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EVALUATION OF THE USE OF THE TRANS METRO DELI BUS TRANSPORTATION MODE ON THE LAPANGAN MERDEKA - PINANG BARIS ROUTE IN MEDAN CITY

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ABSTRACT

Transportation has a very significant role in various aspects such as social, economic, environmental, and others. Therefore, the problems faced by almost all big cities in Indonesia are congestion, air pollution and traffic congestion. This mode of transportation consists of land, water and air transportation modes. For the land transportation mode itself, it is subdivided into road and rail modes. Public Transportation is passenger transportation using public transportation and is carried out with a Rent or Pay system. This study is to measure the level of passenger service with the Customer Satisfaction Index method. With the aim of knowing how much interest the people of Medan are in using the Trans Metro Deli Corridor of Pinang Baris Terminal – Medan Merdeka Square. the calculation of the questionnaire data was carried out using the Customer Satisfaction Index (CSI) method to calculate the service quality of Trans Metro Deli Medan, that the level of service obtained was satisfactory with a passenger satisfaction level of 73%. The factors that do not satisfy passengers are in terms of the condition of the bus stop and service information.

***Key Words**: Transportation, public transportation, service level, Customer Satisfaction Index*

ABSTRAK

Transportasi memiliki peranan yang sangat signifikan dalam berbagai aspek seperti sosial, ekonomi, lingkungan, dan lain lain. Oleh karena itu, masalah yang dihadapi hampir semua kota besar di Indonesia adalah kemacetan, polusi udara dan kesemerautan lalu lintas. Moda transportasi ini terdiri dari moda transportasi darat, air, dan udara. Untuk moda transportasi darat sendiri dibagi lagi dengan moda jalan raya dan moda jalan kereta api. Angkutan Umum adalah angkutan penumpang dengan menggunakan kendaraan umum dan dilaksanakan dengan sistem Sewa atau Bayar. Penelitian ini untuk mengukur tingkat pelayanan penumpang dengan metode *Customer Satisfaction Index*. Dengan tujuan adalah untuk megetahui seberapa besar minat masyarakat kota Medan menggunakan moda Trans Metro Deli Rute Terminal Pinang Baris – Lapangan Merdeka Medan.dari hasil evaluasi penggunaan moda transportasi bus trans metro deli koridor Lapangan Merdeka – Terminal Pinang Baris Di Kota Medan dapat disimpulkan bahwa dari hasil perhitungan data kuesioner yang dilakukan menggunakan metode *Customer Satisfaction Index* (CSI) untuk menghitung kualitas pelayanan Trans Metro Deli Medan, bahwa tingkat pelayanan yang didapatkan sudah memuaskan dengan tingkat kepuasan penumpang sebesar 73%. Adapun faktor yang kurang memuaskan penumpang adalah dari segi kondisi halte dan informasi layanan.

***Kata Kunci**: Transportasi, angkutan umum, tingkat pelayanan, Customer Satisfaction Index*

1. INTRODUCTION

Transportation has a very significant role in various aspects such as social, economic, environmental, and others. According to Santos et al. (2010), transportation is one of the main factors influencing economic development and social welfare in urban areas. Therefore, the problems faced by almost all big cities in Indonesia are congestion, air pollution and traffic congestion.

In general, traffic jams are caused by the large number of private vehicles and the disorderly operation of public transport (Rodrigue et al., 2020). One of the means of transportation currently that is easiest to obtain and frequently used is public transportation. Public transportation is transportation provided for public purposes using a rental or payment system. Generally, people want public transportation services that are safe, fast, cheap and comfortable (Cervero, 2013).

Route and fare issues are another important topic in the public transport operating system. Public transportation routes are usually determined by the type of vehicle (Litman, 2013). Tariffs are costs that must be paid by users of public transportation services per unit weight or passengers per km. The regional government determines the number of tariffs by setting upper and lower limits which are adjusted to the amount of vehicle operating costs, so that it is hoped that the tariffs charged to passengers are not burdensome or in accordance with applicable regulations (Farida, 2020).

Management as a group of people is a term used in a collective sense to indicate leadership positions in an organization, including the top leadership group, middle leadership group, and lower leadership group (Kamarwan, 1998).

It has been proven that the urban population, including in Indonesia, is growing rapidly. The population in cities in Indonesia with a population of more than one million people is increasing rapidly with an average growth rate of 5.38% per year, which is greater than the national population growth rate of 1.98% per year (BPS, 2020). The increase in urban population, both as a result of natural growth and as a result of rural-to-urban migration (urbanization), cannot be stopped. As a result, the proportion of the urban population continues to increase (Suharto, 2018).

