.74 minutes. This value does not meet the standard specified by World Bank (1986) which was 5 – 10 minutes. The obtained value does not meet the criteria as it is still below the standard. This can be caused by the number of samples, also the date and time of survey. Pratomo et. al. (2015) stated that the value obtained for their research was also not adequate for their waiting time value, where it does not meet the 5 – 10 minutes standard specified by World Bank.

5.3.2 Vehicle Operational Costs Discussion

From the analysis and calculation done beforehand, the vehicle operational costs for Trans Jogja Bus Line K1J obtained value was Rp 10.457,29 ,- /km, which was calculated in accordance with Decree of the Ministry of Transportation Number 251 of 2022. The ticket price for passengers to ride the Trans Jogja Bus Line K1J are Rp 3.600,00 ,- per person, therefore the total value of vehicle operational cost is higher.

Kamaludin (2018) obtained different vehicle operation costs values for Corridor VII Transjakarta (Kampung Melayu – Kampung Rambutan), from PT Eka Sari Lorena is Rp 9.373,00/bus/km and from PT. Jakarta Mega Trans is Rp 13.070,00/bus/km. Both were calculated based on Decree of the Directorate General of Land Transportation Number 687 of 2002.

Differences in values and component costs influence the calculation of vehicle operational costs. The significant differences in cost components are management, offices, workshop, drivers, etc. The differences in those cost influence the value of vehicle operational costs.

5.3.3 Fare and Feasibility Analysis Discussion

The results for feasibility analysis using the Benefit Cost Ratio methos for Trans Jogja Bus Line K1J were obtained the value of BCR < 1, namely 0.077. It can be seen that the obtained result is not worthy of service because it will suffer loss. The lack of passengers and low exposure to this route can be the cause of this value to be below standard.

The government can provide subsidies for this route in order for the management and operations team to not experience many losses in carrying out Trans Jogja Bus line K1J operations. From the BCR calculation, the amount of subsidies the government can provide is Rp33.343.194,2 each day. This can help to increase support in making the general public use more public transportation rather than private vehicles.

The results for fare analysis were obtained from vehicle operational costs value in order to understand the differences between the applicable rate and to know the fare needed for the BCR value to be BCR > 1 to not suffer losses. The results obtained was Rp 46.865,91 ,- / passenger.

CHAPTER VI
CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

From the calculation and analysis done for performance evaluation, vehicle operational costs, and fare and feasibility analysis done, therefore can be concluded as follows.

1. The analysis results for performance evaluation using standard specified by World Bank with load factor, headway, and speed has meet the specified standard while waiting time does not meet the standard required.
2. The vehicle operational costs obtained for Trans Jogja Bus line K1J was Rp 10.457,29 ,- /km. Feasibility analysis showed that the Benefit Cost Ratio does not meet the standard where it has to be BCR > 1, but the result gotten was 0,077, which was BCR < 1. It can be concluded that this route is not worthy of service because of its potential of losses.
3. Fare analysis was done in order to know how much would it take for BCR value to be BCR >1 which the result of was Rp 46.865,91 ,- / passenger.

6.2 Recommendations

From the research done on Trans Jogja Bus Line K1J, there are some recommendations that can be considered as follows.

1. Make improvements for load factor by promoting so it can be more optimal while also meeting the standard. For instance, by working with educational institutions, government institutions, public facilities passed by this route to propose a program to decrease the private vehicle use and increase the public to use Trans Jogja line K1J.
2. Improve the applications features by making it user-friendly for all people, adding additional features such as live tracking, arrival time, and bus number.
3. For it to make profit, related institutions can reduce fleets used for this route and consider adding more stops that reaches wider and more populated area, or government can provide subsidies to it does not suffer losses.

4. Make it easier for future passengers to access information about this route by updating and adding applications and/or information board.
5. Further research into this topic in order for there to be more suggestions and evaluation material for related institutions.
6. The results of this research applied to the situation and time that corresponds to the time of when this research was carried out. Therefore, more research needs to be carried out according to actual situations in the future because changes will occur as time goes by.

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ATTACHMENT

ATTACHMENT 1 Schedule

No.	Month			1 (%)				2 (%)				3 (%)				4 (%)			
	Week			1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
	Activity	Hour (%)	Percent (%)																
1	Preparation																		
	Survey Preparation	5	2,7	1	1														
	Pre-Survey	10	5			2,7	2,7												
2	Data Collection																		
	Secondary Data	10	5,4					5,4											
	Primary Data	80	43,2					21,6	21,6										
3	Interview	6	3						1,6	1,6									
4	Data Analysis	15	8,1							4,1	4,1								
5	Discussion Analysis	15	8,1								4,1	4,1							
6	Results Analysis	24	13,0									3,2	3,2	3,2	3,2				
7	Report Preparation	20	10,8												2,2	2,2	2,2	2,2	2,2
Total Hour (%)		185	100	2,5	2,5	5	5	50	43	10,5	15	13,5	6	6	10	4	4	4	4
Weekly (%)				1	1	3	3	27	23	6	8	7	3	3	5	2	2	2	2
Cummulative (%)				1	3	5	8	35	58	64	72	79	83	86	91	94	96	98	100

ATTACHMENT 2 Survey Form Trans Jogja Bus Line K1J

Date and Time :
No. Bus :
Arrival Time :
Departure Time :

Segment	Bus Stop	Passenger IN	Passenger OUT	Time	Duration (Minute)	Description
1	Bus Condong Catur Terminal					
2	Affandi Susteran Novisiat Shelter					
3	TJ Sanata Dharma					
4	TJ Colombo Samirono					
5	TJ Colombo Panti Rapih					
6	TJ Kaliurang Pertanian UGM					
7	TPB Fakultas Peternakan UGM					
8	TJ RSUP Sardjito					
9	TPB MM EP UGM					
10	Hotel Vidi Jalan Kaliurang					
11	Superindo Kaliurang					
12	Pasar Kolombo					
13	Terminal Bangunan					
14	Simpang Kaliurang Palem Raya					
15	Kantor Camat Ngaglik					
16	Puskesmas Ngaglik 1					
17	SMPN 2 Ngaglik					
18	Warung Sego Penyetan Banyuwangi					
19	Wedangan Kampoeng					
20	Pusat Rehabilitasi Yakkum					
21	Raminten Boutique and Cafe					
22	RS Panti Nugroho K1J					
23	Pasar Pakem					
24	SMPN 4 Pakem					
25	Raminten Boutique and Cafe 1					
26	Pusat Rehabilitasi Yakkum 2					
27	Wedangan Kampoeng 2					
28	SPBU Kaliurang					
29	SMPN 2 Ngaglik 2					
30	Puskesmas Ngaglik 2					
31	TK Bias Kaliurang					
32	Simpang Kaliurang Palem Raya 2					
33	PLN Gardu Induk Kentungan					
34	Pasar Kolombo 2					
35	Superindo Kaliurang 2					
36	TPB Graha ASUS Jalan Kaliurang					
37	TPB Fakultas Biologi UGM					
38	TJ Fak UGM					
39	TPB Fak UGM					
40	TJ Kaliurang Kpma UGM					
41	TJ Colombo Kosudgama					
42	TJ Colombo UNY					
43	TJ UNY					
44	Grand Tjokro Yogyakarta					
45	SPBU Gejayan					
46	Condong Catur Bus Terminal					

ATTACHMENT 3 Survey Permission Letter

B

PEMERINTAH DAERAH DAERAH ISTIMEWA YOGYAKARTA

DINAS PERHUBUNGAN

Alamat : Jl. Babarsari No. 30 Yogyakarta Telepon (0274) 485775, 487335, Fax: (0274) 485405
Website : www.dishub.jogjaprov.go.id Email : dishub@jogjaprov.go.id

Nomor	:	070/4588	Yogyakarta, 26 Oktober 2023
Sifat	:	Biasa	
Lampiran	:	-	Kepada:
Hal	:	Permohonan Izin Penelitian Skripsi a.n. Hani Maharani	Yth. Direktur PT. Jogja Tugu Trans
			di - YOGYAKARTA

Menindaklanjuti surat Ketua Program Studi Teknik Sipil Program Sarjana Universitas Islam Indonesia nomor:124/Ka.ProdiPSTS/20/TA/IV/2023 tanggal 10 Oktober 2023 perihal Permohonan Izin Penelitian TA dan Pengambilan Data untuk TA, bahwa yang berkepentingan dibawah ini:

Nama	: Hani Maharani
NIM	: 17511042
Program Studi	: Teknik Sipil
Keperluan	: Melaksanakan Penelitian Skripsi
Judul Tesis	: Performance Evaluation Of Teman Bus (Case Study: Teman Bus Line K1J)

Agar dibantu dalam pengambilan data penelitian sehubungan dengan pelaksanaan penyusunan Skripsi.

