



ANALYSIS OF SERVICE EFFECTIVENESS AND OPERATION POLICY OF TRANS METRO BANDUNG (TMB) USING CUSTOMER SATISFACTION INDEX (CSI) AND FISHBEIN METHOD

Galuh Ramadhan Mangku Praja*¹, Fauzia Mulyawati², Hedy Rahadian³, Ignatius Sudarnoso⁴

Universitas Langlangbuana, Indonesia*¹²³⁴

galuhramadhan.mp9@gmail.com*¹, ocidfauzia@gmail.com²,

rahadian.hedy@gmail.com³, ignazsd2@gmail.com⁴

Abstract: Bandung is a developing city. Focus on Areas of Service Effectiveness Analysis and Operational Policies of Trans Metro Bandung (TMB) Bandung City Using the Customer Satisfaction Index (CSI) and Fishbein Methods. Trans Metro Bandung (TMB) is one of the transportation options in the city of Bandung. However, along with advances in transportation technology, many choices of this cause congestion in the city of Bandung because it is dominated by private vehicles, the lack of application of orientation to the use of public transportation in Bandung. This study aims to determine the optimization of Trans Metro Bandung using a qualitative approach with a descriptive method. Later this can be an evaluation material for UPT Trans Metro Bandung by looking at the results of the analysis of the customer satisfaction index (CSI) with a value of 63.12 and Fishbein with a value of 283.41, perceived by consumers as less effective with the description "Ineffective".

Keywords: Customer Satisfaction Index (CSI); Fishbein Methods; Service; Trans Metro Bandung

INTRODUCTION

Public transportation in the city of Bandung is one of the public services run by the city government. Public transportation is actually very common in the city of Bandung with the many places that can be visited which is the reason why this is the main choice for Bandung residents. However, along with the development of the era of transportation operating in the city of Bandung, there are many choices, both private vehicles, online transportation, and city transportation. This is what causes congestion due to the accumulation of vehicles which are currently more dominated by private vehicles due to the lack of implementation of the orientation of the use of public transportation in the city of Bandung. This is an illustration of the solution to how precisely a Trans Metro Bandung (TMB) Bus becomes a transition in using private vehicles. Therefore, we need to examine the extent to which this application is running, later whether the application in the field is optimal or not, depending on the results of the study. Previous research discussed policy implementation with a focus on shelter construction only (Whibiksana, n.d.).

METHODS

The area where this study is located is in every corridor that is actively operated, such as Corridors 1 – 5, where UPT TMB and the Department of Transportation are hereby involved (Talitha & Hudalah, 2014). The method in this study focused on answer research questions related to the who, what, where and questions how an event or experience occurs until it is finally studied in depth to find patterns that appear in these events (Yuliani, 2018).

Submitted: July 13, 2022; Revised: -;

Accepted: August 11, 2022; Published: August 23, 2022;

Website: <http://journalfeb.unla.ac.id/index.php/almana/article/view/1899>



All TMB routes that operate from corridors 1-5 and the Trans Metro Bandung Department that are already operating Hasanuddin et al. (2017):TMB Bandung route:

- Corridor 1: Cibiru-Cibeureum
- Corridor 2: Cicaheum-Cibeureum
- Corridor 3: Cicaheum-Sarijadi
- Corridor 4: Antapani-Leuwipanjang (via South Ring)
- Corridor 5: Antapani - Hall . Station

This method is almost the same as the name, namely collecting any results in the field, whether events, activities or things that are needed so that researchers are helped by the data generated in the field according to research needs. In this study, the authors took the object of research on the Trans Metro Bandung bus, both in service and in implementing current policies. Rijali (2018) In referring to the literature to complete a research, there are several things that need to be done, namely: (1) Observation; (2) Interview; (3) Questionnaire.

