

Analysis Of Effectiveness Service Of Public Transportation Mass Rapid Transit Or MRT Case Study Lebak Bulus – Bundaran HI

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Abstract

Jakarta is one of the largest cities in Indonesia, its location as business center and government center make Jakarta densely of people and vehicles. According to BPS DKI Jakarta, the population of Jakarta in 2017 reached 10.18 million people and the population density is 15,367 people per km². With a growing population, Jakarta is becoming more congested by existing vehicles. One of the Jakarta government's strategies to solve the problem of congestion is by implementing Mass Rapid Transit as mass transportation. Mass Rapid Transit (MRT) is one of the new modes of transportation for peoples. The first phase which opened is Lebak Bulus-Bundaran HI route, with a relatively short operational time, MRT needs to be evaluated of the effectiveness of service. For this analysis, the authors use the Minimum Service Standards as a reference then used validity test, reliability test, normality test, Linear Regression analysis and Importance Performance Analysis by using SPSS to analysis the data. This research distributed questionnaires to 100 respondents. The results from analysis and data processing is obtained that the highest number of MRT passengers in July with 2.888.126 of passengers. The validity testing of service factors obtained the value more than 0,1654 and the data result is valid. The Reliability test obtained the value Cronbach's Alpha more than 0,60. The Normality test obtained the value more than 0,05 and the data results is normal. As for the analysis of linear regression conducted, it was obtained that the percentage of service performance and satisfaction was 75.3%. Performance and satisfaction assessment by passengers are very good and very satisfied.

Keywords

MRT, Minimum Service Standards, Importance Performance Analysis

1. Introduction

Jakarta is one of the largest cities in Indonesia, its location as business center and government center make Jakarta densely of people and vehicles. The population of Jakarta in 2017 reached 10.18 million people and the population density is 15,367 people per km² (BPS, 2018). In 2012 the number of cars in Jakarta was 2.74 million units while in 2016 it increased to 3.52 million vehicles with a growth of 6.48% per year. Whereas motorcycle in 2012 it reached 10.82 million units and in 2016 it became 13.3 million units with growth of 5.3% per year (BPS, 2018). The number of vehicles will increase and the level of congestion will increase too.

One of the Jakarta government's strategies to solve congestion problems is by implementing Mass Rapid Transit. The megaproject of transportation of Mass Rapid Transit was built on October 10, 2013 by Provincial Government of DKI Jakarta with the first phase is north – south track with Lebak Bulus – Bundaran HI route along 15.7 km and operational on March, 2019 (BPS, 2018). In Figure 1 Mass Rapid Transit (MRT) is one of the new modes of transportation for peoples (Iradi, 2019)



Figure 1 Mass rapid transit

MRT has a relatively short operational time, so it is necessary to conduct an evaluation of the effectiveness of services to find out whether the services provided are sufficient or not (Abas, 2000). Effectiveness is a measurement in the sense of achieving a predetermined goal. If the goals have been achieved in accordance with previously planned, then it means effective. If the goals do not match what has been determined, then it means ineffective (Handayadiningrat, 1995).

Quality of service is a way of working for companies that strive to make continuous quality improvements to the processes, products, and services produced by the company (Januar, 2016). Service quality is an effort to fill the needs and desires of consumers and the accuracy of its delivery in offsetting consumer expectations (Fendy, 2007).

Minimum Service Standards (MSS) is the minimum service that must be fulfilled by service providers in providing services to users, which must be accompanied by benchmarks used as guidelines for service providers and reference for assessing service quality as obligations and promises of service providers to the public in order quality service, fast, easy, affordable and measurable (Warpani, 1990).

Minimum service standards on the trip as stated by DKI Jakarta Governor's Regulation number 95 in 2019 concerning Minimum Transportation Service Standards People with Moda Raya Terpadu / Mass Rapid Transit and Lintas Raya Terpadu / Light Rail Transit Chapter III Clause 10 Paragraph (1), includes (Anonym, 2019):

- A. Safety;
- B. Security;
- C. Reliability;
- D. Convenience;
- E. Ease; and
- F. Equality.