Demikian disampaikan atas perhatian dan kerjasamanya diucapkan terima kasih.

Plh. KEPALA,

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Dokumen ini ditandatangani secara elektronik menggunakan sertifikat elektronik yang diterbitkan oleh Balai Sertifikasi Elektronik (BSrE) Badan Siber dan Sandi Negara

ATTACHMENT 4 Number of Passengers

Peak Hour	*Thursday, October 19th 2023*		*Sunday, October 22nd 2023*	
	Bus	Number of Passengers	Bus	Number of Passengers
Morning	1	13	1	3
	2	16	2	15
	3	1	3	4
	4	10	4	5
	5	4	5	13
Afternoon	1	30	1	12
	2	7	2	12
	3	11	3	2
	4	32	4	13
	5	9	5	3

ATTACHMENT 5 Load Factor on Thursday, October 19th 2023

Tabel L-5.1 Load Factor of Bus 1 on Thursday, October 19th 2023 at Morning Peak Hour

Bus	Segment	Load Factor
1	1	10.256
	2	10.256
	3	10.256
	4	12.821
	5	12.821
	6	12.821
	7	12.821
	8	17.949
	9	17.949
	10	17.949
	11	20.513
	12	20.513
	13	20.513
	14	20.513
	15	20.513
	16	20.513
	17	20.513
	18	20.513
	19	15.385
	20	15.385

Continuation of Tabel L-5.1 Load Factor of Bus 1 on Thursday, October 19th 2023 at Morning Peak Hour

Bus	Segment	Load Factor
1	21	12.821
	22	12.821
	23	7.692
	24	2.564
	25	10.256
	26	10.256
	27	10.256
	28	2.564
	29	2.564
	30	2.564
	31	5.128
	32	5.128
	33	5.128
	34	5.128
	35	5.128
	36	2.564
	37	2.564
	38	2.564
	39	2.564
	40	2.564
	41	2.564
	42	2.564
	43	2.564
	44	2.564
	45	2.564
	46	2.564
	47	0.000

Tabel L-5.2 Factor of Bus 2 on Thursday, October 19th 2023 at Morning Peak Hour

Bus	Segment	Load Factor
2	1	5.128
	2	5.128
	3	5.128
	4	5.128
	5	5.128
	6	5.128
	7	5.128
	8	10.256
	9	10.256
	10	12.821
	11	12.821
	12	7.692
	13	5.128
	14	5.128
	15	5.128
	16	7.692
	17	12.821
	18	12.821
	19	12.821
	20	7.692
	21	5.128
	22	5.128
	23	5.128
	24	2.564
	25	2.564
	26	7.692
	27	7.692
	28	2.564
	29	2.564
	30	2.564
	31	2.564
	32	2.564
	33	2.564
	34	2.564
	35	2.564
	36	7.692
	37	7.692
	38	10.256

Continuation Tabel L-5.2 Factor of Bus 2 on Thursday, October 19th 2023 at Morning Peak Hour

Bus	Segment	Load Factor
2	39	10.256
	40	7.692
	41	5.128
	42	5.128
	43	5.128
	44	7.692
	45	7.692
	46	7.692
	47	0.000

Tabel L-5.3 Factor of Bus 3 on Thursday, October 19th 2023 at Morning Peak Hour

Bus	Segment	Load Factor
3	1	0.000
	2	0.000
	3	0.000
	4	0.000
	5	0.000
	6	0.000
	7	2.564
	8	2.564
	9	2.564
	10	2.564
	11	2.564
	12	2.564
	13	2.564
	14	2.564
	15	0.000
	16	0.000
	17	0.000
	18	0.000
	19	0.000
	20	0.000
	21	0.000
	22	0.000

Continuation of Tabel L-5.3 Factor of Bus 3 on Thursday, October 19th 2023 at Morning Peak Hour

Bus	Segment	Load Factor
3	23	0.000
	24	0.000
	25	0.000
	26	0.000
	27	0.000
	28	0.000
	29	0.000
	30	0.000
	31	0.000
	32	0.000
	33	0.000
	34	0.000
	35	0.000
	36	0.000
	37	0.000
	38	0.000
	39	0.000
	40	0.000
	41	0.000
	42	0.000
	43	0.000
	44	0.000
	45	0.000
	46	0.000
	47	0.000

Tabel L-5.4 Factor of Bus 4 on Thursday, October 19th 2023 at Morning Peak Hour

Bus	Segment	Load Factor
4	1	7.692
	2	10.256
	3	12.821
	4	12.821

Continuation of Tabel L-5.4 Factor of Bus 4 on Thursday, October 19th 2023 at Morning Peak Hour

Bus	Segment	Load Factor
4	5	12.821
	6	15.385
	7	15.385
	8	15.385
	9	15.385
	10	15.385
	11	12.821
	12	10.256
	13	5.128
	14	5.128
	15	5.128
	16	5.128
	17	5.128
	18	5.128
	19	2.564
	20	2.564
	21	2.564
	22	2.564
	23	0.000
	24	2.564
	25	5.128
	26	5.128
	27	5.128
	28	5.128
	29	5.128
	30	5.128
	31	5.128
	32	10.256
	33	10.256
	34	10.256
	35	10.256
	36	10.256
	37	10.256
	38	7.692
	39	7.692
	40	2.564

Continuation of Tabel L-5.4 Load Factor of Bus 4 on Thursday, October 19th 2023 at Morning Peak Hour

Bus	Segment	Load Factor
4	41	0.000
	42	0.000
	43	0.000
	44	0.000
	45	0.000
	46	0.000
	47	0.000

Tabel L-5.5 Load Factor of Bus 5 on Thursday, October 19th 2023 at Morning Peak Hour

Bus	Segment	Load Factor
5	1	0.000
	2	0.000
	3	0.000
	4	0.000
	5	0.000
	6	0.000
	7	0.000
	8	0.000
	9	0.000
	10	0.000
	11	0.000
	12	0.000
	13	0.000
	14	0.000
	15	0.000
	16	0.000
	17	0.000
	18	0.000
	19	0.000
	20	0.000
	21	0.000
	22	0.000
	23	2.564

Continuation of Tabel L-5.5 Load Factor of Bus 5 on Thursday, October 19th 2023 at Morning Peak Hour

Bus	Segment	Load Factor
5	24	5.128
	25	5.128
	26	7.692
	27	10.256
	28	10.256
	29	10.256
	30	10.256
	31	10.256
	32	10.256
	33	10.256
	34	10.256
	35	10.256
	36	10.256
	37	10.256
	38	10.256
	39	10.256
	40	7.692
	41	5.128
	42	5.128
	43	5.128
	44	5.128
	45	5.128
	46	5.128
	47	0.000

Tabel L-5.6 Load Factor of Bus 1 on Thursday, October 19th 2023 at Afternoon Peak Hour

Bus	Segment	Load Factor
1	1	0.000
	2	0.000
	3	5.128
	4	5.128
	5	15.385

Continuation of Tabel L-5.6 Load Factor of Bus 1 on Thursday, October 19th 2023 at Afternoon Peak Hour

Bus	Segment	Load Factor
1	6	23.077
	7	28.205
	8	33.333
	9	33.333
	10	35.897
	11	35.897
	12	35.897
	13	35.897
	14	35.897
	15	30.769
	16	30.769
	17	30.769
	18	30.769
	19	20.513
	20	17.949
	21	15.385
	22	15.385
	23	10.256
	24	7.692
	25	17.949
	26	17.949
	27	17.949
	28	23.077
	29	23.077
	30	23.077
	31	23.077
	32	23.077
	33	23.077
	34	23.077
	35	20.513
	36	20.513
	37	12.821
	38	12.821
	39	12.821
	40	12.821
	41	12.821