Urban areas with a population of more than one million people should have adequate public passenger or mass public transportation services. Urban management needs to be efficient in using urban infrastructure because many urban residents still depend on the existence of public transportation. They are residents who have no other choice but to use public transportation (Cervero, 2013).

A transportation system is a system that plays a role in moving people and objects from one place to another in an effort to overcome geographical or topographical distance barriers. Apart from its role in moving people or objects, transportation has an environmental dimension which includes other needs such as economic, social and political needs (Az-Zahra, 2011). The need for transportation is also referred to as a derivative need, because it arises from other primary needs (Rodrigue et al., 2020).

The public transport transportation system is regulated in UU No. 22 tahun 2009 tentang Lalu Lintas dan Angkutan Jalan. This regulation provides a legal framework for safe, efficient and environmentally friendly transportation management, as well as regulating the obligations and rights of road users (Ministry of Transportation, 2009).

According to Litman (2013), an effective transportation system can increase community mobility, reduce congestion, and reduce negative impacts on the environment. In addition, Cervero (2013) emphasized the importance of integration between various modes of transportation to achieve a holistic and sustainable transportation system.

2. DATA AND METHODS

2.1. General Force Service Standards

There are several evaluations or characteristics of universal transportation that are said to be perfect in terms of their performance, which can be seen in table 1 below.

Table 1. Public Transport Service Standards

No	Criteria	Size
1	Waiting time	
	Average	5 – 10 minutes
	Maximum	10 – 20 minutes
2	Walking distance to shelter	
	Congested area	300 – 500 minutes
	Less dense area	500 – 1000 minutes
3	Number of modal changes	
	Average	0 – 1 time
	Maximum	2 times
4	Bus travel time	
	Average	1 - 1.5 hours
	Maximum	2 – 3 hours
5	Bus travel speed	
	Congested area and mixed traffic	10 – 12 km/hour
	Special bus lane area	15 – 18km/hour
	Less dense area	25 km/hour
6	Travel expense	
	From RT income	10%
7	*Load factor*	70%

Source: Abubakar, 1995

2.2. Measuring Service Levels

One method that can be used to measure customer satisfaction is the Customer Satisfaction Index (CSI), which is a method that uses an index to measure the level of consumer satisfaction based on certain attributes. CSI is a quantitative analysis in the form of the percentage of happy customers in a customer satisfaction survey. CSI is needed to determine the overall level of customer satisfaction by paying attention to the level of importance of service attributes.

The results of CSI measurements can be used as a reference for determining future targets and used to determine the overall level of consumer/passenger satisfaction. There are four steps in calculating CSI, namely:

1. determine the Mean Important Score (MIS) and Mean Satisfaction Score (MSS). This value is scaled from the average level of importance and performance.

$$\text{MIS} = \sum_{i=1}^{n} \text{Yi dan MSS} = \sum_{i=1}^{n} \text{Xi}$$

Information:
MIS = mean important service;
M.S.S = mean satisfaction index;
Yi = importance value of the 1st attribute;
Xi = i-th attribute performance value;

2. create Weight Factors (WF), this weight is the percentage of the MIS value per variable to the total MIS of all variables.
3. create a Weight Score (WS), this weight is the multiplication of the Weight Factor (WF) with the average level of satisfaction (Mean Satisfaction Score = MSS). WSi = WFi x MSS. Note: i = I-th variable.

4. calculate the Weighted Total (WT), this weight is the sum of the Weight Score (WS) of all variables.
5. Determining the Customer Satisfaction Index (CSI) is done by dividing the Weighted Total (WT) by the nominal scale used and then multiplying by 100 percent. The formula for determining CSI is as follows:

$$CSI = \frac{\sum_{i}^{p} WT}{5} X\ 100\%$$

Information: P = number of important attributes
5 = number of scales

The CSI value criteria can be seen in Table 2.

Table 2. CSI Value Criteria

CSI Index	Performance Parameters
90.01% - 100%	Excellent
70.01% - 90.00%	Satisfied
50.01% - 70.00%	Average
25.01% - 50.00%	Unsatisfied
0% - 25.00%	Very unsatisfied

Source: Irawan, 2004

2.3. World Bank Recommended Public Transport Performance Parameters

The factors that are generally used as performance indicators of public transportation are as shown in: Table 3 Public transportation performance parameters recommended by the World Bank.