The purpose and Objectives that will be achieved from this research are:

- A. Knowing the number of passengers of MRT users;
- B. Identifying passenger satisfaction with service facilities provided by the Jakarta MRT;
- C. Knowing the value of service performance from the assessment of passenger satisfaction with MRT service facilities;

Analyze the performance of MRT facility services against the Minimum Service Standards (SPM) that have been determined.

2. Research Methodology

In this research the data sources needed are primary data and secondary data. The variables used in this research are based on minimum service standards by DKI Jakarta Governor number 95 in 2019 and observations in the field by looking and feeling directly as users. The survey technique in this research are distribute questionnaires to 100 respondents. This questionnaire consists of 36 questions with a number of answers in accordance with its establishment. Respondents check the answers that best suit their standpoint. The questionnaire in this research used the interval measurement scale, such as Likert scale. Questionnaires were distributed on weekdays, and distributed to MRT service users on the Lebak Bulus - Bundaran HI route.

2.1 Data Processing and Data Management

In data processing, researchers use descriptive statistical data analysis techniques. This technique is used by researchers because the data collection by distributing questionnaires and processing it, the following tests are performed:

2.1.1 Validity Test

The validity test in this research was carried out with the aim of hinting the extent to which a measuring device (instrument) measures what it wants to measure. Question items in the questionnaire are declared valid if $r > r$ table (Sunyoto, 2009). Researcher using SPSS Program to find out validity from the results.

2.1.2 Reliability Test

In this research the Alpha Cronbach (α) technique will be used. This technique is used to measure the reliability of question items whose scores are a range of values (for example 0-10, 0-7) or scale (or 1-3, 1-5). The Cronbach's Alpha formula used is shown in the following formula:

$$\alpha = \left[\frac{k}{k-1} \right] \left[1 - \frac{\Sigma \sigma_b^2}{\sigma_t^2} \right]$$

explanation:

- α = Instrument reliability coefficient (cronbach alpha)
- k = number of data variables that make up the latent variable
- $\Sigma \sigma_b^2$ = total item variance

The reliability testing of a questionnaire there is a basis for decision making in advance, in determining the reliability test results used the SPSS program to find out the results as follows [7]:

- If Cronbach's Alpha value $> 0,60$, then it is reliable or consistent
- If Cronbach's Alpha value $< 0,60$, then it is not reliable or consistent

2.1.3 Normality Test

The normality test with SPSS will be carried out through the Kolmogrov-Smirnov test with the condition that the significance value is > 0.05 , then the data is declared to be normal while if the significance value is < 0.05 , then the data is declared to be abnormally distributed.

2.1.4 Testing Linear Regression Analysis

Regression analysis is an analysis that measures the effect of the independent variable (X) on the dependent variable (Y). Regression analysis is the same as correlation analysis, which is to find out the extent of the relationship between performance and satisfaction. Both of these tests use the SPSS statistical program (Sunyoto, 2009).

2.1.5 Effectiveness Level Analysis

Data analysis begins by tabulating data from primary data collection for each variable then the data is analyzed using descriptive statistics to find out the mean and standard deviation. The descriptive statistical results are analyzed and then entered into the Cartesian diagram IPA (Importance Performance Analysis). To measure the extent of performance and satisfaction, researcher using Importance and Performance Analysis method.

3. Result And Analysis

3.1. Analysis of Number of Passengers

Analysis of the number of MRT passengers in April - 22 October obtained the following data:

