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Transportation System Performance Analysis Urban Area Public Transport

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ABSTRACT: *Urban transport rises and develops with the development carried out in urban areas. The high mobility of population movement would require the availability of facilities and adequate transport infrastructures to support the various activities undertaken. Urban transportation development aimed at the realization of an integrated national transportation system, orderly, smooth, safe, comfortable, and efficient in supporting the mobility of people, goods and services. Urban transportation problems continue to increase with the increasing social and economic activities that affect the decline in the level of public transport service.*

The objective of this study is to examine the service performance of public transportation systems in urban areas. While the purpose of the study is to determine the performance of the public transport services currently in view of the aspects of satisfaction and expectations or interests of people who use public transport. Data analysis methods used for public transport performance using Importanca Performance Analysis (IPA) and customer satification index (CSI), while to test whether there is an influence on the performance of public transport user satisfaction using Structural Equation Model (SEM) using Amos version 18.0.

The results showed that the performance indicator of public transportation services is still very low. Where the indicators of service performance in Makassar are rated by the community is not satisfied with the indicator of accessibility, affordable rates, and efficient integration. The biggest gap is efficient indicator (64.69), accessibility (66.39) and low pollution (67.59). Based on the value of CSI for public transport services in the city of Makassar is 0.53, still lower than the standard value of 0.81 CSI - 1:00. Whereas the effect on the performance of public transport user satisfaction with SEM analysis obtained equation Y = 0.488 X + e, that the estimated value for the performance was positive, amounting to 0.488 that the performance of public transport in the city of Makassar positive impact on community satisfaction with the public transport service.

Keywords:- *Service Performance, IPA, CSI, SEM.*

I. INTRODUCTION

The urban area is strategic for a country, the strategic role of urban areas, urban areas where the economy is the key to success for both the national and global scale. Urban areas in particular that have a wide area is a very important element in generating employment, increasing productivity and growth and prosperity in a country. Urban area is an attractive place both for people and businesses to live and strive for its number of things like the benefits offered from the collection of economic resources in one place that has a proximity that allows for intensive interaction. Urban area is home to a manufacturing activities and services, which will increase the added value of the overall economy. Development of urban areas is always accompanied by the current transformation, namely the increasing urban population and the increasing contribution of the sectors of manufacturing and service industries, [3].

Needs of urban transport services is a consequence of population movements due to increased activity in a region. [6], said that the move will lead to increased activity of transport demand. To improve the performance of the public transport service in an urban area is done developing sustainable transport systems. Meanwhile [5] improve the performance of the transportation system is very important in reducing the problems of transportation system to improve service and provide optimal results. It is necessary for the proper performance of the improvement of public transport through a systematic approach, integrated, identify and evaluate the operation of public transport. [4], stated that the level of service provided to the user in the increased use of public transport, done in a way to accommodate the level of service required by the user of public transport on the performance of public transport.

Several researches of the performance of public transport services and the development level of public transport as a means of increasing the level of public transport services including, [12] states the population for public transport trips is determined by factors such as comfort, safety and travel time of choice existing modes. [7], the aspects such as reliability, frequency time, travel, tariff and network coverage / distance to stop. [8], Safety and convenience. The public transport service attributes to be a very important factor in assessing the

performance and increase the level of urban public transportation service region. The aim of this study is to assess the performance of the service system of public transportation in the city of Makassar, while the aim of this study to investigate the performance of public transport services transport system on the performance of public transport services currently in view of the aspects of satisfaction and expectations or interests of public transport users general of Makassar city.

II. LITERATURE REVIEWS

2.1. Urban Transport

Urban transport system forms the basis of the economic development community as a whole in an area [10]. The public transport system was developed to be more competitive with other modes of transportation, by providing optimum service and increase the provision of facilities and infrastructure for urban transport system. In developing the public transport system, how to move people in large numbers in support of public mobility, in particular access to employment, trade, and education. Condition and capacity of public transport has not met the demand for public transportation is inadequate, poor road networks, and the high cost of travel for people using the public transport system [1].