Table 3. Public Transport Performance Parameters

Performance parameters	Performance value	
	maximum	minimum
Minimum frequency	Average 3 - 6 vehicles/hour	1.5 – 2 vehicles/hour
Waiting time	Average 5 – 10 minutes	Maximum 10 – 20 minutes
Displacement rate	Average 0 - 1	Maximum 2
Travel time	Average 1-1.5 hours	Maximum 2 hours

Source: World Bank 1987

Table 4. Walking Time and Distance

Service Level	Walking Time (minutes)	Walking Distance (meters)
A	< 2	0 -100
B	2-4	101-200
C	4-7.5	201-400
D	7.5-12	401-600
E	12-20	601-1000
F	>20	>1000

Source: World Bank 1987

Table 5. Transfers and Waiting Times

Service Level	Number of Public Transport Transfers	Waiting Time (minutes)
A	0	–
B	1	<5
C	1	5-10
D	1	>10
E	2	
F	>2	

Source: World Bank 1987

Table 6. Waiting Time

Service Level	Waiting Time (minutes)			
	>8	9-12	13-20	>21
A	85-100%	90-100%	95-100%	89-100%
B	75-84	80-89	90-94	95-98
C	66-74	70-79	80-89	90-94
D	55-65	60-69	65-79	75-89
E	50-54	50-59	50-64	50-74
F	<50	<50	<50	<50

Source: World Bank 1987

Table 7. Headway and Population Density

Service Level	Population Density/km2			
	>4000		3000-4000	
	Headway (minutes)		Headway (minutes)	
	Busy	Not busy	Busy	Not busy
A	<2	≤5	4	≤9
B	2-4	15-19	5-9	10-14
C	5-9	10-14	10-14	15-19
D	10-14	15-20	15-19	20-29
E	15-20	21-30	20-30	30-60
F	>20	>30	>30	>60

Source: World Bank 1987

Table 8. Headway and Population Density

Service Level	Population Density/km2			
	2000-3000		750-2000	
	Headway (minutes)		Headway (minutes)	
	Busy	Not busy	Busy	Not busy
A	<9	≤14	≤9	≤14
B	10-15	15-19	10-14	15-29
C	15-24	20-30	15-24	30-44
D	25-39	31-45	25-39	45-59
E	40-60	46-40	40-60	60-19
F	>60	>60	>60	>90

Source: World Bank 1987

Table 9. Passenger density

Service Level	Passenger Density
A	Separate seating with high back
B	Longitudinal parallel seating per passenger minimum 0.46 m2/pass
C	Transverse parallel seating per passenger minimum 0.46 m2/pass
D	Seating 0.28-0.46 m2/pass or load factor 100-110%
E	Load factor 111-125%
F	Load factor >125%

Source: World Bank 1987

Table 10. Travel Time Index for Private Vehicles

Service Level	Travel Time Index	Information
A	< 2	Travel time index= travel time using shared public transport travel time using private transport
B	2-4	
C	4-7.5	
D	7.5-12	
E	12-20	
F	>20	

Source: World Bank 1987

2.4. Analysis of Trans Metro Deli Bus Services

The presence of TEMAN BUS in Medan City is the fifth service in the Buy the Service (BTS) program initiated by the Ministry of Transportation of the Republic of Indonesia. The operator that runs the TEMAN BUS service operations in Medan City is PT. Medan Bus Transport (Trans Metro Deli).

This Bus Rapid Transit (BRT) transportation supports the mobilization of the people of Medan City which includes the Belawan District, Pinang Baris Terminal, Merdeka Square, Amplas Terminal and Tembung.

Trans Metro Deli is one of the Bus Friends created by the government as a Public Transport Transportation program. Trans Metro Deli itself has run 5 routes and all of them are operational. The following are the Trans Metro Deli Medan routes.

2.5. Corridor 1: Pinang Baris Terminal – Merdeka Square

Corridor 1 will start from the Pinang Baris terminal, then cross the Panca Budi Terminal route - Jalan Gajah Mada - Jalan Tugu Grupatimpus - Jalan Mayor's Office - Jalan Bank Indonesia - Merdeka Square. A map of the Trans Metro Deli Bus Corridor 1 service route can be seen in Figure 2 below.