Continuation of Tabel L-5.6 Load Factor of Bus 1 on Thursday, October 19th 2023 at Afternoon Peak Hour

Bus	Segment	Load Factor
1	42	12.821
	43	12.821
	44	12.821
	45	10.256
	46	7.692
	47	0.000

Tabel L-5.7 Load Factor of Bus 2 on Thursday, October 19th 2023 at Afternoon Peak Hour

Bus	Segment	Load Factor
2	1	10.256
	2	10.256
	3	10.256
	4	10.256
	5	12.821
	6	12.821
	7	12.821
	8	12.821
	9	12.821
	10	12.821
	11	10.256
	12	5.128
	13	5.128
	14	5.128
	15	5.128
	16	5.128
	17	5.128
	18	5.128
	19	5.128
	20	5.128
	21	5.128
	22	5.128
	23	5.128
	24	2.564
	25	2.564
	26	5.128

Continuation of Tabel L-5.7 Load Factor of Bus 2 on Thursday, October 19th 2023 at Afternoon Peak Hour

Bus	Segment	Load Factor
2	27	5.128
	28	5.128
	29	5.128
	30	5.128
	31	5.128
	32	5.128
	33	5.128
	34	5.128
	35	5.128
	36	5.128
	37	5.128
	38	7.692
	39	7.692
	40	5.128
	41	2.564
	42	2.564
	43	2.564
	44	2.564
	45	2.564
	46	2.564
	47	0.000

Tabel L-5.8 Load Factor of Bus 3 on Thursday, October 19th 2023 at Afternoon Peak Hour

Bus	Segment	Load Factor
3	1	7.692
	2	7.692
	3	7.692
	4	7.692
	5	10.256
	6	12.821
	7	15.385
	8	20.513
	9	25.641
	10	23.077

Continuation of Tabel L-5.8 Load Factor of Bus 3 on Thursday, October 19th 2023 at Afternoon Peak Hour

Bus	Segment	Load Factor
3	11	25.641
	12	23.077
	13	23.077
	14	23.077
	15	23.077
	16	17.949
	17	17.949
	18	17.949
	19	15.385
	20	15.385
	21	12.821
	22	12.821
	23	10.256
	24	5.128
	25	5.128
	26	5.128
	27	5.128
	28	5.128
	29	5.128
	30	5.128
	31	5.128
	32	5.128
	33	5.128
	34	5.128
	35	5.128
	36	5.128
	37	5.128
	38	5.128
	39	5.128
	40	5.128
	41	5.128
	42	5.128
	43	5.128
	44	5.128
	45	5.128
	46	5.128
	47	0.000

Table L-5.9 Load Factor of Bus 4 on Thursday, October 19th 2023 at Afternoon Peak Hour

Bus	Segment	Load Factor
4	1	5.128
	2	5.128
	3	12.821
	4	15.385
	5	28.205
	6	35.897
	7	38.462
	8	41.026
	9	53.846
	10	51.282
	11	56.410
	12	48.718
	13	41.026
	14	28.205
	15	28.205
	16	23.077
	17	23.077
	18	23.077
	19	17.949
	20	15.385
	21	15.385
	22	15.385
	23	12.821
	24	0.000
	25	0.000
	26	0.000
	27	2.564
	28	2.564

Continuation of Table L-5.9 Load Factor of Bus 4 on Thursday, October 19th 2023 at Afternoon Peak Hour

Bus	Segment	Load Factor
4	29	2.564
	30	2.564
	31	2.564
	32	2.564
	33	5.128
	34	5.128
	35	5.128
	36	5.128
	37	2.564
	38	5.128
	39	5.128
	40	5.128
	41	5.128
	42	2.564
	43	2.564
	44	2.564
	45	2.564
	46	2.564
	47	0.000

Table L-5.10 Load Factor of Bus 5 on Thursday, October 19th 2023 at Afternoon Peak Hour

Bus	Segment	Load Factor
5	1	0.000
	2	0.000
	3	0.000
	4	0.000
	5	7.692
	6	15.385
	7	15.385

Continuation of Table L-5.10 Load Factor of Bus 5 on Thursday, October 19th 2023 at Afternoon Peak Hour

No. Bus	No. Segmen	*Load Factor*
5	8	15.385
	9	17.949
	10	17.949
	11	17.949
	12	17.949
	13	17.949
	14	17.949
	15	15.385
	16	12.821
	17	12.821
	18	10.256
	19	7.692
	20	7.692
	21	7.692
	22	7.692
	23	2.564
	24	0.000
	25	0.000
	26	0.000
	27	0.000
	28	0.000
	29	0.000
	30	0.000
	31	0.000
	32	0.000
	33	0.000
	34	0.000
	35	0.000
	36	0.000
	37	0.000
	38	0.000
	39	0.000
	40	0.000
	41	0.000
	42	0.000

Continuation of Table L-5.10 Load Factor of Bus 5 on Thursday, October 19th 2023 at Afternoon Peak Hour

No. Bus	No. Segmen	*Load Factor*
5	43	0.000
	44	0.000
	45	0.000
	46	0.000
	47	0.000

ATTACHMENT 6 Load Factor on Sunday, October 22nd 2023

Table L-6.1 Load Factor of Bus 1 on Sunday, October 22nd 2023 at Morning Peak Hour

No. Bus	No. Segmen	*Load Factor*
1	1	0.000
	2	0.000
	3	0.000
	4	0.000
	5	0.000
	6	0.000
	7	0.000
	8	0.000
	9	0.000
	10	0.000
	11	0.000
	12	0.000
	13	0.000
	14	0.000
	15	0.000
	16	0.000
	17	0.000
	18	0.000
	19	5.128
	20	5.128
	21	5.128
	22	5.128
	23	5.128

Continuation of Table L-6.1 Load Factor of Bus 1 on Sunday, October 22nd 2023 at Morning Peak Hour

No. Bus	No. Segmen	*Load Factor*
1	24	0.000
	25	0.000
	26	0.000
	27	0.000
	28	0.000
	29	0.000
	30	0.000
	31	0.000
	32	0.000
	33	0.000
	34	0.000
	35	2.564
	36	2.564
	37	2.564
	38	0.000
	39	0.000
	40	0.000
	41	0.000
	42	0.000
	43	0.000
	44	0.000
	45	0.000
	46	0.000
	47	0.000

Table L-6.2 Load Factor of Bus 2 on Sunday, October 22nd 2023 at Morning Peak Hour

No. Bus	No. Segmen	*Load Factor*
2	1	7.692
	2	7.692
	3	7.692
	4	7.692
	5	10.256
	6	10.256
	7	10.256
	8	23.077

Continuation of Table L-6.2 Load Factor of Bus 2 on Sunday, October 22nd 2023 at Morning Peak Hour

No. Bus	No. Segmen	*Load Factor*
2	9	23.077
	10	23.077
	11	17.949
	12	17.949
	13	17.949
	14	15.385
	15	15.385
	16	15.385
	17	15.385
	18	15.385
	19	12.821
	20	10.256
	21	10.256
	22	10.256
	23	10.256
	24	5.128
	25	5.128
	26	5.128
	27	7.692
	28	12.821
	29	10.256
	30	10.256
	31	10.256
	32	12.821
	33	10.256
	34	10.256
	35	10.256
	36	10.256
	37	10.256
	38	10.256
	39	10.256
	40	10.256
	41	10.256
	42	10.256
	43	10.256
	44	10.256
	45	10.256
	46	10.256
	47	0.000

Table L-6.3 Load Factor of Bus 3 on Sunday, October 22nd 2023 at Morning Peak Hour

No. Bus	No. Segmen	*Load Factor*
3	1	5.128
	2	5.128
	3	5.128
	4	5.128
	5	5.128
	6	5.128
	7	5.128
	8	5.128
	9	5.128
	10	5.128
	11	5.128
	12	5.128
	13	5.128
	14	0.000
	15	0.000
	16	0.000
	17	0.000
	18	0.000
	19	0.000
	20	0.000
	21	0.000
	22	0.000
	23	0.000
	24	0.000
	25	0.000
	26	0.000
	27	0.000
	28	0.000
	29	0.000
	30	0.000
	31	0.000
	32	0.000
	33	2.564
	34	2.564
	35	5.128