Transportation system is a system that allows the movement from one place to another both natural either or artificial / engineering. Transportation system aims to move an object, whether inanimate objects, as well as living things like humans, animals and plants. In transportation system is the basic components that function in the transport system. Basic components of transport system consisting of a load is moved, vehicles move things, thing or vehicle movement paths consisting of segments and points, terminals for moving cargo from one point to another path, and management transport includes operating plans, information and control, and maintenance. The components of the transportation system are interrelated and influence each other. Good transport system required a transportation system planning techniques to find the most optimum combination of means of transport and method for its operation on a particular area [9].

Urban transport system consists of a system of passenger transport and freight transport system. Furthermore passenger transport systems themselves are grouped according to their use and the manner of operation [14], namely: (1) personal transport, ie transport which owns and operated by and for the benefit of private infrastructure owners by using both private and public infrastructure. (2) Public transport, ie transport owned by the operator that can be used for the general to the specific requirements.

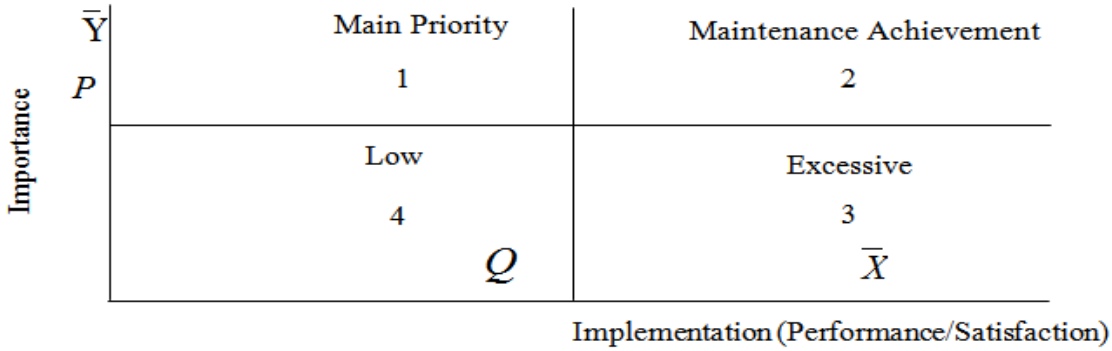
2.2 Public Transport Service Performance

The performance of public transport services is a measure in determining the level of success of transport development, associated with the mission of the National Transportation System which is a tool to know the impact of a policy that has been done as well as the creation of transportation services effectively and efficiently. The effectiveness of road transport services can be measured by: (1) the availability of capacity and road transport infrastructure development in accordance with the demands / needs, (2) the achievement of integration between road transport and intramoda in network infrastructure and services, (3) an order that the implementation of the system transportation in accordance with the rules and norms prevailing in the community, (4) the achievement of precision and regularity that is in accordance with the schedule and the certainty of service; (5) safe or protected from natural and human disturbance, (6) the achievement level of service desired speed or travel time is short but with a high level of safety; (7) to achieve the level of safety or to avoid accidents; (8) the establishment of peace and comfort or enjoyment of the service user; achievement of providing services in accordance with the purchasing power of user services and rates / costs reasonable. Efficiency of road transport services can be measured by comparing the use of the public burden of low to fairly high utility in the implementation of the unified transport network [2]. [11], categorize performance measures public transportation system i.e. mobility, accessibility, operational, maintenance, and security. Westrern Australian Public Transport Authority in the annual report uses five categories to measure performance indicators, including the use of public transport was measured by passenger / km service and the number of passenger kilometers reliability, the level of overall customer satisfaction, customer perception of safety and security levels. Criteria to measure the performance of a tool to evaluate the condition of the system, based on service level objectives, and security is provided to the customer as well as economic policy, the environment and society. Performance measures can also provide information for decisions about how to allocate resources and help to prioritize improvements to the areas most in need.

The performance appraisal system of public transportation can be done method Importance Performance Analysis (IPA) in order to measure the relationship between consumer perceptions and priorities of improving the quality of products / services that are also known as quadrant analysis. Importance performance analysis in general can be used in various fields of study because of the ease to apply and display the results of the analysis that facilitates performance improvement proposed IPA has the main function to display information related to service factors which greatly affect consumer satisfaction and loyalty, and the factors

services according to customer needs to be improved because the condition has not been satisfactory. Importance performance analysis combining the measurement of interest rate factors and the level of satisfaction in two-dimensional graphics that facilitate explanation of the data and getting practical proposals, [14].