In processing data, it is aimed at whether the data we want has met the research that was designed from the beginning, from here we can know the shortcomings, if we feel there is still something that needs to be added then we can complete it again. Then the results of the data are made in tabulation or tables, as follows:

Table 1. Data Required In Primary Survey

No.	Required data	Tools used	Data form
1	Bus stops and facilities	Camera & Field Survey	Visualization
2	Waiting time	Form	Minutes
3	Travel Speed	Stopwatch & Field Survey	Km/Hour
4	Stop time at the stop	Form	Minutes
5	Service information	Stopwatch & Field Survey	Visualization
6	Access in and out of the sto	Form	Visualization
7	Accuracy and certainty obus departure and arrival	Stopwatch & Field Survey	Visualization
8	Headway	Form	Minutes

Source: PM No 10 of 2012 and Mannheim, 1979 (2021)

To find out the needs that there are several journals accompanying what needs are needed in collecting data in the field (Wirawan et al., 2016).

Table 2. Data Required in Secondary Survey

No.	Agency	Required data	Year Taken	Data Form
1.	Bandung City Transportation Agency	Route Map	2021	Map
		Total of fleet	2021	Table
		Vehicle capacity	2021	Table
		Fleet rates	2021	Table
		Fleet revenue	2021	
		TMB Operational Legislation	2021	
		Operating system map	2021	Map
2.	UPT TMB	TMB Route map	2021	Map
		Number of operating fleet	2021	Table
		Stop location	2021	Map
		Service corridor network map	2021	Map
		Total passenger	2021	Table

Source: PM No 10 Tahun 2012 and Mannheim,1979 (2021)



The process of data analysis begins with collecting all the data from the research, then the researcher conducts an assessment of the relationship between the various data so as to produce a conclusion. Analyzing existing data is a process that needs to be done because using this method the data generated through interviews, questionnaires, or file or document collection is deemed to meet what is targeted in a study, the following are data analysis techniques used by researchers Gunawan (2013): (1) Data Reduction; (2) Data Presentation; (3) Conclusion