Continuation of Table L-6.3 Load Factor of Bus 3 on Sunday, October 22nd 2023 at Morning Peak Hour

No. Bus	No. Segmen	*Load Factor*
3	36	5.128
	37	5.128
	38	5.128
	39	2.564
	40	0.000
	41	0.000
	42	0.000
	43	0.000
	44	0.000
	45	0.000
	46	0.000
	47	0.000

Table L-6.4 Load Factor of Bus 4 on Sunday, October 22nd 2023 at Morning Peak Hour

No. Bus	No. Segmen	*Load Factor*
4	1	5.128
	2	5.128
	3	5.128
	4	5.128
	5	5.128
	6	5.128
	7	5.128
	8	5.128
	9	5.128
	10	5.128
	11	5.128
	12	5.128
	13	5.128
	14	5.128
	15	5.128
	16	5.128
	17	5.128
	18	5.128
	19	5.128
	20	5.128
	21	5.128
	22	5.128
	23	5.128
	24	5.128
	25	7.692

Continuation of Table L-6.4 Load Factor of Bus 4 on Sunday, October 22nd 2023 at Morning Peak Hour

No. Bus	No. Segmen	*Load Factor*
4	26	7.692
	27	7.692
	28	7.692
	29	7.692
	30	7.692
	31	7.692
	32	7.692
	33	10.256
	34	10.256
	35	10.256
	36	7.692
	37	7.692
	38	10.256
	39	10.256
	40	10.256
	41	10.256
	42	10.256
	43	10.256
	44	10.256
	45	7.692
	46	7.692
	47	0.000

Table L-6.5 Load Factor of Bus 5 on Sunday, October 22nd 2023 at Morning Peak Hour

No. Bus	No. Segmen	*Load Factor*
5	1	0.000
	2	0.000
	3	0.000
	4	0.000
	5	5.128
	6	7.692
	7	7.692
	8	7.692
	9	7.692
	10	7.692
	11	12.821
	12	12.821
	13	10.256
	14	10.256
	15	10.256

Continuation of Table L-6.5 Load Factor of Bus 5 on Sunday, October 22nd 2023 at Morning Peak Hour

No. Bus	No. Segmen	*Load Factor*
5	16	10.256
	17	10.256
	18	7.692
	19	5.128
	20	5.128
	21	2.564
	22	2.564
	23	0.000
	24	2.564
	25	7.692
	26	7.692
	27	10.256
	28	10.256
	29	12.821
	30	15.385
	31	15.385
	32	15.385
	33	15.385
	34	15.385
	35	15.385
	36	17.949
	37	12.821
	38	12.821
	39	12.821
	40	7.692
	41	7.692
	42	7.692
	43	5.128
	44	2.564
	45	2.564
	46	2.564
	47	0.000

Table L-6.6 Load Factor of Bus 1 on Sunday, October 22nd 2023 at Afternoon Peak Hour

No. Bus	No. Segmen	*Load Factor*
1	1	5.128
	2	5.128
	3	7.692
	4	7.692
	5	7.692
	6	7.692
	7	7.692
	8	10.256
	9	10.256
	10	15.385
	11	12.821
	12	12.821
	13	12.821
	14	12.821
	15	12.821
	16	12.821
	17	12.821
	18	12.821
	19	12.821
	20	10.256
	21	7.692
	22	7.692
	23	5.128
	24	5.128
	25	7.692
	26	7.692
	27	12.821
	28	12.821
	29	15.385
	30	15.385
	31	15.385
	32	15.385
	33	15.385
	34	17.949
	35	17.949
	36	17.949
	37	12.821
	38	12.821
	39	12.821
	40	12.821
	41	12.821
	42	7.692

Continuation of Table L-6.6 Load Factor of Bus 1 on Sunday, October 22nd 2023 at Afternoon Peak Hour

No. Bus	No. Segmen	*Load Factor*
1	43	5.128
	44	5.128
	45	5.128
	46	5.128
	47	0.000

Table L-6.7 Load Factor of Bus 2 on Sunday, October 22nd 2023 at Afternoon Peak Hour

No. Bus	No. Segmen	*Load Factor*
2	1	0.000
	2	0.000
	3	5.128
	4	5.128
	5	5.128
	6	10.256
	7	10.256
	8	12.821
	9	17.949
	10	17.949
	11	23.077
	12	23.077
	13	23.077
	14	23.077
	15	23.077
	16	23.077
	17	17.949
	18	17.949
	19	12.821
	20	12.821
	21	12.821
	22	12.821
	23	10.256
	24	5.128
	25	5.128
	26	5.128
	27	5.128
	28	7.692
	29	5.128
	30	5.128
	31	5.128
	32	5.128

Continuation of Table L-6.7 Load Factor of Bus 2 on Sunday, October 22nd 2023 at Afternoon Peak Hour

No. Bus	No. Segmen	*Load Factor*
2	33	5.128
	34	5.128
	35	5.128
	36	5.128
	37	5.128
	38	5.128
	39	5.128
	40	2.564
	41	2.564
	42	0.000
	43	0.000
	44	0.000
	45	0.000
	46	0.000
	47	0.000

Table L-6.8 Load Factor of Bus 3 on Sunday, October 22nd 2023 at Afternoon Peak Hour

No. Bus	No. Segmen	*Load Factor*
3	1	0.000
	2	0.000
	3	0.000
	4	0.000
	5	0.000
	6	0.000
	7	0.000
	8	0.000
	9	0.000
	10	0.000
	11	0.000
	12	0.000
	13	0.000
	14	0.000
	15	0.000
	16	0.000
	17	0.000
	18	0.000
	19	0.000
	20	0.000

Continuation of Table L-6.8 Load Factor of Bus 3 on Sunday, October 22nd 2023 at Afternoon Peak Hour

No. Bus	No. Segmen	*Load Factor*
3	21	0.000
	22	0.000
	23	0.000
	24	0.000
	25	0.000
	26	0.000
	27	5.128
	28	5.128
	29	5.128
	30	5.128
	31	5.128
	32	5.128
	33	5.128
	34	5.128
	35	5.128
	36	5.128
	37	2.564
	38	2.564
	39	2.564
	40	0.000
	41	0.000
	42	0.000
	43	0.000
	44	0.000
	45	0.000
	46	0.000
	47	0.000

Table L-6.9 Load Factor of Bus 4 on Sunday, October 22nd 2023 at Afternoon Peak Hour

No. Bus	No. Segmen	*Load Factor*
4	1	0.000
	2	0.000
	3	0.000
	4	0.000
	5	12.821
	6	15.385
	7	15.385
	8	15.385
	9	17.949
	10	17.949

Continuation of Table L-6.9 Load Factor of Bus 4 on Sunday, October 22nd 2023 at Afternoon Peak Hour

No. Bus	No. Segmen	*Load Factor*
4	11	17.949
	12	17.949
	13	17.949
	14	17.949
	15	17.949
	16	17.949
	17	17.949
	18	17.949
	19	2.564
	20	0.000
	21	0.000
	22	0.000
	23	0.000
	24	0.000
	25	0.000
	26	2.564
	27	10.256
	28	10.256
	29	5.128
	30	5.128
	31	5.128
	32	7.692
	33	7.692
	34	7.692
	35	7.692
	36	10.256
	37	7.692
	38	7.692
	39	7.692
	40	7.692
	41	7.692
	42	2.564
	43	2.564
	44	2.564
	45	0.000
	46	0.000
	47	0.000

Table L-6.10 Load Factor of Bus 5 on Sunday, October 22nd 2023 at Afternoon Peak Hour

No. Bus	No. Segmen	*Load Factor*
5	1	0.000
	2	0.000
	3	0.000
	4	0.000
	5	0.000
	6	0.000
	7	0.000
	8	0.000
	9	0.000
	10	0.000
	11	5.128
	12	5.128
	13	5.128
	14	5.128
	15	5.128
	16	5.128
	17	5.128
	18	5.128
	19	5.128
	20	5.128
	21	5.128
	22	5.128
	23	5.128
	24	7.692
	25	7.692
	26	7.692
	27	7.692
	28	7.692
	29	7.692
	30	7.692
	31	7.692
	32	7.692
	33	7.692
	34	2.564
	35	2.564
	36	2.564
	37	0.000
	38	0.000
	39	0.000
	40	0.000