In subsequent processing, customer satisfaction levels are translated into Cartesian diagram. Cartesian diagram is a building that is divided into four sections bounded by two lines intersecting perpendicular points (P, Q), where Q is the average of the average score of the level of implementation or customer satisfaction all the factors or attributes and P is the average of the average score of the importance of all the factors that affect customer satisfaction, can be addressed cartesian diagram in Figure 1.



Source: (Supranto, 1997)

Figure 1. Catesian Diagram

Explanations:

a. Point P as the middle point of the score level expectations, obtained by dividing the total score of the average level of expectation per respondent each dimension by the number of dimensions of the existing
b. Q As a point middle point of the performance level score, obtained by dividing the total score of the average level of performance per respondent each dimension with the existing number of dimensions.
c. Top Priority (1). The factors that are considered important by the customer but in reality these factors have not been in line with expectations. Attributes that are included in this quadrant should get more attention or repaired so that the performance is increased.
d. Maintain Achievement (2), the factors that are considered important in accordance with the reality perceived by the customer so that the relatively high level of satisfaction. Attributes that are included in this quadrant must be maintained because these attributes that have attracted the attention of the customers to take advantage of the product.
e. Excessive (3). The factors that are considered less important by the customer but in reality is quite satisfactory
f. Low Priority (4) the factors that are considered less important by the customer and in fact not too special. Increase the attributes in this quadrant can be reconsidered because of the effect on the benefits perceived by customers is very small.

III. RESEARCH METHOD

3.1. Metode Penelitian

The research method is a measurement tool used by researchers to guide research so that the method used in accordance with the purposes of research. The method used in this research is descriptive quantitative method. Basically this quantitative descriptive study aims to accurately describe the properties of an individual, state, or the symptoms of a particular group. Descriptive method is the fact-finding the right interpretation.

3.2. DATA COLLECTION METHOD

Data collection methods used in the research performance of public transport services is done as follows:

1. The Observations made by observation and research in general by visiting / looking for public transport users, with the aim to obtain a general overview of the assessment of the quality of public transport services in the city of Makassar.
2. Interview, conducted by a question and answer directly to those using public transport modes in the hope to get additional information for completeness of data obtained through questionnaires.
3. Questionnaires were completed by submitting a statement to the respondent a list of public transport users to get the information needed to answer the research problem.

3.3. Research Variables

The research variables used in this study are based on the implementation of the National Transportation System indicator, relating to the conduct which integrates various modes of transportation in a service system to improve the flow of goods and mobility of people, while the performance indicators used as variables of this study is high accessibilities, congratulations, unified, sufficient capacity, orderly, swift and fast, easy, on time, convenient, affordable rates, orderly, safe, low pollution.

3.4. Data Analysis Methods

The method used for the analysis of performance of public transport services carried out by the method of Importance Performance Analysis (IPA) and the Customer Satisfaction Index (CSI), by combining the measurement of interest rate factors and the level of satisfaction of the users of public transport in the graph so as to facilitate explanation of the data. IPA chart interpretation in four quadrants based on the importance of measurement results obtained from the questionnaire in the field. Meanwhile, to test whether there is an influence on the performance of public transport user satisfaction using Structur al Equation Model (SEM) using Amos version 18.0.

1. *Importance performance analysis*

The basic principle of Importance Performance Analysis (IPA) is the multiplicative weights of importance and satisfaction of each respondent in order to obtain an average performance index of each parameter review. IPA analysis study conducted on 3 sectors are always involved in the organization of public transport, the government / local, the operator, the user and expert from academia. The analysis of user satisfaction levels are shown in Equation (1).

$$\text{Tki} = \frac{Xi}{Yi}\, x\, 100\% \quad (1)$$

where :

Tki : Respondent Specific Level
Xi : Performance Appraisal Scor
Yi : Customer's importance Score

Horizontal axis (X) will be filled by the score level implementation, while the vertical axis (Y) will be filled by the score level expectations. In simplifying the formula, then any factors that affect customer satisfaction is calculated by Equation (2) and (3).