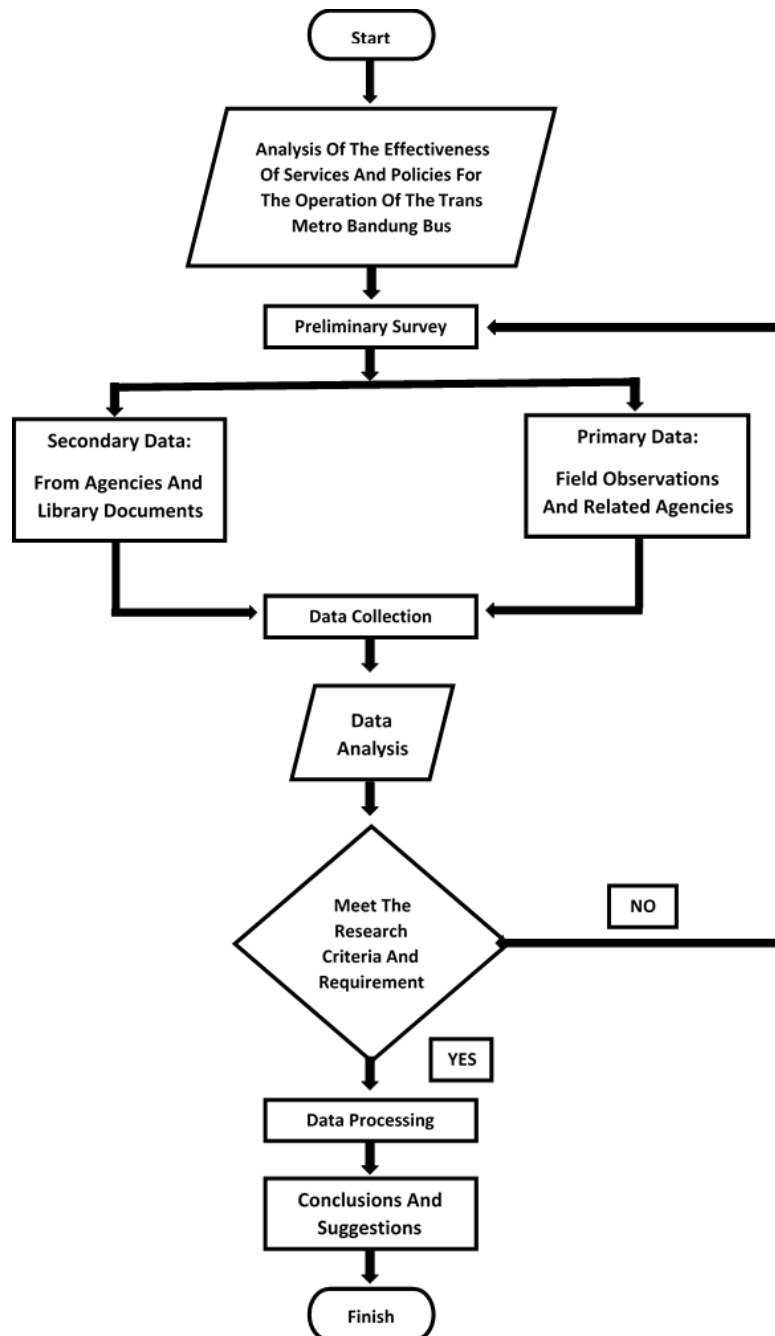


Figure 1. Research Flowchart
Source: Data processing results (2022)



RESULTS AND DISCUSSION

Overview of Bandung City TMB Bus

Trans Metro Bandung is a Bus Rapid Transit in the city of Bandung which was officially operated on 2021

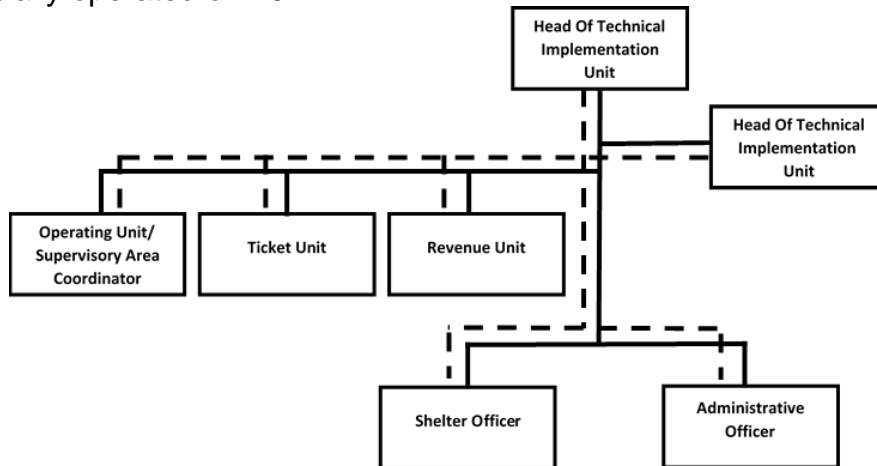


Figure 2. Organizational Structure

Source: UPT Bus Trans Metro Bandung (2019)

Variables Affecting Effectiveness

It is known that the policies so far have been optimal or not in terms of implementation, either from the management unit or consumers as service users, namely the people of Bandung City. Several variables obtained in data collection in the field on September 23, 2021, involving UPT Trans Metro Bandung, obtained some data as follows:

1. Standard Operating Procedures (SOP) of Bandung City TMB
2. Minimum Service Standards (SPM) of Bandung City TMB
3. Bandung City TMB Schedule
4. Bandung City TMB Rates
5. Bandung City TMB Passenger Data
6. Bandung City TMB Shelter Data

Accompanied by field data obtained from the community as a whole by distributing questionnaires and processing them with detailed data as follows:

1. Questionnaire
2. Interview
3. Documentation
4. CSI and Fish Bein method
5. IMB SPSS Statistics 22 and Ms. Excel

Fleet Needs At Peak Hours

To find out the needs at peak hours, there are several aspects that need to be combined so as to provide an overview of this question, such as the schedule for each corridor and the vehicle capacity and speed traveled in operation, the results are as follows (Apriyudha et al., 2015):



Table 3. Traveling time

Corridor	Direction	(Vt) Speed	Length	(Wt) Travel Time
1	Cibiru-Cibeureum	40	15.9	23.85
2	Cicaheum-Cibeureum	40	9.08	13.62
3	Cicaheum-Sarijadi	40	8.48	12.72
4	Antapani-Leuwipanjang	40	6.5	9.75
5	Antapani-Stasiun Hall	40	4.55	6.83

Source: Field data processing results (2022)

So that it is known that how far is the distance from each corridor and the description of the travel time to provide understanding for researchers. In this study, we take the example of corridor 1 (one) in the following calculations (Menteri Perhubungan Republik Indonesia, 2012).