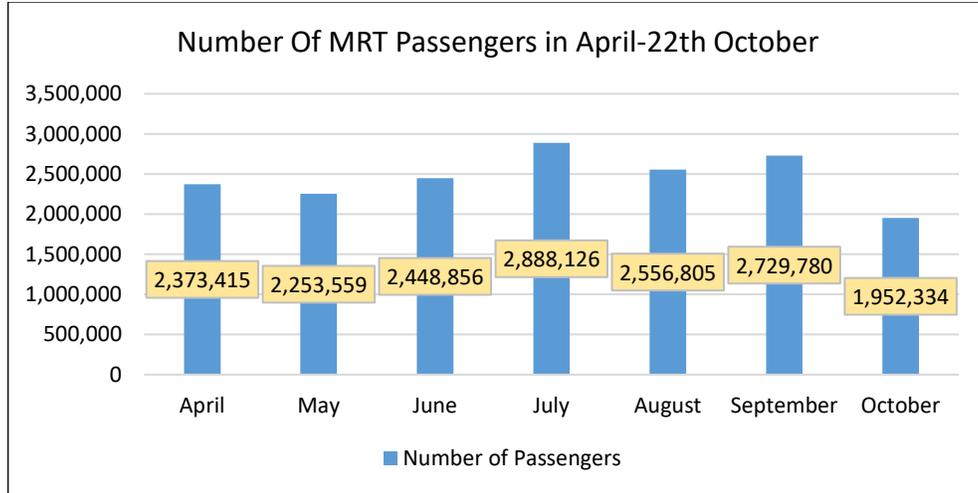


Figure 2 Chart of passengers numbers

In Figure 2 the average number of passengers is 2,452,850 passengers per month and the highest number of passengers is in July with 2,888,126 passengers.

3.2. Analysis of Characteristics Respondents

In this research, respondents taken were users of the MRT route Lebak Bulus - HI Roundabout with a total of 100 respondents, (see Table 1) with the following respondent characteristics are:

Table 1. Number of Respondent Base on Gender

Gender	Total	Percentage
Male	39	39%
Female	61	61%
Total	100	100%

3.3. Validity Test

Data inputted for validity testing is the value of the performance factor or variable X and satisfaction factor or variable Y, with the concept of comparing between calculated R values and obtained R table values, (see Table 2 and see Table 3) In this case the amount of df can be calculated that is 100-2 or df = 98 with an alpha of 0.10 obtained an R table of 0.1654. i

Table 2 Validity test results of performance factors

Variable	R Value	R Table	Result
X1	0,552	0,1654	Valid
X2	0,486	0,1654	Valid
X3	0,476	0,1654	Valid
X4	0,522	0,1654	Valid
X5	0,617	0,1654	Valid
X6	0,547	0,1654	Valid
X7	0,587	0,1654	Valid
X8	0,562	0,1654	Valid
X9	0,552	0,1654	Valid
X10	0,595	0,1654	Valid
X11	0,610	0,1654	Valid
X12	0,576	0,1654	Valid
X13	0,503	0,1654	Valid
X14	0,638	0,1654	Valid

Variable	R Value	R Table	Result
X15	0,656	0,1654	Valid
X16	0,570	0,1654	Valid
X17	0,656	0,1654	Valid
X18	0,610	0,1654	Valid

Table 3 Validity test results of satisfaction factors

Variable	R Value	R Table	Result
Y1	0,734	0,1654	Valid
Y2	0,566	0,1654	Valid
Y3	0,634	0,1654	Valid
Y4	0,605	0,1654	Valid
Y5	0,612	0,1654	Valid
Y6	0,595	0,1654	Valid
Y7	0,737	0,1654	Valid
Y8	0,716	0,1654	Valid
Y9	0,594	0,1654	Valid
Y10	0,635	0,1654	Valid
Y11	0,617	0,1654	Valid
Y12	0,703	0,1654	Valid
Y13	0,655	0,1654	Valid
Y14	0,758	0,1654	Valid
Y15	0,713	0,1654	Valid
Y16	0,623	0,1654	Valid
Y17	0,769	0,1654	Valid
Y18	0,758	0,1654	Valid

The results of the validity test above show that R value for the performance and satisfaction variables get R value > R table at a significant value of 10%. Therefore, it can be concluded that all items in the questionnaire in this research are valid, so that it can be used as a research instrument.

3.4. Reliability Test

In this research, researcher using SPSS application to found out the results by entering the factors that have been given an assessment score by respondents for performance's factor and satisfaction's factor.