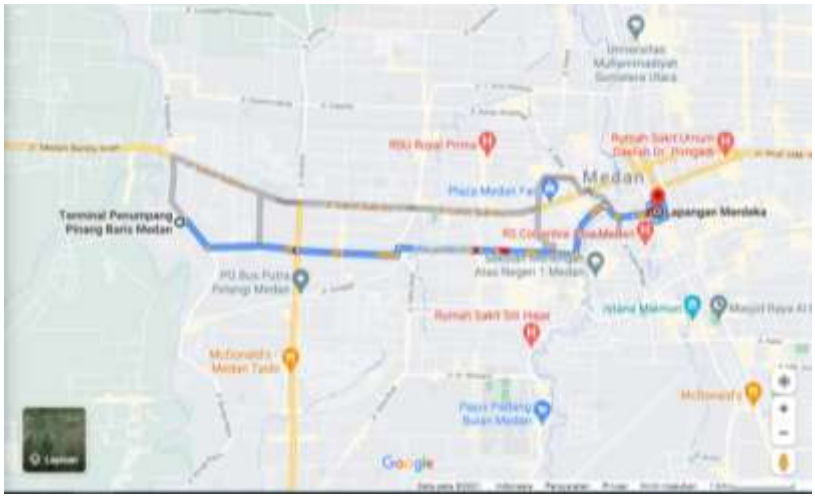

Figure 1. Trans Metro Deli Bus Corridor 1 Route
Source: Google Maps

2.6. Research Population and Sample

The sample is a part of the whole and the characteristics possessed by a population. If the population is large, it is certainly not possible for researchers to study everything in that population, some of the obstacles that will be faced include limited funds, energy and time, so in this case it is necessary to use samples taken from that population. Furthermore, what is learned from the sample will result in conclusions which will later be applied to the population (Sugiyono, 2011).

2.7. Reliability Test

Instrument reliability testing can be done externally or internally (Sugiyono, 2011). Externally, testing can be carried out using test-retest (stability), equivalent, and a combination of both. The results of the analysis can be used to predict the reliability of the instrument (Sugiyono, 2011). Instrument reliability testing was carried out with internal consistency using the Cronbach Alpha technique. Cronbach Alpha is a calculation carried out by calculating the average intercorrelation between the items in the questionnaire. A variable is said to be reliable if the alpha value is more than 0.30. The following is the Alpha Cronbach formula used to test reliability:

$$a = \left(\frac{k}{k-1}\right)\left(1 - \frac{\sum si^2}{\sum st^2}\right)$$

Information:

A : instrument reliability
K : number of items
Si^2 : respondent variance for item i
St^2 : the amount of variance in the total score

2.8. Validity test

Validity comes from the word validity which means the extent to which a measuring instrument is accurate and accurate in carrying out its measuring function (Azwar 1986). Apart from that, validity is a measure that shows that the variable being measured is truly the variable that the researcher wants to study (Zulganef, 2006).

Meanwhile, according to Sitinjak (2006), validity is related to a variable measuring what should be measured. Validity in research states the degree of accuracy of research measuring instruments to the actual content being measured. Ghozali (2009) stated that the validity test is used to measure whether a

questionnaire is valid or not. Validity testing is carried out using the Pearson product moment correlation formula. The following is the formula for the Pearson product moment correlation:

$$rxy = \frac{n\sum xy - (\sum x)(\sum y)}{\sqrt{\left((n\sum x^2 - (\sum x)^2(n\sum y^2 - (\sum y)^2\right)}}$$

Information:
R count : product moment correlation coefficient
N : number of respondents
∑xy : number of multiplications of y
∑x : total score for each item
∑y : total score
∑x2 : the number of x scores squared
∑y2 : the sum of the y scores squared