In the SOP, the Trans Metro Bandung Bus is included in the Medium Bus with the Medium Bus category, that is, if you look at the SPM (Minimum Service Standards) for the Medium Bus capacity, which is 30 Passengers (persons) with details of 20 Sitting and 10 Standing.

Table 4. Vehicle Capacity

Type of Transportation	Vehicle Capacity		
	Sit	Stand up	Total
Public Passenger Car	8	-	8
Small Bus	19	-	19
Medium Bus	20	10	30
Single Floor Big Bus	49	30	79
Bouble Floor Big Bus	85	35	120

Source: Minimum Service Standards (2020)

If it is read in the SOP, the number of vehicles operating in corridor 1, totaling 15 fleets with operating intervals per vehicle for 15 minutes/vehicle (Fahrudin, 2018):

$$\text{number of trips/vehicle} = \frac{\text{number of vehicles operating}}{\text{Travel Time}}$$

For example, we take Corridor 1 in the Travel Time of 24 Minutes (completed) with a fleet of 15 units, we can see that in 1 Fleet we can get 6 times round trip or 3 times Rit.

Table 5. Vehicle Capacity

Operating Days	Passengers per Unit Time of Departure										Total
	K1		K2		K3		K4		K5		
	D	B	D	B	D	B	D	B	D	B	
Monday	30	7	30	3	25	0	25	0	20	0	140
Tuesday	30	4	30	2	30	3	15	0	25	0	139
Wednesday	25	0	11	0	11	0	17	0	19	0	83
Thursday	15	0	12	0	10	0	13	0	19	0	69
Friday	13	0	27	0	13	0	14	0	20	0	87
Saturday	30	6	30	8	21	0	10	0	15	0	120
Sunday	30	10	30	7	25	0	20	0	20	0	142
Number/ Corridor	173	27	170	20	135	3	114	0	138	0	780
	200		190		138		114		138		

Source: Data processing results (2022)

Table 6. Vehicle Capacity

Corridor	Time	Total Passenger							Total/ week	Average	
		Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday			
1	06.00 - 07.00	17	12	15	12	20	15	25	116	16.6	
	07.00 - 08.00	26	15	22	18	17	32	30	160	22.9	
	08.00 - 09.00	30	20	25	20	21	17	29	162	23.1	
	09.00 - 10.00	34	24	29	29	19	25	27	187	26.7	
	10.00 - 11.00	40	26	30	19	24	29	35	203	29.0	
	11.00 - 12.00	30	22	12	22	17	30	21	154	22.0	
	12.00 - 13.00	15	13	15	11	11	39	27	131	18.7	
	13.00 - 14.00	31	27	28	18	12	40	29	185	26.4	
	14.00 - 15.00	30	10	29	14	15	30	33	161	23.0	
	15.00 - 16.00	44	25	25	28	20	34	31	207	29.6	
	16.00 - 17.00	45	21	20	30	28	43	34	221	31.6	
	17.00 - 18.00	31	22	23	17	22	51	36	202	28.9	
	18.00 - 19.00	15	19	7	20	15	51	31	158	22.6	
	Total/Days		388	256	280	258	241	436	388		24,7
	Average/hour		29.8	19.7	21.5	19.8	18.5	33.5	29.8		
	Average/week										321,00

Source: Field data survey (2022)

In the information above, peak hours are on Monday, Saturday and Sunday, we take as an example the average number of passengers in corridor 1 on Saturday, which is 33 passengers in one departure with details of 30 sitting and 3 standing. The results will be 196 passengers in 3 trips / each operating fleet, this result is obtained from the number of passengers in the field, then after that we try to compare it with the applicable rules where in the SOP and SPM, which requires to fill a capacity of 30 vehicles. Generating a total of 180 passengers in 3 trips per operating fleet, to find out how many fleets are needed in peak hours according to the SOP and SPM rules, we calculate it with the previous calculation.