Table 4 Reliability test results of performance factor

Reliability Statistics	
Cronbach's Alpha	N of Items
.908	18

Table 5 Reliability test results of satisfaction factor

Reliability Statistics	
Cronbach's Alpha	N of Items
.939	18

From the Table 4 above, it can be concluded that performance factor or variable X has a Cronbach's Alpha value is $0.908 > 0.6$, so this questionnaire is considered to be reliable or consistent. While that satisfaction factor or variable Y has a Cronbach's Alpha value is $0.939 > 0.6$ (see Table 5), this questionnaire is considered reliable or consistent.

3.5. Normality Test

In this research the normality test uses the Kolmogorov-Smirnov test (see Table 6), with the following results:

Table 6 Normality test results

One-Sample Kolmogorov-Smirnov Test			
		Performance	Satisfaction
N		100	100
Normal Parameters ^{a,b}	Mean	78,03	77,11
	Std. Deviation	8,096	8,883
Most Extreme Differences	Absolute	0,088	0,073
	Positive	0,070	0,073
	Negative	-0,088	-0,071
Test Statistic		0,088	0,073
Asymp. Sig. (2-tailed)		.054^c	.200^{c,d}
a. Test distribution is Normal. b. Calculated from data. c. Lilliefors Significance Correction. d. This is a lower bound of the true significance.			

The results of the normality test above showing that the Kolmogorov-Smirnov test results is obtained Asymp. Sig (2-tailed), for performance's factor is $0.054 > 0.05$, it can be concluded that this data is normally distributed. Whereas Asymp. Sig (2-tailed) for satisfaction's factor is $0.200 > 0.05$, it can be concluded that this data is normally distributed.

3.6. Linear Regression Analysis Test

This regression test is used to predict or test the level of influence between the two variables reviewed, in this case the performance's factor and satisfaction's factor. The data inputted is the average of performance's factor assessment (X) and the average of satisfaction's factor assessment (Y).

Table 7 Linear regression test result

Model Summary ^b				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.868 ^a	.753	.751	4.436
a. Predictors: (Constant), Performance				
b. Dependent Variable: Satisfaction				

From the Table 7 above explains that the value of the correlation (R) is 0.868. From the output obtained that a coefficient of determination (R Square) is 0.753 that means the independent variable (performance) on the dependent variable (satisfaction) is 75.3%

3.7. Analysis of Passenger Responses

Analysis of passenger responses is used to find out how effective the services of the facilities provided by MRT to passengers in Figure 3. The results of the analysis are calculated and then entered into a graph of the service performance's factor and passenger satisfaction's factor as follows:

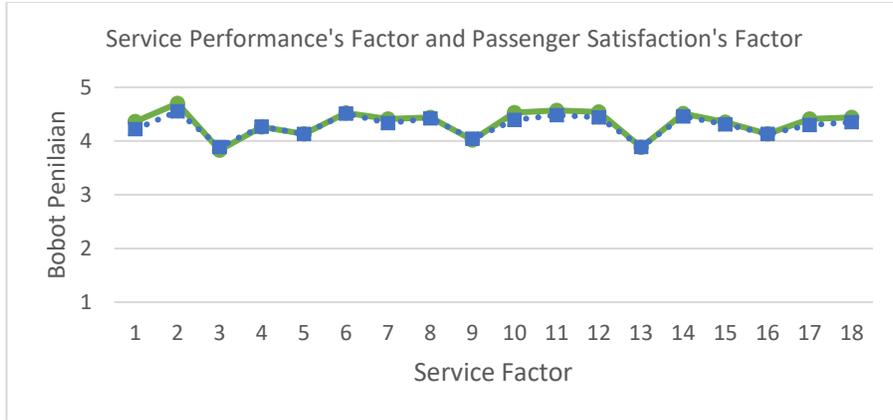


Figure 3 Chart of service and satisfaction's factor

From the average calculation of each dimension as a whole, the following results are obtained:

- The average dimensions of service factors for performance on the MRT Lebak Bulus - Bundaran HI route obtained that 4.335, so that the service performance provided at each service factor dimensions of category are **Very Good**.
- The average dimensions of service factors for satisfaction on the MRT Lebak Bulus - Bundaran HI route obtained that 4.284, so that the service performance provided at each service factor dimensions of category are **Very Satisfied**.