$$\bar{X} = \frac{\sum Xi}{n} \quad (2)$$

$$\bar{Y} = \frac{\sum Yi}{n} \quad (3)$$

Cartesian diagram is a building that is divided into four sections bounded by two perpendicular lines that intersect at the points (X, Y), where X is the mean of the average score of the level of implementation or customer satisfaction all the factors or attributes, and Y is the average of the average score of the importance of all the factors that affect customer satisfaction. Cartesian diagram is a building that is divided into four sections bounded by two perpendicular lines that intersect at the points (X, Y), where X is the mean of the average score of the level of implementation or customer satisfaction all the factors or attributes, and Y is the average of the average score of the importance of all the factors that affect customer satisfaction, calculated using Equation (4) and (5).

$$\text{Q} = \frac{\sum_{i=1}^{n} \overline{Xi}}{k} \quad (4)$$

$$\text{P} = \frac{\sum_{i=1}^{n} \overline{Yi}}{k} \quad (5)$$

where :

K = the number of attributes or facts that could affect customer satisfaction.

2. Indeks kepuasan pelanggan (*customer satisfaction index*)

Customer Satisfaction Index is a method to determine the level of satisfaction with the overall respondents see the importance of the attributes of products or services. As for how to measure customer satisfaction index is done by using the average value of the level of expectation and the performance of each

service item. To get the customer satisfaction index score through four stages, namely: To know the CSI, it can be done the following steps;

a) Determining *Mean Importance Score* (MIS)

MIS average value of each variable rate consumer expectations or attributes shown in Equation (6).

$$MIS_t = \frac{\left(\sum_{t=1}^{n} Y_t\right)}{n} \quad (6)$$

where:

n = number of respondent

Yi = Expectation velue atributes Y ke-i

b) Determining the value of *Mean Satisfaction Score* (MSS)

MSS is the value of the average level of perceived reality students per variable or attribute. MSS is shown in Equation (7)

$$MSS_t = \frac{\left(\sum_{t=1}^{n} X_t\right)}{n} \quad (7)$$

where:

n = number of respondent

Xi = Real value atributes X to i

c) Making *Weight Factor* (WF)

This weight is as MIS value per attribute to total all the attributes MIS. The WF value is shown in Equation (8)

$$WF_t = \frac{MIS_t}{\sum_{t=1}^{p} MIS_t} \quad (8)$$

d) Making *Weight Score* (WS)

This weight is a product of the WF with the average level of student service perceived reality as Mean Satisfaction Score (MSS). Shown in Equation (9).

$$WS_t = WF_t \, x \, MSS_i \quad (9)$$

e) Determining the CSI

Equations used to determine the CSI is shown in Equation (10)

$$CSI = \frac{\sum_{t=1}^{p} WS_t}{HS} x100\% \quad (10)$$

where:

p = Aribut of behalft to p

HS = Highest *Scale* used

CSI values in this study is divided into five criteria are not satisfied to very satisfied criteria are shown in Table

Table 1. Criteria satification customer value index

CSI Value	Criterion of CSI
0.81 – 1.00	Very satisfied
0.66 – 0.80	Satisfied
0.51 – 0.65	Quaite Satisfied
0.35 – 0.50	Less Satisfied
0.00 – 0.34	Not satisfied

Sumber: (Supranto, 1997)

3. Analysis of the influence of satisfaction on the performance of public transport

In testing the effect of satisfaction on the performance of public transport using Structural Equation Modeling (SEM). Therefore the SEM can be used to determine the dominant variable. Structural testing using AMOS 18.0 program will convert the model specifications in structural equation and measurement equation of the model specification. Structural equation formulated to express causality relationship between variable is shown in Equation (11).

$$Y = \beta X + e \quad (11)$$

where:

X = Satisfaction
Y = Traffic Performance
e = Latent variable measurement error traffic performance.
β = Regression Weight (Regresion Coefisient of Unstandardized Beta)

In this study using SEM because of the SEM is in principle obtain structural models. When estimating the parameters based on the data input range of-covariance matrix (var-cov matrix), the SEM produces beneficial structural models for forecasting (prediction) or to prove the model. Whereas if the input data in the form of a correlation matrix, the SEM beneficial to check the size of the effect, whether direct, indirect or total effects of independent variables (variable exogend) to the dependent variable. Therefore the SEM can be used to determine the dominant variable. Furthermore, each latent variable (construct) were tested by confirmatory factor and proceed with testing.