With the remaining 16 passengers, if you look at the capacity of the TMB Bus which can only have a capacity of 30 passengers, it can be concluded that in its operation it is necessary to add 1 Fleet to accommodate the remaining number that exceeds capacity, so the number of fleets needed at Peak Hours is 16 Fleet for Corridor 1 majoring in Cibereum-Cibiru.

Traffic Management

Knowing how the traffic is on the route traversed by the TMB Bus, we need to find out the number of vehicles that pass according to the type of vehicle, this will be an illustration of the performance of the TMB Bus, where this traffic level will be a major influence on the effectiveness of the TMB Bus in serving Every Corridor (Prasetya & Winarna, 2014).

Table 7. Traffic Flow and Volume

The results of the 15-minute traffic survey are as follows:		
Light Vehicle	27	
Heavy vehicle	3	
Motorcycle	55	
Total	85	Vehc/15 minutes
Total Traffic	85	Vech/15 Minutes
Traffic Volume Unit is Vehicle/Hour		
One Hour = 60 Minutes, So the multiplier is 60/15 = 4		
Traffic Volume:	340	Vehicle/Hour

Source: Field data processing results (2022)



It can be seen that for traffic flow the results are 85 vehicles/minute, with an hourly volume of 340 vehicles/hour. This is how dense the vehicles are within 1 hour, this gives an idea of the effectiveness of the TMB Bus in traveling according to the existing schedule.

Table 8. Traffic Flow and Passenger Car Unit Volume

The results of the 15-minute traffic survey are as follows:

Type	Total	EMP	Vech x EMP	
Heavy vehicle	27	1,0	27.0	
Motocycle	3	1,3	3.9	
Total	55	0,4	22.0	
Light Vehicle			52.9	SMP/15 Minutes
Traffic Total			52.9	SMP/15 Minutes

EMP value obtained from MKJI 1997

Source: Field data processing results (2022)

It's different if in determining the flow and volume with the Passenger Car Unit, in the rules each vehicle has its own EMP, we just need to multiply it to get the amount with the EMP Unit.

Table 9. Traffic Volume and Passenger Car Unit Volume

The results of the traffic volume survey for 1 hour with a time interval of 15 minutes are as follows:

Time	Light Vehicle	Heavy Vehicle	Motocycle
06.00 - 06.15	15	4	50
06.15 - 06.30	18	3	73
06.30 - 06.45	21	5	35
06.45 - 07.00	19	6	72

Source: Field data processing results (2022)

If we want to get an hourly overview of Total Traffic Volume, then we multiply it by the applicable EMP, to find out the amount, as follows:

Table 10. Traffic Volume and Passenger Car Unit Volume

Time+B48:B48:M58	Light Vehicle (LV)	Heavy Vehicle (HV)	Motocycle (MC)	Flow (SMP/15)	Volume (SMP/Hour)
EMP	1.0	1.3	0.4		
06.00 - 06.15	15.0	5.2	20.0	55.6	160.8
06.15 - 06.30	18.0	3.9	29.2	40.2	204.4
06.30 - 06.45	21.0	6.5	14.0	51.1	166.0
06.45 - 07.00	19.0	7.8	28.8	41.5	222.4
Lowest Traffic Volume (SMP/Hour)					160.8
Highest Traffic Volume (SMP/Hour)					222.4
Average Traffic Volume (SMP/Hour)					188.4
So the Average Traffic Volume is				188.4	SMP/Hour

Source: Field data processing results (2022)



The total traffic volume is 188.4 SMP/hour, so in the hourly period on this route, more than 188 vehicles with various types will pass, which becomes an obstacle if the TMB Bus does not reach the maximum time in Departure and Arrival according to the existing schedule.

Questionnaire

Understanding the needs of the community is one of the factors to find out how the level of service and policies that have been implemented by a public transportation have been optimal or not optimal [8]. This questionnaire is distributed online using a link with a period of September 1, 2021 – October 1, 2021, using the Liker technique and random sampling .