3.8. Priority Level Calculations

After obtaining the average calculation from valuation of the performance and passenger satisfaction, we can see the position of each service quality factor examined in the Cartesian diagram "Importance Performance Analysis". The average value of the performance's factor is 4.335 and the average value of passenger satisfaction is 4.284. In Figure 4 the value from each factor are used for divider border on Cartesian diagram as follows:

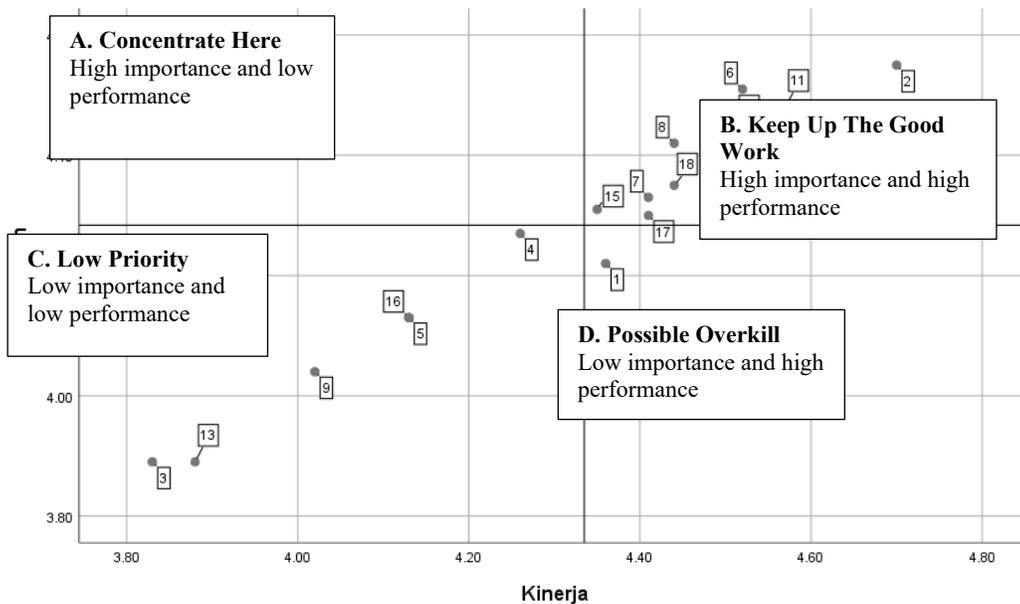


Figure 4. Cartesian Diagram Graph

The results of the questionnaire data processing described in the Cartesian program "Importance Performance Analysis" above, we can describe as follows:

A. Service factors that are the main priority in handling:

Excessive service factors are in quadrant A Cartesian diagram "Importance Performance Analysis", the average value of performance is below total of the average service factor and the average value of satisfaction is above of the total average service factor. In this study, there are no service factors that are in quadrant A.

B. Service factors that should maintained the performance

Service factors that must be maintained in quadrant B Cartesian diagram "Importance Performance Analysis" are as follows:

- a. The MRT train access door can be closed completely.
- b. The lighting works well.
- c. Arrival and departure of MRT train accordingly with the schedule.
- d. There is an audio notification when the door will be open or close.
- e. The availability a seat and cabin area clean.
- f. The availability of air-conditioning systems that maintain room temperature.
- g. The availability of handrails for standing passengers.
- h. The availability of map MRT route.
- i. The availability of information of nearest MRT station.
- j. The availability of priority seats in MRT train.
- k. The availability of priority seat marks.

C. Service factors with low priority in handling:

Service factors that must be considered with low priority in handling in quadrant C Cartesian diagram "Importance Performance Analysis", are as follows:

- a. The availability of first aid kits that brought by security officers.
- b. The availability of CCTV in each MRT train.
- c. The availability of information (such as a sticker) that contain telephone number and SMS of the complaint
- d. There is a two-way communication channel or intercom for emergencies.
- e. The availability of information of room temperature in MRT Train.
- f. The availability of special space for passengers who carry wheelchair.