Research Flow Chart

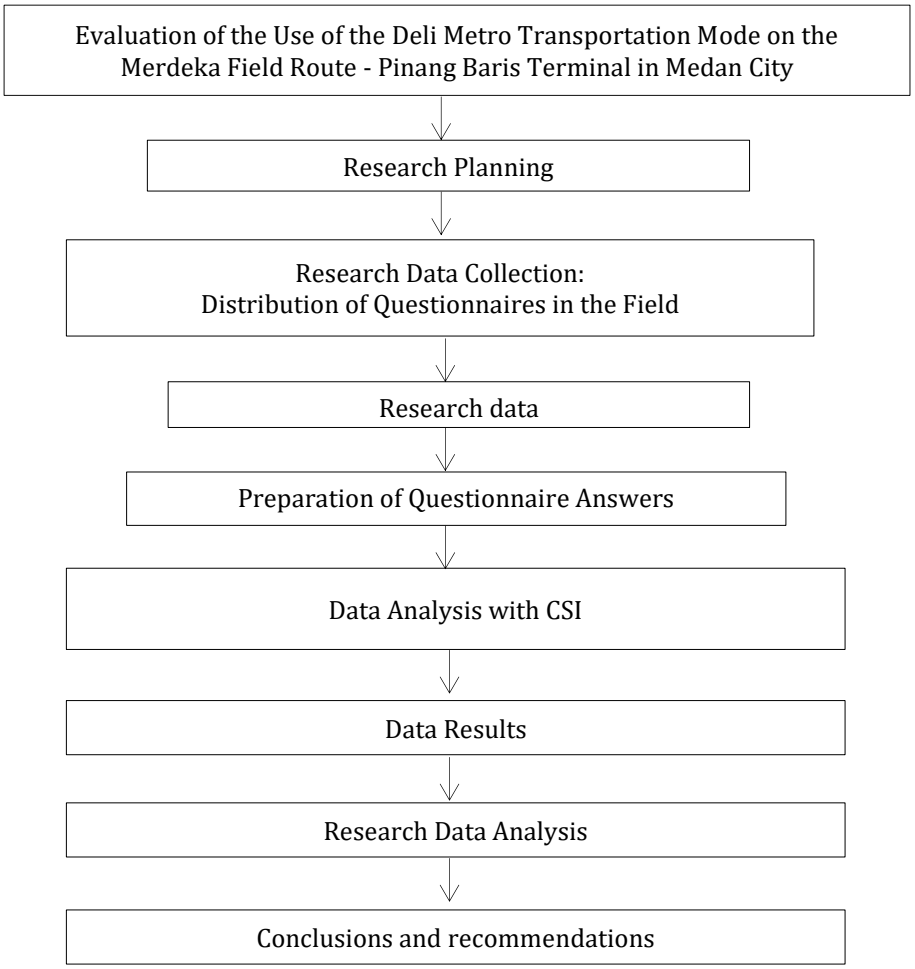

Figure 2. Research flow diagram

3. RESULTS AND DISCUSSION

3.1. Calculation of Research Questionnaire Data

To calculate this questionnaire data from research results where the researcher explains and describes the conditions in the field related to descriptive research. This data was obtained from the results of

quantitative research methods and data analysis carried out based on the results of a questionnaire on 100 respondents obtained using this research technique using sampling techniques, namely Probability Sampling and Simple Random Sampling. And this research is used to assess the level of effectiveness and how much interest the people of Medan city have in using the Trans Metro Deli mode, Pinang Baris Terminal Corridor - Medan Merdeka Square and to assess how good the Trans Metrodeli Medan service is in terms of efforts to attract people's interest in using it.

3.2. Respondent Identity

OnIn filling out this research questionnaire, respondents or passengers will first fill in the passenger's identity which consists of several variables including gender, age of the passenger, how much they use Trans MetroDeli Medan transportation, especially corridor I of Pinang Baris Terminal - Medan Merdeka Square. Determine the start time of the project until the end of the project.

3.3. Passenger Gender

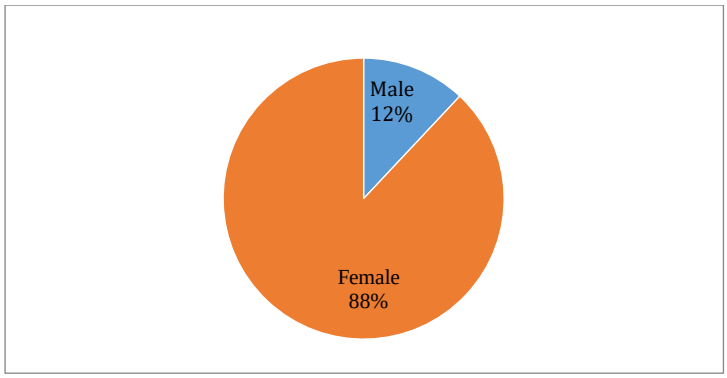

Figure 3. Passenger Identity by Gender
Source: Research Results (2021)

Based on the passenger questionnaire data calculations in Figure 3, we can conclude that out of 100 respondents or passengers, as many as 12 passengers were male, namely 12% and 88 passengers were female, namely 88%. The results obtained show that the majority of Trans Metro Deli Medan Corridor I Terminal Pinang Baris - Merdeka Square users are female.