Table 11. Gender of Respondents

Respondent's Gender	Total of Respondents	Participation Percentage
Woman	64	73.6%
Men	23	26.4%
Total	87	1.00

Source: Field data processing results (2022)

Based on the table information, it can be seen that the gender of the respondents from a total of 87 people who filled out the questionnaire was dominated by women with 64 respondents, then men with 23 respondents, where the presentation results were divided. (Pranatawijaya & Priskila, 2019).

Table 12. Age Types of Respondents

Respondent's Age Type	Total of Respondents	Participation Percentage
15 - 20 YO	31	35.6%
21 - 25 YO	39	44.8%
26 - 30 YO	13	14.9%
30 YO Over	4	4.6%
Total	87	100%

Source: Field data processing results (2022)

Table 13. Types of Education of Respondents

Respondent's Profession Type	Total Of Respondents	Participation Percentage
Student	2	2.6%
University Student	48	55.2%
Employee	31	35.6%
Doesn't work	7	8%
Total	87	100%

Source: Field data processing results (2022)



Table 14. How many times increased TMB/day

How Many Times Increase TMB/Day	Total of Respondents	Participation Percentage
1-3 Times / Day	80	98,8%
4-5 Times / Day	7	1,2%
Often	0	0,0%
Total	87	100%

Source: Field data processing results (2022)

Data Analysis

Customer Satisfaction Index (CSI)

The Customer Satisfaction Index (CSI) is used to find out how the level of satisfaction from consumers or users of this public transportation service will be in the form of a questionnaire assessment (Kim et al., 2019). Divide the weighted total by the nominal scale used and then multiply by 100 percent. The CSI formula is as follows:

Table 15. Calculation Results of CSI Value

Question/ Statement	WF	WF
1	3.37	9.36
2	3.84	12.31
3	3.80	12.32
4	3.90	12.79
5	3.72	11.60
6	3.88	12.75
7	3.72	11.90
8	3.72	12,12
9	3.66	11.78
10	3.84	12.45
11	3.47	10,17
12	3.90	12.65
13	3.80	11.84
14	3.75	11.60
15	3.80	11.97
16	3.66	11.36
17	3.78	12.15
18	3.56	10.76
19	3.66	11.53
20	3.55	10.72
21	3.29	9.34
22	3.61	11.33
23	3.74	12.11
24	3.65	11.53
25	3.62	11.24
26	3.67	11.78
27	4.03	14.13
	WT	315.59
CSI		63,12

Source: Field data processing results (2022)



Table 16. Criteria for Customer Satisfaction Index (CSI)

Likers Scale	0.00 - 34.99	Very satisfied
1	35.00 - 50.99	Satisfied
2	51.00 - 65.99	Total
3	66.00 - 80.99	Very Dissatisfied
4	81.00 - 100.00	Not satisfied
5	Index (%)	Normal

Source: Field data processing results (2022)

The incoming data is based on the questionnaire distributed and then processed by the researcher to find the value of the Likers scale from 1 to 5 which means the level of satisfaction by dividing the variables into Hope and Perception. At the end we look for the customer satisfaction index (CSI) by adding up using the formula as in the table and producing 63.12 where to find out the conclusions of this research method we need to prepare the criteria for the method where the criteria have been set with a value of 0.00% to 100 % with the information dissatisfied, dissatisfied, quite satisfied, satisfied, and finally very satisfied.

From the results of the table above we can see that the value of the Customer Satisfaction Index (CSI) is in accordance with the criteria. Quite satisfied with the information: (1) The results of the calculation of the Customer Satisfaction Index (CSI) method produce a value of 63.12; (2) The index value is 51.00 to 65.99 information (BIASA), so it can be concluded that the service from the Trans Metro Bandung (TMB) Bus with the service applied and matched through the existing policy then made a question and statement to the user of the transportation service , Then we process the data and produce information using the customer satisfaction index (CSI) method with the "Ordinary" statement which was called the value 63.12

Multiatribut Fishbein

The Fishbein method suggests an assessment of a particular object in this case the Trans Metro Bandung Bus Performance which is based on the trust of service users