D. Service factors with excessive performance:

Service factors are in the quadrant D Cartesian diagram "Importance Performance Analysis", the average value of performance is above total of the average service factor and the average value of satisfaction is below of the total average service factor are as follows:

- a. The availability of safety facilities (such as APAR, intercom for emergency conditions, emergency brakes, and emergency exits).

4. Conclusion

Based on the results of research and analysis conducted on the MRT facilities of the Lebak Bulus – Bundaran HI route, there are several conclusions are obtained as follows:

- A. The average number of MRT passengers in the period of April to October 2019 is 2.452.850 passengers per month, with the highest number of passengers is in July, 2.888.126 passengers.
- B. The average dimensions of service factors for performance on the MRT Lebak Bulus - Bundaran HI route obtained that 4.335, so that the service performance provided at each service factor dimensions of category are Very Good. The average dimensions of service factors for satisfaction on the MRT Lebak Bulus - Bundaran HI route obtained that 4.284, so that the service performance provided at each service factor dimensions of category are Very Satisfied. Based on the results of the Cartesian diagram data obtained factors with low priority where the satisfaction's factor and performance are equally low, are as follows:
 - a. The availability of first aid kits that brought by security officers.

- b. The availability of CCTV in each MRT train.
 - c. The availability of information (such as a sticker) that contain telephone number and SMS of the complaint
 - d. There is a two-way communication channel or intercom for emergencies.
 - e. The availability of information of room temperature in MRT Train.
 - f. The availability of special space for passengers who carry wheelchair.
- C. Data influence of the independent variable (Performance) on the dependent variable (Satisfaction) that is 75.3%
- D. Review of MRT facility service performance towards the minimum service standards referring to the Governor regulation of DKI Jakarta number 95 in 2019 about minimum service standards for transporting people with Moda Raya Terpadu / Mass Rapid Transit and Lintas Raya Terpadu / Light Rail Transit obtained result that the performance of services provided by the MRT was approaching according to standards based on passenger views.

References

- Abbas, Salim. 2000. *Manajemen Transportasi*. Jakarta: Ghalia Indonesia.
- Badan Pusat Statistik Provinsi DKI Jakarta, 2018. *Statistik Transportasi Dki Jakarta*, 2018. BPS Provinsi DKI Jakarta.
- Fendy, Tjiptono. 2007. *Strategi Pemasaran*. Yogyakarta: Andi.
- Gubernur Provinsi DKI Jakarta. 2019. *Peraturan Gubernur Daerah Khusus Ibukota Jakrta Nomor 95 Tahun 2019 Tentang Standar Pelayanan Minimum Angkutan Orang dengan Moda Raya Terpadu / Mass Rapid Transit dan Lintas Raya Terpadu / Light Rail Transit*. Jakarta: Sekretariat Daerah Provinsi Daerah Khusus Ibukota.
- Handayadiningrat, Soewarno 1995. *Pengantar Studi Ilmu Administrasi dan Manajemen*. Jakarta: CV. Haji Masagung.
- Isradi,M.,Hidayat,A., Aly,S. 2019, Socialization Of Mass Transportation In Madrasah Ibtidaiyah Nurul Hidayah Kecamatan Pancoran, Jakarta Selatan, Journal ICCD, vol.2, issue.1, 436-439
- Januar, Efendi Panjaitan. 2016. *Pengaruh Kualitas Pelayanan Terhadap Kepuasan Pelanggan Pada JNE Cabang Bandung*. *Jurnal Manajemen*, Volume 11.
- Sunyoto, Danang. 2009. *Analisis Regresi dan Uji Hipotesis edisi pertama*. Yogyakarta: Media Pressindo.
- Warpani, Suwardjoko. 1990. *Merencanakan Sistem Perangkutan*. Bandung: Institut Teknologi Bandung.

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