Continuation of Table L-6.10 Load Factor of Bus 5 on Sunday, October 22nd 2023 at Afternoon Peak Hour

No. Bus	No. Segmen	*Load Factor*
5	41	0.000
	42	0.000
	43	0.000
	44	0.000
	45	0.000
	46	0.000
	47	0.000

ATTACHMENT 6 Headway on Thursday, October 19th 2023

Table L-7.1 Average Headway on Thursday, October 19th 2023 at Morning Peak Hour

Thursday						
SEGMENT	*STOP*	BUS 1	BUS 2	BUS 3	BUS 4	BUS 5
1	Terminal Bus Condong Catur - *Shelter* Affandi Susteran Novisiat	08.36.00	08.40.00	08.56.00	09.05.00	09.17.00
2	*Shelter* Affandi Susteran Novisiat - Halte TJ Sanata Dharma	08.42.00	08.47.00	09.00.00	09.12.00	09.23.00
3	Halte TJ Sanata Dharma - Halte TJ Colombo Samirono	08.44.00	08.49.00	09.03.00	09.14.00	09.25.00
4	Halte TJ Colombo Samirono - Halte TJ Colombo Panti Rapih	08.46.00	08.50.00	09.05.00	09.15.00	09.26.00
5	Halte TJ Colombo Panti Rapih- Halte TJ Kaliurang Pertanian UGM	08.51.00	08.53.00	09.08.00	09.18.00	09.29.00
6	Halte TJ Kaliurang Pertanian UGM - TPB Fakultas Peternakan UGM	08.54.00	08.56.00	09.12.00	09.21.00	09.31.00
7	TPB Fakultas Peternakan UGM - Halte TJ RSUP Sardjito	08.55.00	08.57.00	09.12.00	09.22.00	09.32.00
8	Halte TJ RSUP Sardjito - TPB MM EP UGM	08.56.00	08.59.00	09.14.00	09.23.00	09.34.00
9	TPB MM EP UGM - Hotel Vidi Jalan Kaliurang	08.58.00	09.02.00	09.16.00	09.26.00	09.35.00
10	Hotel Vidi Jalan Kaliurang - Superindo Kaliurang	08.59.00	09.04.00	09.20.00	09.28.00	09.37.00
11	Superindo Kaliurang - Pasar Kolombo	09.03.00	09.07.00	09.23.00	09.31.00	09.41.00
12	Pasar Kolombo - Terminal Bangunan	09.05.00	09.09.00	09.25.00	09.34.00	09.44.00
13	Terminal Bangunan - Simpang Kaliurang Palem Raya	09.07.00	09.11.00	09.26.00	09.36.00	09.46.00
14	Simpang Kaliurang Palem Raya - Kantor Camat Ngaglik	09.10.00	09.14.00	09.29.00	09.40.00	09.50.00
15	Kantor Camat Ngaglik - Puskesmas Ngaglik 1	09.12.00	09.16.00	09.32.00	09.42.00	09.52.00
16	Puskesmas Ngaglik 1 - SMPN 2 Ngaglik	09.12.00	09.17.00	09.32.00	09.42.00	09.53.00
17	SMPN 2 Ngaglik - Warung Sego Penyetan Banyuwangi	09.14.00	09.19.00	09.34.00	09.44.00	09.54.00
18	Warung Sego Penyetan Banyuwangi - Wedangan Kampoeng	09.15.00	09.20.00	09.36.00	09.45.00	09.55.00

Continuation of Table L-7.1 Average Headway on Thursday, October 19th 2023 at Morning Peak Hour

Thursday						
SEGMENT	*STOP*	BUS 1	BUS 2	BUS 3	BUS 4	BUS 5
19	Wedangan Kampoeng - Pusat Rehabilitasi Yakkum	09.17.00	09.21.00	09.36.00	09.47.00	09.57.00
20	Pusat Rehabilitasi Yakkum - Halte Kampus UII 1	09.19.00	09.24.00	09.38.00	09.49.00	09.59.00
21	Halte Kampus UII 1 - Raminten *Boutique and Cafe*	09.21.00	09.27.00	09.40.00	09.51.00	10.02.00
22	Raminten *Boutique and Cafe* - RS Panti Nugroho K1J	09.23.00	09.29.00	09.42.00	09.53.00	10.03.00
23	RS Panti Nugroho K1J - Pasar Pakem	09.24.00	09.30.00	09.43.00	09.54.00	10.04.00
24	Pasar Pakem - SMPN 4 Pakem	09.26.00	09.31.00	09.44.00	09.55.00	10.06.00
25	SMPN 4 Pakem - Raminten *Boutique and Cafe* 1	09.28.00	09.34.00	09.46.00	09.57.00	10.08.00
26	Raminten *Boutique and Cafe* 1 - Halte Kampus UII 2	09.30.00	09.35.00	09.47.00	09.59.00	10.09.00
27	Halte Kampus UII 2 - Pusat Rehabilitasi Yakkum 2	09.32.00	09.38.00	09.48.00	10.01.00	10.11.00
28	Pusat Rehabilitasi Yakkum 2 - Wedangan Kampoeng 2	09.34.00	09.40.00	09.50.00	10.04.00	10.13.00
29	Wedangan Kampoeng 2 - SPBU Kaliurang	09.37.00	09.43.00	09.53.00	10.06.00	10.16.00
30	SPBU Kaliurang - SMPN 2 Ngaglik 2	09.39.00	09.44.00	09.54.00	10.07.00	10.18.00
31	SMPN 2 Ngaglik 2 - Puskesmas Ngaglik 2	09.40.00	09.46.00	09.55.00	10.08.00	10.19.00
32	Puskesmas Ngaglik 2 - TK Bias Kaliurang	09.42.00	09.47.00	09.57.00	10.10.00	10.21.00
33	TK Bias Kaliurang - Simpang Kaliurang Palem Raya 2	09.43.00	09.49.00	09.57.00	10.11.00	10.22.00
34	Simpang Kaliurang Palem Raya 2 - PLN Gardu Induk Kentungan	09.45.00	09.50.00	09.59.00	10.12.00	10.23.00
35	PLN Gardu Induk Kentungan - Pasar Kolombo 2	09.48.00	09.52.00	10.01.00	10.14.00	10.26.00
36	Pasar Kolombo 2 - Superindo Kaliurang 2	09.50.00	09.54.00	10.03.00	10.17.00	10.27.00
37	Superindo Kaliurang 2 - TPB Graha ASUS Jalan Kaliurang	09.53.00	09.56.00	10.04.00	10.19.00	10.28.00
38	TPB Graha ASUS Jalan Kaliurang - TPB Fakultas Biologi UGM	09.58.00	10.01.00	10.08.00	10.23.00	10.33.00
39	TPB Fakultas Biologi UGM - Halte TJ Fak UGM	10.00.00	10.02.00	10.11.00	10.26.00	10.37.00
40	Halte TJ Fak UGM - TPB Fak UGM	10.02.00	10.04.00	10.13.00	10.28.00	10.38.00
41	TPB Fak UGM - Halte TJ Kaliurang Kopma UGM	10.03.00	10.06.00	10.14.00	10.30.00	10.39.00
42	Halte TJ Kaliurang Kopma UGM - Halte TJ Colombo Kosudgama	10.04.00	10.07.00	10.15.00	10.31.00	10.40.00
43	Halte TJ Colombo Kosudgama - Halte TJ Colombo UNY	10.08.00	10.11.00	10.18.00	10.35.00	10.42.00
44	Halte TJ Colombo UNY - Halte TJ UNY	10.12.00	10.13.00	10.20.00	10.39.00	10.46.00

Continuation of Table L-7.1 Average Headway on Thursday, October 19th 2023 at Morning Peak Hour

Thursday						
SEGMENT	*STOP*	BUS 1	BUS 2	BUS 3	BUS 4	BUS 5
45	Halte TJ UNY - Grand Tjokro Yogyakarta	10.13.00	10.14.00	10.22.00	10.40.00	10.48.00
46	Grand Tjokro Yogyakarta - Halte SPBU Gejayan	10.16.00	10.17.00	10.25.00	10.42.00	10.50.00
47	Halte SPBU Gejayan - Terminal Bus Condong Catur	10.17.00	10.19.00	10.27.00	10.44.00	10.52.00