Ao	283,41	Not satisfied
-----------	--------	----------------------

The results of this study obtained, the Ordinary category in this CSI method gives a value where the service is not yet optimal based on the community who is the user. The value of Fishbein's dissatisfaction becomes an evaluation for optimizing UPT TMB in implementing policies accompanied by the implementation of convenient services for users

Table 17. Effectiveness Measures Based on Parameters

Index Intervals (129.6)	Total
27 - 156.6	Very Dissatisfied
156.7 - 286.2	Not satisfied
286.3 - 415.8	Normal
545.4 - 675	Very satisfied
415.9 - 545.4	Satisfied

Source: Field data processing results (2022)



If it is based on the number of parameter assessments obtained from the sum of the respondents' values in the Questionnaire, the interval range is 129.6 according to the CSI and Fishbein analysis. Then the value of 283.41 is included in the "Ineffective" category as seen from the table above. The hypothesis proposed is that the application of optimal policies and services will increase TMB Bus Performance.

CONCLUSION

Assessing the application in the field of Bandung City TMB bus policies in order to improve or streamline the performance of Trans Metro Bandung bus services and record the extent to which the level of satisfaction and orientation of the views of TMB users in the field towards existing policies. Policies are deemed ineffective, marked by overall field service, supported by user responses who feel that the performance of UPT TMB has not been effective so far. Therefore, it is hoped that this research can be more optimal in terms of service.

REFERENCES

- Apriyudha, R., Handayani, D., & Djumari, D. (2015). Analisis Kebutuhan Armada Dan Jadwal Operasional Bis Kampus Dalam Rangka Mendukung Program Green Campus UNS. *Matriks Teknik Sipil*, 268–276.
- Fahrudin, Muhammad Afif. (2018). *SOP BUS*. 6.
- Gunawan, I. (2013). Metode Kualitatif. *Bumi Aksara*.
- Hasanuddin, U., Herdiani, E., Sarjana, M. P., Sipil, J. T., Teknik, F., Maranatha, U. K., Joewono, T. B., Studi, P., Sipil, T., Teknik, F., & Parahyangan, U. K. (2017). *PERBANDINGAN PENILAIAN KUALITAS PELAYANAN BUS TRANS BANDUNG RAYA DAN*. November, 4–5.
- Kim, D., Sun, K., & Kim, D. (2019). Does customer satisfaction increase firm performance? An application of American Customer Satisfaction Index (ACSI) International Journal of Hospitality Management Does customer satisfaction increase firm performance? An application of American Customer Satisfaction Index (ACSI). *International Journal of Hospitality Management*, 35(April), 68–77. <https://doi.org/10.1016/j.ijhm.2013.05.008>
- Menteri Perhubungan Republik Indonesia. (2012). *Standar Pelayanan Angkutan Massal Berbasis Jalan*.
- Pranatawijaya, V. H., & Priskila, R. (2019). *Pengembangan Aplikasi Kuesioner Survey Berbasis Web Menggunakan Skala Likert dan Guttman*. 5, 128–137. <https://doi.org/10.34128/jsi.v5i2.185>
- Prasetya, T. B., & Winarna, W. (2014). Pengembangan Model Transportasi Kota dalam Menghadapi Tantangan Aglomerasi Kota. *Jurnal Maksipreneur: Manajemen, Koperasi, Dan Entrepreneurship*, 4(1), 116. <https://doi.org/10.30588/jmp.v4i1.98>
- Rijali, A. (2018). *Analisis Data Kualitatif Ahmad Rijali UIN Antasari Banjarmasin*. 17(33), 81–95.
- Talitha, T., & Hudalah, D. (2014). *MODEL KERJASAMA ANTAR DAERAH DALAM PERENCANAAN SISTEM TRANSPORTASI WILAYAH*. 194–208.
- Whibiksana, I. (n.d.). Impelementasi TMB Pembangunan Shelter. *Ilmu Politik Negara*.
- Wirawan, P. W., Riyanto, D. E., & Solo, B. (2016). *JURNAL INFORMATIKA Vol. 10, No. 2, Jul 2016*. 10(2), 1271–1279.
- Yuliani, Wiwin. (2018). *Metode Deskriptif Kualitatif*. 2(2), 83–91. <https://doi.org/10.22460/q.v1i1p1-10.497>