VI. RESULTS AND DISCUSSION

1. **Performance of the public transport services in Makassar City**

Makassar city is considered as the main objective movement. Therefore the use of public transport services becomes very vital for any activity that involves people in Makassar. The position of performance indicatos in each quadrant determines the value and treatment that will be taken for each performance indicator. The position of each indicator in the IPA quadrant is shown in Table 2.

Table 2. Position Indicators in IPA in the city of Makassar

No.	Indicators	Performance	Behalf	Tki	Quadrant			
		X	Y		I	II	III	IV
1.	Safety	3,17	4,07	77,94		√		
2.	Accessibility	2,35	3,54	66,39				√
3.	Affordable Tariff	2,43	3,54	68,51				√
4.	Capacity	2,57	3,63	70,57				√
5.	Reguler	2,51	3,65	68,81				√
6.	Swift and Fast	2,66	3,79	70,20		√		
7.	On time	2,67	3,74	71,32		√		
8.	Integrated	2,42	3,52	68,72				√
9.	Efficient	2,25	3,48	64,69				√
10.	Easy	3,01	3,99	75,64		√		
11.	Orderly	2,78	3,89	71,51		√		
12.	Secure	2,88	3,93	73,14		√		
13.	Cozy	2,64	3,75	70,41		√		
14.	Low Pollution	2,48	3,67	67,59				√
	Average	**2,63**	**3,73**	**70,39**				

Based on Table 3, shows that there is a value of public transport performance and value of the public interest against the public transport Makassar City. To see the GAP between satisfaction and expectations of consumers / stakeholders on performance indicators of public transport services in the city of Makassar that the indicators that have the greatest GAP is efficient indicator (64.69), accessibility (66,39) and low pollution (67.59) . Public transport users considered that the general public where public transport is not efficient in the sense of not able to reduce the burden on society in terms of transportation needs. In addition, the conditions of service shall be considered public transport was no longer able to accommodate the amount of movement of the needs of people in the city of Makassar.

Further assessment of our performance and the interests of society can also be described the GAP between importance and performance of public transport in the city of Makassar. Properly complete GAP behalfs and the performance of public transport that occurred in the city of Makassar can be shown in Figure 2.

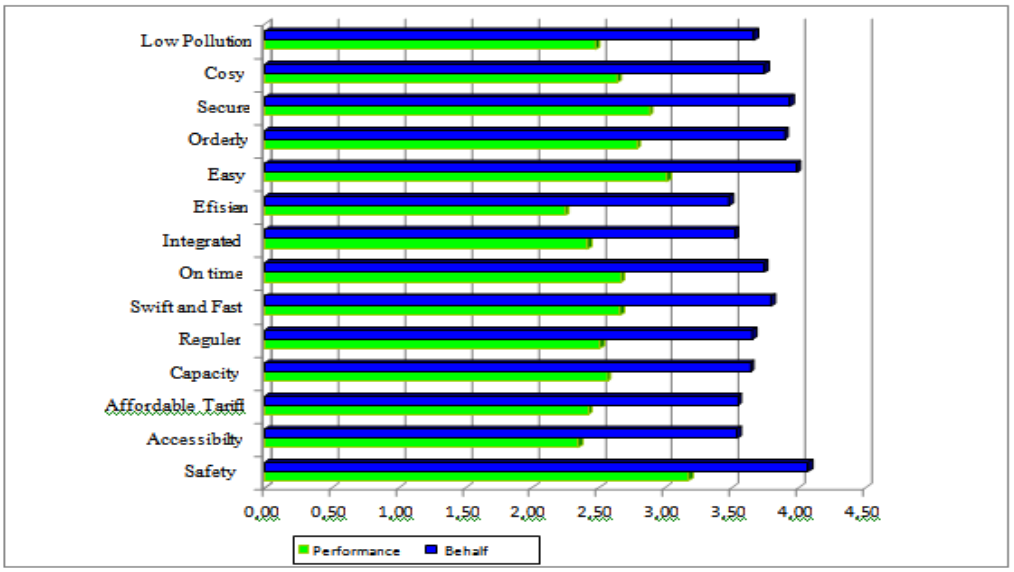


Figure 2. Diagram of Behalf and Performance Gap Public Transportation in Makassar City