Table L-7.2 Average Headway on Thursday, October 19th 2023 at Afternoon Peak Hour

Sunday						
SEGMENT	*STOP*	BUS 1	BUS 2	BUS 3	BUS 4	BUS 5
1	Terminal Bus Condong Catur - *Shelter* Affandi Susteran Novisiat	16.09.00	16.12.00	16.41.00	16.47.00	16.52.00
2	*Shelter* Affandi Susteran Novisiat - Halte TJ Sanata Dharma	16.18.00	16.23.00	16.46.00	16.54.00	16.58.00
3	Halte TJ Sanata Dharma - Halte TJ Colombo Samirono	16.21.00	16.26.00	16.50.00	16.56.00	17.01.00
4	Halte TJ Colombo Samirono - Halte TJ Colombo Panti Rapih	16.22.00	16.27.00	16.51.00	16.58.00	17.02.00
5	Halte TJ Colombo Panti Rapih- Halte TJ Kaliurang Pertanian UGM	16.26.00	16.31.00	16.54.00	17.03.00	17.06.00
6	Halte TJ Kaliurang Pertanian UGM - TPB Fakultas Peternakan UGM	16.29.00	16.35.00	16.57.00	17.06.00	17.08.00
7	TPB Fakultas Peternakan UGM - Halte TJ RSUP Sardjito	16.31.00	16.36.00	16.58.00	17.08.00	17.10.00
8	Halte TJ RSUP Sardjito - TPB MM EP UGM	16.33.00	16.37.00	17.00.00	17.09.00	17.11.00
9	TPB MM EP UGM - Hotel Vidi Jalan Kaliurang	16.36.00	16.39.00	17.02.00	17.11.00	17.13.00
10	Hotel Vidi Jalan Kaliurang - Superindo Kaliurang	16.40.00	16.42.00	17.05.00	17.15.00	17.16.00
11	Superindo Kaliurang - Pasar Kolombo	16.56.00	16.58.00	17.22.00	17.30.00	17.32.00
12	Pasar Kolombo - Terminal Bangunan	16.59.00	17.01.00	17.25.00	17.33.00	17.35.00
13	Terminal Bangunan - Simpang Kaliurang Palem Raya	17.00.00	17.04.00	17.27.00	17.35.00	17.37.00
14	Simpang Kaliurang Palem Raya - Kantor Camat Ngaglik	17.04.00	17.08.00	17.31.00	17.38.00	17.42.00
15	Kantor Camat Ngaglik - Puskesmas Ngaglik 1	17.07.00	17.10.00	17.34.00	17.40.00	17.43.00
16	Puskesmas Ngaglik 1 - SMPN 2 Ngaglik	17.09.00	17.10.00	17.34.00	17.41.00	17.44.00
17	SMPN 2 Ngaglik - Warung Sego Penyetan Banyuwangi	17.10.00	17.12.00	17.36.00	17.42.00	17.46.00

Continuation of Table L-7.2 Average Headway on Thursday, October 19th 2023 at Afternoon Peak Hour

Thursday						
SEGMENT	*STOP*	BUS 1	BUS 2	BUS 3	BUS 4	BUS 5
18	Warung Sego Penyetan Banyuwangi - Wedangan Kampoeng	17.11.00	17.14.00	17.37.00	17.44.00	17.47.00
19	Wedangan Kampoeng - Pusat Rehabilitasi Yakkum	17.14.00	17.17.00	17.40.00	17.46.00	17.51.00
20	Pusat Rehabilitasi Yakkum - Halte Kampus UII 1	17.17.00	17.20.00	17.43.00	17.48.00	17.54.00
21	Halte Kampus UII 1 - Raminten *Boutique and Cafe*	17.19.00	17.22.00	17.45.00	17.51.00	17.57.00
22	Raminten *Boutique and Cafe* - RS Panti Nugroho K1J	17.22.00	17.24.00	17.47.00	17.54.00	17.59.00
23	RS Panti Nugroho K1J - Pasar Pakem	17.23.00	17.26.00	17.49.00	17.55.00	18.00.00
24	Pasar Pakem - SMPN 4 Pakem	17.25.00	17.27.00	17.50.00	17.56.00	18.02.00
25	SMPN 4 Pakem - Raminten *Boutique and Cafe* 1	17.28.00	17.29.00	17.52.00	17.58.00	18.04.00
26	Raminten *Boutique and Cafe* 1 - Halte Kampus UII 2	17.29.00	17.31.00	17.53.00	17.59.00	18.05.00
27	Halte Kampus UII 2 - Pusat Rehabilitasi Yakkum 2	17.31.00	17.33.00	17.55.00	18.01.00	18.07.00
28	Pusat Rehabilitasi Yakkum 2 - Wedangan Kampoeng 2	17.34.00	17.36.00	17.58.00	18.04.00	18.09.00
29	Wedangan Kampoeng 2 - SPBU Kaliurang	17.40.00	17.40.00	18.00.00	18.07.00	18.12.00
30	SPBU Kaliurang - SMPN 2 Ngaglik 2	17.41.00	17.42.00	18.02.00	18.09.00	18.14.00
31	SMPN 2 Ngaglik 2 - Puskesmas Ngaglik 2	17.43.00	17.44.00	18.03.00	18.10.00	18.15.00
32	Puskesmas Ngaglik 2 - TK Bias Kaliurang	17.44.00	17.45.00	18.05.00	18.12.00	18.16.00
33	TK Bias Kaliurang - Simpang Kaliurang Palem Raya 2	17.45.00	17.46.00	18.05.00	18.12.00	18.17.00
34	Simpang Kaliurang Palem Raya 2 - PLN Gardu Induk Kentungan	17.47.00	17.48.00	18.07.00	18.14.00	18.19.00
35	PLN Gardu Induk Kentungan - Pasar Kolombo 2	17.50.00	17.51.00	18.09.00	18.16.00	18.21.00
36	Pasar Kolombo 2 - Superindo Kaliurang 2	17.52.00	17.52.00	18.12.00	18.18.00	18.23.00
37	Superindo Kaliurang 2 - TPB Graha ASUS Jalan Kaliurang	17.58.00	17.58.00	18.14.00	18.21.00	18.25.00
38	TPB Graha ASUS Jalan Kaliurang - TPB Fakultas Biologi UGM	18.04.00	18.06.00	18.20.00	18.26.00	18.32.00
39	TPB Fakultas Biologi UGM - Halte TJ Fak UGM	18.06.00	18.08.00	18.22.00	18.28.00	18.35.00
40	Halte TJ Fak UGM - TPB Fak UGM	18.08.00	18.10.00	18.24.00	18.30.00	18.37.00
41	TPB Fak UGM - Halte TJ Kaliurang Kopma UGM	18.10.00	18.11.00	18.25.00	18.32.00	18.38.00

Continuation of Table L-7.2 Average Headway on Thursday, October 19th 2023 at Afternoon Peak Hour

Thursday						
SEGMENT	*STOP*	BUS 1	BUS 2	BUS 3	BUS 4	BUS 5
42	Halte TJ Kaliurang Kopma UGM - Halte TJ Colombo Kosudgama	18.11.00	18.12.00	18.27.00	18.33.00	18.39.00
43	Halte TJ Colombo Kosudgama - Halte TJ Colombo UNY	18.15.00	18.16.00	18.30.00	18.36.00	18.41.00
44	Halte TJ Colombo UNY - Halte TJ UNY	18.19.00	18.20.00	18.35.00	18.39.00	18.45.00
45	Halte TJ UNY - Grand Tjokro Yogyakarta	18.21.00	18.22.00	18.36.00	18.40.00	18.47.00
46	Grand Tjokro Yogyakarta - Halte SPBU Gejayan	18.23.00	18.25.00	18.38.00	18.43.00	18.49.00
47	Halte SPBU Gejayan - Terminal Bus Condong Catur	18.33.00	18.33.00	18.50.00	18.54.00	19.00.00