3.4. Based on Passenger Age

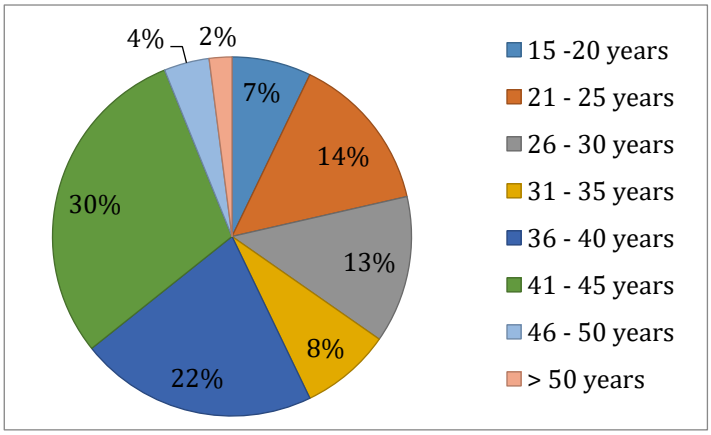

Figure 4. Passenger Identity Based on Age
Source: Research Results (2021)

Based on the passenger questionnaire data calculations in Figure 4, we can conclude that out of 100 respondents or passengers, 7 passengers were aged 15-20 years, which is 7%, 14 passengers were aged 21-25 years, which was 14%, 13 passengers were aged 26- 30 years old, namely 13%, 8 passengers aged 31-35 years, 8%, 22 passengers aged 36-40 years, 22%, 30 passengers aged 41-45 years, 30%, 4 passengers aged 46- 50 years is 45 and 2 passengers aged >50 years are 2%. The results obtained show that the most users of Trans Metro Deli Medan Corridor I Pinang Baris Terminal - Merdeka Square are passengers with an age range of 36-45 years.

3.5. Based on the number of uses of Trans Metro Deli

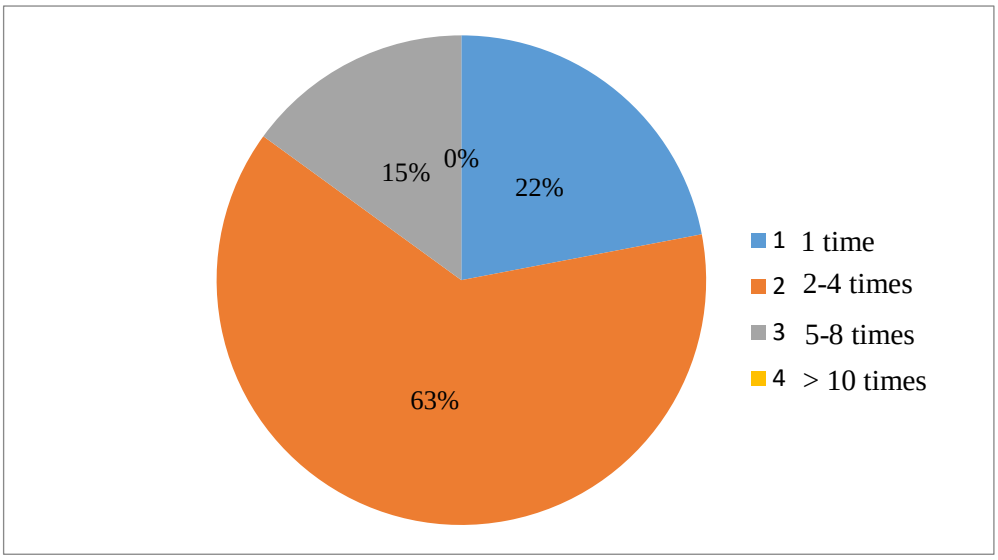

Figure 5. The identity of the number of passengers using Trans Metro Deli
Source: Research Results (2021)

Based on the passenger questionnaire data calculations in Figure 5, we can conclude that out of 100 respondents or passengers, as many as 22 passengers used Trans Metro once, which is 22% and 63 passengers used Trans Metro 2-4 times, which is 22%. 63%, and as many as 15 passengers with the total use of Trans Metro Deli 5-8 times, which is 15%. So the results obtained show that the majority of Trans Metro Deli Medan Corridor I Terminal Pinang Baris - Merdeka Square users have on average used it more than once.