In subsequent processing, the level of public satisfaction will be translated into Cartesian diagram for performance of public transport in the city of Makassar. This diagram illustrates Cartesian quadrant intersection line on the average value of the observations at the level of interest and axis performance assessment in order to determine the specifics of each factor lies in which quadrant. Treatment for each indicator based on its location in each quadrant. Priority Quadrant I (high expectations and low performance), Quadrant II Maintain Achievement (high expectations and high performance), Quadrant III, Excessive (high performance low expectations) and Quadrant IV Low priority (low expectations and low performance). More picture of the position indicator in the Cartesian quadrant can be shown in Figure 3.

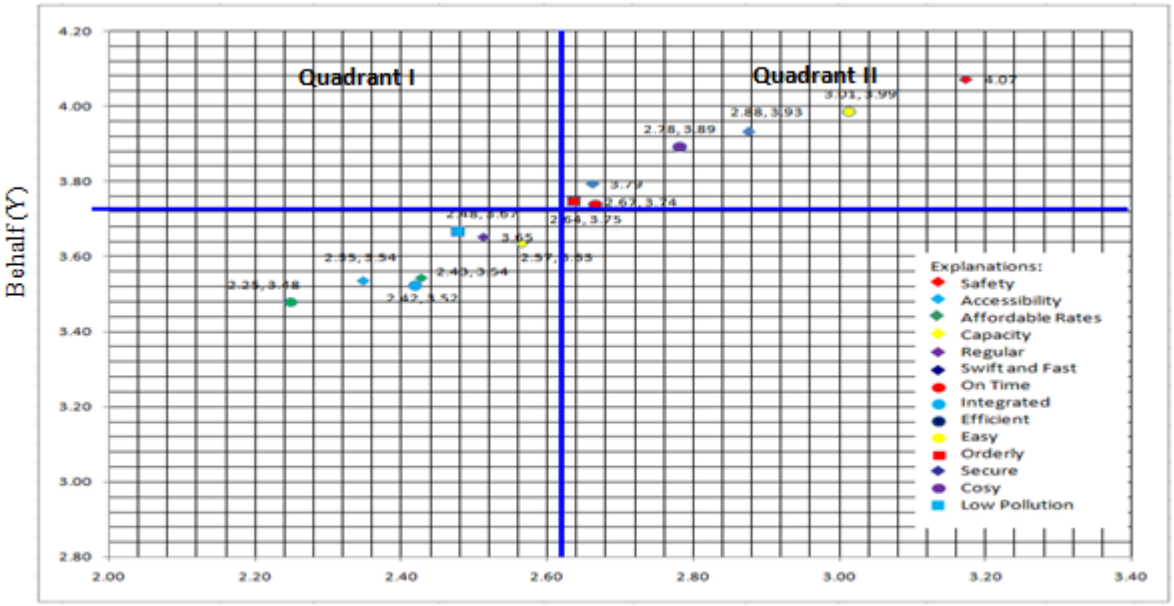


Figure 3. Cartesian diagram IPA of Makassar City

Quadrant IV **Quadrant III**

Based on Figure 3, shows that the indicator is located in Quadrant II are indicators of safety, swift and fast, on time, easy, orderly, safe, and comfortable, whereas in quadrant IV are indicators of accessibility,

affordable rates, capacity, orderly, integrity, efficiency, and low pollution. Based on Cartesian diagram above is known that the indicators of public transport services that can be maintained is safety, swift and fast, on time, easy, orderly, safe, and comfortable. The indicators in this quadrant must be maintained because these attributes that have attracted the attention of the customers to take advantage of the product. This is due to the assessment of the indicators are in line with expectations perceived by the public desired.