ATTACHMENT 8 Headway on Sunday, October 22nd 2023

Table L-8.1 Average Headway on Sunday, October 22nd 2023 at Morning Peak Hour

Sunday						
SEGMENT	*STOP*	BUS 1	BUS 2	BUS 3	BUS 4	BUS 5
1	Terminal Bus Condong Catur - *Shelter* Affandi Susteran Novisiat	08.36.00	08.46.00	08.55.00	09.02.00	09.14.00
2	*Shelter* Affandi Susteran Novisiat - Halte TJ Sanata Dharma	08.39.00	08.50.00	09.01.00	09.03.00	09.17.00
3	Halte TJ Sanata Dharma - Halte TJ Colombo Samirono	08.40.00	08.52.00	09.03.00	09.05.00	09.19.00
4	Halte TJ Colombo Samirono - Halte TJ Colombo Panti Rapih	08.42.00	08.53.00	09.04.00	09.06.00	09.20.00
5	Halte TJ Colombo Panti Rapih- Halte TJ Kaliurang Pertanian UGM	08.45.00	08.58.00	09.06.00	09.10.00	09.24.00
6	Halte TJ Kaliurang Pertanian UGM - TPB Fakultas Peternakan UGM	08.47.00	09.00.00	09.06.00	09.13.00	09.27.00
7	TPB Fakultas Peternakan UGM - Halte TJ RSUP Sardjito	08.48.00	09.02.00	09.08.00	09.14.00	09.28.00
8	Halte TJ RSUP Sardjito - TPB MM EP UGM	08.49.00	09.04.00	09.10.00	09.15.00	09.29.00
9	TPB MM EP UGM - Hotel Vidi Jalan Kaliurang	08.51.00	09.06.00	09.11.00	09.16.00	09.31.00
10	Hotel Vidi Jalan Kaliurang - Superindo Kaliurang	08.52.00	09.07.00	09.13.00	09.18.00	09.32.00
11	Superindo Kaliurang - Pasar Kolombo	08.57.00	09.11.00	09.15.00	09.22.00	09.36.00

Continuation of Table L-8.1 Average Headway on Sunday, October 22nd 2023 at Morning Peak Hour

Sunday						
SEGMENT	*STOP*	BUS 1	BUS 2	BUS 3	BUS 4	BUS 5
12	Pasar Kolombo - Terminal Bangunan	08.58.00	09.13.00	09.17.00	09.24.00	09.39.00
13	Terminal Bangunan - Simpang Kaliurang Palem Raya	09.01.00	09.14.00	09.19.00	09.26.00	09.41.00
14	Simpang Kaliurang Palem Raya - Kantor Camat Ngaglik	09.03.00	09.18.00	09.22.00	09.29.00	09.45.00
15	Kantor Camat Ngaglik - Puskesmas Ngaglik 1	09.05.00	09.20.00	09.24.00	09.31.00	09.49.00
16	Puskesmas Ngaglik 1 - SMPN 2 Ngaglik	09.06.00	09.21.00	09.25.00	09.31.00	09.50.00
17	SMPN 2 Ngaglik - Warung Sego Penyetan Banyuwangi	09.07.00	09.23.00	09.26.00	09.33.00	09.51.00
18	Warung Sego Penyetan Banyuwangi - Wedangan Kampoeng	09.09.00	09.25.00	09.27.00	09.34.00	09.53.00
19	Wedangan Kampoeng - Pusat Rehabilitasi Yakkum	09.11.00	09.27.00	09.30.00	09.36.00	09.56.00
20	Pusat Rehabilitasi Yakkum - Halte Kampus UII 1	09.12.00	09.30.00	09.32.00	09.38.00	09.58.00
21	Halte Kampus UII 1 - Raminten *Boutique and Cafe*	09.14.00	09.32.00	09.34.00	09.40.00	10.00.00
22	Raminten *Boutique and Cafe* - RS Panti Nugroho K1J	09.17.00	09.35.00	09.37.00	09.42.00	10.03.00
23	RS Panti Nugroho K1J - Pasar Pakem	09.18.00	09.37.00	09.38.00	09.43.00	10.04.00
24	Pasar Pakem - SMPN 4 Pakem	09.20.00	09.38.00	09.40.00	09.45.00	10.05.00
25	SMPN 4 Pakem - Raminten *Boutique and Cafe* 1	09.23.00	09.41.00	09.41.00	09.47.00	10.07.00
26	*Raminten Boutique and Cafe* 1 - Halte Kampus UII 2	09.24.00	09.43.00	09.43.00	09.49.00	10.09.00
27	Halte Kampus UII 2 - Pusat Rehabilitasi Yakkum 2	09.27.00	09.45.00	09.45.00	09.51.00	10.11.00
28	Pusat Rehabilitasi Yakkum 2 - Wedangan Kampoeng 2	09.29.00	09.46.00	09.48.00	09.52.00	10.13.00
29	Wedangan Kampoeng 2 - SPBU Kaliurang	09.31.00	09.50.00	09.50.00	09.57.00	10.15.00
30	SPBU Kaliurang - SMPN 2 Ngaglik 2	09.34.00	09.52.00	09.53.00	09.59.00	10.18.00
31	SMPN 2 Ngaglik 2 - Puskesmas Ngaglik 2	09.35.00	09.54.00	09.54.00	10.00.00	10.19.00
32	Puskesmas Ngaglik 2 - TK Bias Kaliurang	09.37.00	09.56.00	09.56.00	10.02.00	10.20.00
33	TK Bias Kaliurang - Simpang Kaliurang Palem Raya 2	09.37.00	09.57.00	09.57.00	10.03.00	10.21.00
34	Simpang Kaliurang Palem Raya 2 - PLN Gardu Induk Kentungan	09.39.00	09.59.00	09.59.00	10.04.00	10.23.00
35	PLN Gardu Induk Kentungan - Pasar Kolombo 2	09.42.00	10.01.00	10.02.00	10.07.00	10.26.00
36	Pasar Kolombo 2 - Superindo Kaliurang 2	09.43.00	10.03.00	10.04.00	10.09.00	10.27.00

Continuation of Table L-8.1 Average Headway on Sunday, October 22nd 2023 at Morning Peak Hour

Sunday						
SEGMENT	*STOP*	BUS 1	BUS 2	BUS 3	BUS 4	BUS 5
37	Superindo Kaliurang 2 - TPB Graha ASUS Jalan Kaliurang	09.45.00	10.05.00	10.06.00	10.11.00	10.30.00
38	TPB Graha ASUS Jalan Kaliurang - TPB Fakultas Biologi UGM	09.50.00	10.10.00	10.10.00	10.16.00	10.34.00
39	TPB Fakultas Biologi UGM - Halte TJ Fak UGM	09.52.00	10.12.00	10.12.00	10.18.00	10.36.00
40	Halte TJ Fak UGM - TPB Fak UGM	09.53.00	10.14.00	10.14.00	10.19.00	10.37.00
41	TPB Fak UGM - Halte TJ Kaliurang Kopma UGM	09.54.00	10.15.00	10.16.00	10.21.00	10.39.00
42	Halte TJ Kaliurang Kopma UGM - Halte TJ Colombo Kosudgama	09.55.00	10.17.00	10.17.00	10.22.00	10.40.00
43	Halte TJ Colombo Kosudgama - Halte TJ Colombo UNY	09.57.00	10.19.00	10.19.00	10.25.00	10.44.00
44	Halte TJ Colombo UNY - Halte TJ UNY	10.01.00	10.22.00	10.22.00	10.29.00	10.47.00
45	Halte TJ UNY - Grand Tjokro Yogyakarta	10.02.00	10.24.00	10.24.00	10.30.00	10.48.00
46	Grand Tjokro Yogyakarta - Halte SPBU Gejayan	10.04.00	10.25.00	10.25.00	10.32.00	10.50.00
47	Halte SPBU Gejayan - Terminal Bus Condong Catur	10.06.00	10.27.00	10.27.00	10.34.00	10.52.00