3.6. Analysis of Satisfaction Levels Based on Passenger Expectations

Analysis of this data uses 9 variables or indicators which are described in 23 questions where each question asks about the expectations or importance of passenger satisfaction when using the Trans Metro Deli Medan transportation mode. As for the nine indicators or variables which are the main question, The nine variables are accessibility, security, comfort, waiting time, facilities, service information, travel time, empathy and convenience.

3.7. Analysis of passenger satisfaction levels based on research questionnaires

Based on the results of a research questionnaire conducted on the Trans Metro Deli Medan bus transportation mode, the level of passenger satisfaction was also measured from 9 variables, each of which will contain several questions related to the issue of passenger satisfaction when using the Trans Metro

Deli Bus. These variables are Accessibility, Security, Comfort, Waiting Time, Facilities, Service Information, Travel Time, Empathy, and Convenience.

Diagram of the Average Level of Passenger Satisfaction and Interest

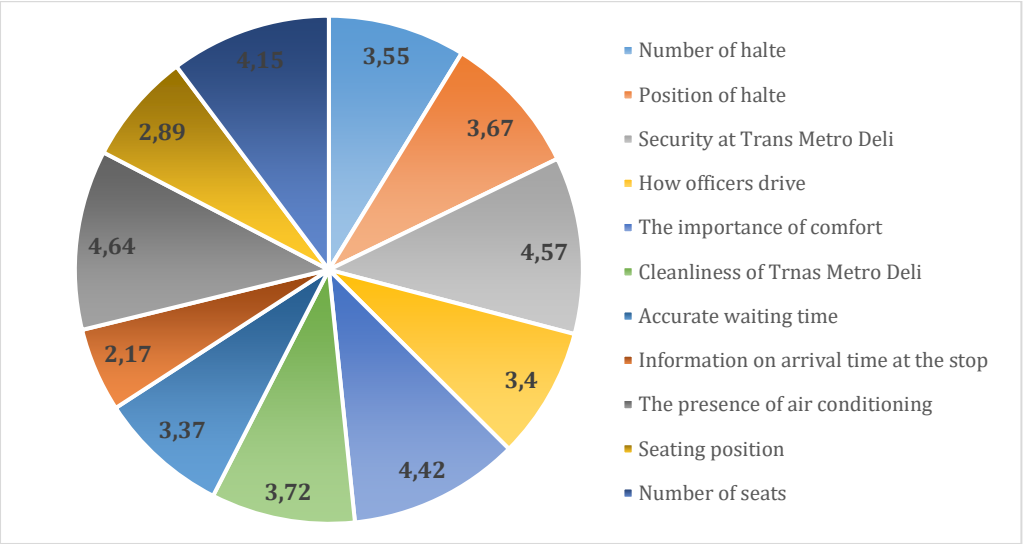

Figure 6. Performance Scale Average Value Diagram
Source: 2021 Research Results

In the diagram above you can see which factors have the highest level of performance and which factors have the lowest performance in the assessments given by passengers.

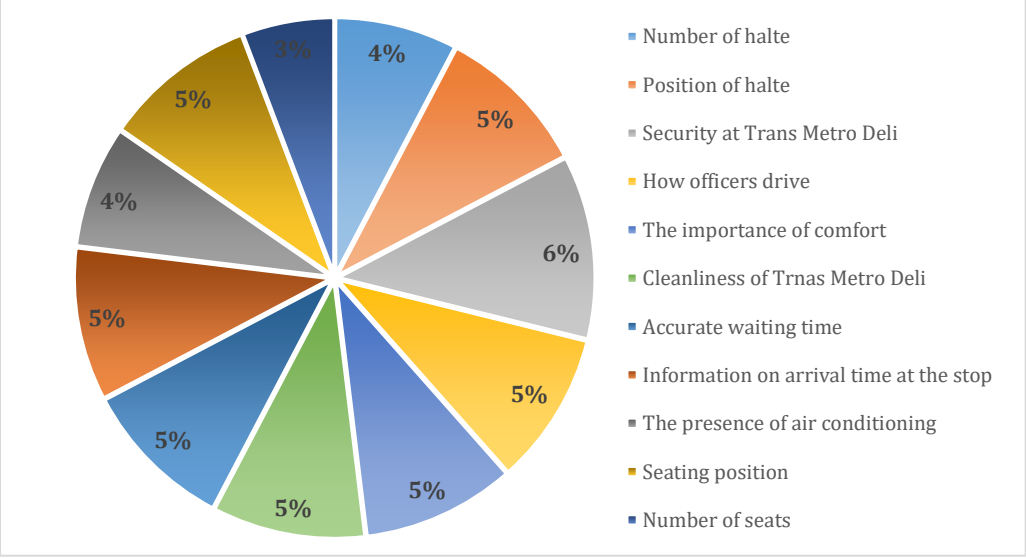

Figure 7. Importance Scale Average Value Diagram
Source: 2021 Research Results

Picture. From the diagram above, it can be seen which factors have the highest level of importance and which factors have the lowest importance in the assessment given by passengers.