Table L-8.2 Average Headway on Sunday, October 22nd 2023 at Afternoon Peak Hour

Sunday						
SEGMENT	*STOP*	BUS 1	BUS 2	BUS 3	BUS 4	BUS 5
1	Terminal Bus Condong Catur - *Shelter* Affandi Susteran Novisiat	16.10.00	16.19.00	16.27.00	16.37.00	16.45.00
2	*Shelter* Affandi Susteran Novisiat - Halte TJ Sanata Dharma	16.17.00	16.21.00	16.38.00	16.51.00	16.55.00
3	Halte TJ Sanata Dharma - Halte TJ Colombo Samirono	16.20.00	16.24.00	16.40.00	16.53.00	16.57.00
4	Halte TJ Colombo Samirono - Halte TJ Colombo Panti Rapih	16.22.00	16.37.00	16.42.00	16.55.00	16.59.00
5	Halte TJ Colombo Panti Rapih- Halte TJ Kaliurang Pertanian UGM	16.25.00	16.40.00	16.46.00	16.59.00	17.03.00
6	Halte TJ Kaliurang Pertanian UGM - TPB Fakultas Peternakan UGM	16.27.00	16.44.00	16.49.00	17.01.00	17.06.00
7	TPB Fakultas Peternakan UGM - Halte TJ RSUP Sardjito	16.28.00	16.45.00	16.50.00	17.02.00	17.07.00

Continuation of Table L-8.2 Average Headway on Sunday, October 22nd 2023 at Afternoon Peak Hour

Sunday						
SEGMENT	*STOP*	BUS 1	BUS 2	BUS 3	BUS 4	BUS 5
8	Halte TJ RSUP Sardjito - TPB MM EP UGM	16.29.00	16.46.00	16.51.00	17.03.00	17.08.00
9	TPB MM EP UGM - Hotel Vidi Jalan Kaliurang	16.31.00	16.47.00	16.53.00	17.05.00	17.09.00
10	Hotel Vidi Jalan Kaliurang - Superindo Kaliurang	16.34.00	16.49.00	16.55.00	17.07.00	17.11.00
11	Superindo Kaliurang - Pasar Kolombo	16.37.00	16.53.00	16.58.00	17.10.00	17.14.00
12	Pasar Kolombo - Terminal Bangunan	16.39.00	16.55.00	17.00.00	17.12.00	17.17.00
13	Terminal Bangunan - Simpang Kaliurang Palem Raya	16.41.00	16.56.00	17.02.00	17.13.00	17.18.00
14	Simpang Kaliurang Palem Raya - Kantor Camat Ngaglik	16.45.00	16.59.00	17.05.00	17.16.00	17.21.00
15	Kantor Camat Ngaglik - Puskesmas Ngaglik 1	16.47.00	17.01.00	17.07.00	17.18.00	17.23.00
16	Puskesmas Ngaglik 1 - SMPN 2 Ngaglik	16.47.00	17.02.00	17.08.00	17.19.00	17.24.00
17	SMPN 2 Ngaglik - Warung Sego Penyetan Banyuwangi	16.49.00	17.03.00	17.09.00	17.20.00	17.26.00
18	Warung Sego Penyetan Banyuwangi - Wedangan Kampoeng	16.50.00	17.05.00	17.11.00	17.22.00	17.27.00
19	Wedangan Kampoeng - Pusat Rehabilitasi Yakkum	16.53.00	17.07.00	17.12.00	17.23.00	17.29.00
20	Pusat Rehabilitasi Yakkum - Halte Kampus UII 1	16.55.00	17.09.00	17.15.00	17.26.00	17.31.00
21	Halte Kampus UII 1 - Raminten *Boutique and Cafe*	16.58.00	17.11.00	17.15.00	17.28.00	17.33.00
22	Raminten *Boutique and Cafe* - RS Panti Nugroho K1J	17.00.00	17.14.00	17.20.00	17.30.00	17.35.00
23	RS Panti Nugroho K1J - Pasar Pakem	17.01.00	17.15.00	17.21.00	17.32.00	17.36.00
24	Pasar Pakem - SMPN 4 Pakem	17.03.00	17.18.00	17.22.00	17.34.00	17.38.00
25	SMPN 4 Pakem - Raminten *Boutique and Cafe* 1	17.05.00	17.19.00	17.24.00	17.35.00	17.39.00
26	Raminten *Boutique and Cafe* 1 - Halte Kampus UII 2	17.06.00	17.20.00	17.25.00	17.37.00	17.41.00
27	Halte Kampus UII 2 - Pusat Rehabilitasi Yakkum 2	17.09.00	17.22.00	17.28.00	17.39.00	17.43.00
28	Pusat Rehabilitasi Yakkum 2 - Wedangan Kampoeng 2	17.12.00	17.24.00	17.30.00	17.42.00	17.46.00
29	Wedangan Kampoeng 2 - SPBU Kaliurang	17.16.00	17.29.00	17.35.00	17.48.00	17.53.00
30	SPBU Kaliurang - SMPN 2 Ngaglik 2	17.18.00	17.31.00	17.36.00	17.50.00	17.54.00
31	SMPN 2 Ngaglik 2 - Puskesmas Ngaglik 2	17.19.00	17.33.00	17.38.00	17.52.00	17.56.00
32	Puskesmas Ngaglik 2 - TK Bias Kaliurang	17.21.00	17.34.00	17.39.00	17.53.00	17.58.00
33	TK Bias Kaliurang - Simpang Kaliurang Palem Raya 2	17.21.00	17.35.00	17.40.00	17.54.00	17.59.00

Continuation of Table L-8.2 Average Headway on Sunday, October 22nd 2023 at Afternoon Peak Hour

Sunday						
SEGMENT	*STOP*	BUS 1	BUS 2	BUS 3	BUS 4	BUS 5
34	Simpang Kaliurang Palem Raya 2 - PLN Gardu Induk Kentungan	17.23.00	17.37.00	17.42.00	17.57.00	18.01.00
35	PLN Gardu Induk Kentungan - Pasar Kolombo 2	17.27.00	17.39.00	17.44.00	17.59.00	18.03.00
36	Pasar Kolombo 2 - Superindo Kaliurang 2	17.28.00	17.41.00	17.46.00	18.01.00	18.05.00
37	Superindo Kaliurang 2 - TPB Graha ASUS Jalan Kaliurang	17.31.00	17.44.00	17.48.00	18.03.00	18.08.00
38	TPB Graha ASUS Jalan Kaliurang - TPB Fakultas Biologi UGM	17.35.00	17.47.00	17.52.00	18.08.00	18.13.00
39	TPB Fakultas Biologi UGM - Halte TJ Fak UGM	17.37.00	17.50.00	17.54.00	18.11.00	18.16.00
40	Halte TJ Fak UGM - TPB Fak UGM	17.38.00	17.51.00	17.56.00	18.13.00	18.17.00
41	TPB Fak UGM - Halte TJ Kaliurang Kopma UGM	17.40.00	17.52.00	17.57.00	18.13.00	18.19.00
42	Halte TJ Kaliurang Kopma UGM - Halte TJ Colombo Kosudgama	17.41.00	17.54.00	17.58.00	18.14.00	18.20.00
43	Halte TJ Colombo Kosudgama - Halte TJ Colombo UNY	17.43.00	17.56.00	18.01.00	18.18.00	18.24.00
44	Halte TJ Colombo UNY - Halte TJ UNY	17.47.00	17.58.00	18.05.00	18.21.00	18.26.00
45	Halte TJ UNY - Grand Tjokro Yogyakarta	17.50.00	18.00.00	18.06.00	18.23.00	18.28.00
46	Grand Tjokro Yogyakarta - Halte SPBU Gejayan	17.53.00	18.01.00	18.09.00	18.26.00	18.30.00
47	Halte SPBU Gejayan - Terminal Bus Condong Catur	17.55.00	18.03.00	18.11.00	18.28.00	18.32.00

ATTACHMENT 9 Vehicle Operational Costs Survey

Table L-9.1 Vehicle Operational Costs Survey

Component	Unit	Price	Source
Vehicle Price	Rupiah	380.000.000	www.oto.com
Driver Wage	Rupiah	4.300.000	Department of Transportation DIY
Fuel Price	Rupiah	6.800	Pertamina
Tire Price	Rupiah	3.500.000	www.tokopedia.com
Engine Oil Price	Rupiah	45.000	www.tokopedia.com
Grease Price	Rupiah	45.000	wwww.tokopedia.com
Brake Fluid Price	Rupiah	75.000	wwww.tokopedia.com
Axle Oil	Rupiah	35.000	wwww.tokopedia.com
Filter Oil Price	Rupiah	60.000	www.tokopedia.com
Terminal Retribution	Rupiah	36.000	Sleman Regional Regulation
Small Service Price	Rupiah	400.000	Department of Transportation DIY
Big Service Price	Rupiah	1.000.000	Department of Transportation DIY