3.8. Calculation of Passenger Satisfaction Levels Using the Customer Satisfaction Index (CSI)

The results of CSI measurements can be used as a reference for determining future targets and used to determine the overall level of consumer/passenger satisfaction. The CSI calculation values are in table 11 below.

Table 11. Customer Satisfaction Index Calculation Results

Hope	MIS	WF	WS	Performance	M.S.S
H1	3.58	4.12	14.64	K1	3.55
H2	4.60	5.30	12.82	K2	2.42
H3	3.70	4.26	15.64	K3	3.67
H4	4.60	5.30	24.22	K4	4.57
H5	4.18	4.82	16.37	K5	3.40
H6	4.31	4.96	21.94	K6	4.42
H7	4.25	4.90	18.21	K7	3.72
H8	3.99	4.60	15.49	K8	3.37
H9	3.76	4.33	9.40	K9	2.17
H10	3.09	3.56	16.52	K10	4.64
H11	4.17	4.80	18.69	K11	3.89
H12	2.87	3.31	13.72	K12	4.15
H13	3.80	4.38	12.17	K13	2.78
H14	4.14	4.77	18.12	K14	3.80
H15	3.96	4.56	17.93	K15	3.93
H16	4.26	4.91	18.55	K16	3.78
H17	3.70	4.26	14.88	K17	3.49
H18	3.57	4.11	12.63	K18	3.07
H19	2.20	2.53	10.29	K19	4.06
H20	3.67	4.23	17.00	K20	4.02
H21	3.28	3.78	15.08	K21	3.99
H22	3.62	4.17	15.89	K22	3.81
H23	3.51	4.04	14.80	K23	3.66
Total	86.81				
		W.T	364.98	Conclusion	
		CSI	73.00	Satisfying	

Source: Research Results (2021)

Based on table 11 of the Customer Satisfaction Index calculation results above, the CSI value is 73% and we can see in table 2.1 CSI Value Criteria (Irawan, 2004), it can be concluded that the calculated CSI value obtained is between 70.01% - 90.00% based on the CSI Index, the performance parameter value

obtained is satisfactory (Satisfied). This shows that Trans Metro Deli Medan bus passengers are satisfied with the level of service provided by Trans Metro Deli. So that the officers or parties who manage Trans Metro can further improve the services provided, so that they can further increase the interest of the people of Medan in trying the Trans Metro Deli Medan Bus transportation mode, and are also able to maintain satisfaction scores from passengers, and are also able to increase the level of service.

4. CONCLUSION

Based on the results of research conducted at Trans Metro Deli and the discussion in the previous chapter, the researcher can conclude that:

1) From the results of questionnaire data calculations carried out using the Customer Satisfaction Index method using the help of the Microsoft Excel application, to calculate the level of service quality of Trans Metro Deli Medan on the Pinang Baris Terminal route - Merdeka Square, to see how high the service level of the Trans Metro Deli Medan transportation mode is, that level The service obtained is satisfactory with a passenger satisfaction level of 73% based on the Customer Satisfaction Index method calculation.
2) In research conducted in the field, researchers concluded that the people of Medan City often use the Trans Metro Deli Medan bus transportation mode to support their daily activities. This is based on service level questionnaire data, that the number of trips made by passengers is an average of 2-4 trips, as for factors Another reason why the people of Medan have quite high interest in using Trans Metro Deli is the free fares during the Covid-19 pandemic and the very good level of service and condition of the buses.
3) And there are several things that need to be paid attention to by the Trans Metrodeli Medan bus management, where during direct observations the researchers found several bus stop (halte) conditions that did not meet expectations, the cleanliness of the bus stops was not maintained, the stops were used for street people to sleep, thus making passengers feel uncomfortable. This certainly needs to be considered and evaluated to improve the quality of existing services, of course.

5. ACKNOWLEDGMENTS

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