While the indicator is a low priority is accessibility, affordable tariff, capacity, orderly, integrity, efficiency and low pollution. These indicators are considered less important by the customer and in fact not too special. Improvement in these indicators should be reconsidered because of the effect on the benefits perceived by customers is very small. This condition is caused by the indicator in accordance with the interests of the community who rate low on these indicators. Index for the assessment of community satisfaction with the performance of public transport in the city of Makassar can be seen in Table 3.

Table 3. CSI matrix of public transport services in Makassar City

No.	Indicators	Performance	Behalf	Weight (WF)	Weight Score (WS)	CSI
		X	Y			
	A	B	C	D	E	F
1.	Safety	3,17	4,07	1,09	2,87	0,57
2.	Accessibility	2,35	3,54	0,95	2,49	0,50
3.	Affordable Rates	2,43	3,54	0,95	2,50	0,50
4.	Capacity	2,57	3,63	0,97	2,56	0,51
5.	Reguler	2,51	3,65	0,98	2,58	0,52
6.	Swift and Fast	2,66	3,79	1,02	2,68	0,54
7.	On time	2,67	3,74	1,00	2,64	0,53
8.	Integrated	2,42	3,52	0,94	2,48	0,50
9.	Efficient	2,25	3,48	0,93	2,45	0,49
10.	Easy	3,01	3,99	1,07	2,81	0,56
11.	Orderly	2,78	3,89	1,04	2,74	0,55
12.	Secure	2,88	3,93	1,05	2,77	0,55
13.	Cozy	2,64	3,75	1,00	2,64	0,53
14.	Low Pollution	2,48	3,67	0,98	2,59	0,52
	Total	**36,82**	**52,19**	**14,00**	**36,82**	**7,36**
	Average	**2,63**	**3,73**	**CS Result Index**		**0,53**

Customer satisfaction is the level of feelings that arise between expectations and satisfaction levels of service received is a function of the difference between perceived performances to expectations. Based on Table 4, shows that people are not satisfied with the indicator of accessibility, affordable rates, and efficient integration. It is seen that the value of the CSI indicator lies among 0.35 to 0.50. While people are satisfied with the safety indicators, capacity, orderly, swift and fast, on time, easy, orderly, safe, convenient and low pollution, because the value of the indicator CSI in the range from 0.51 to 0.65. Overall CSI scores for public transport services in the city of Makassar is 0.53 people feel quite satisfied with the performance of services public transportation in the city of Makassar.

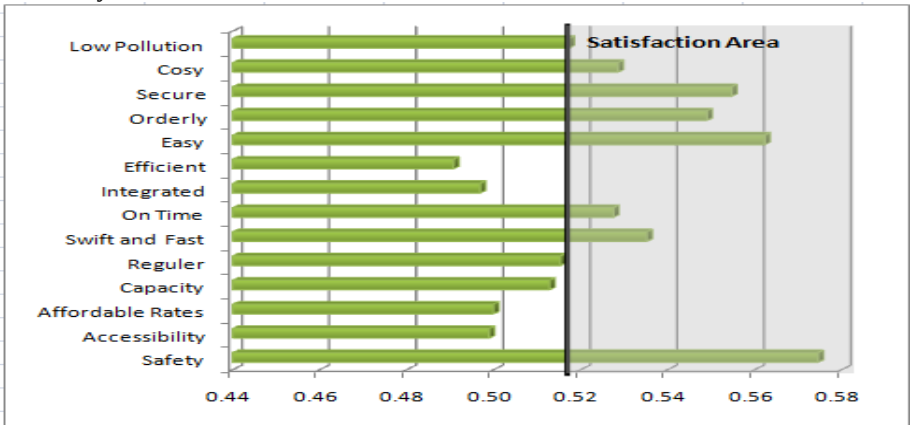


Figure 4. Public Satisfaction level against Public Transport in Makassar City

2. Influence satisfaction with the performance of public transport in Makassar

Based on the position indicator in the IPA in Makassar that the indicators on each variable performance and satisfaction i.e, safety, accessibility, affordable rates, capacity, orderly, swift and fast, on time, integrated, efficient, easy, orderly, safe, convenient, and pollution low. Tests conducted analysis Structural Equation Modeling (SEM) to test the influence of public transport customer satisfaction on the performance of public transport, the scheme each indicator variables can be shown in Figure 5.

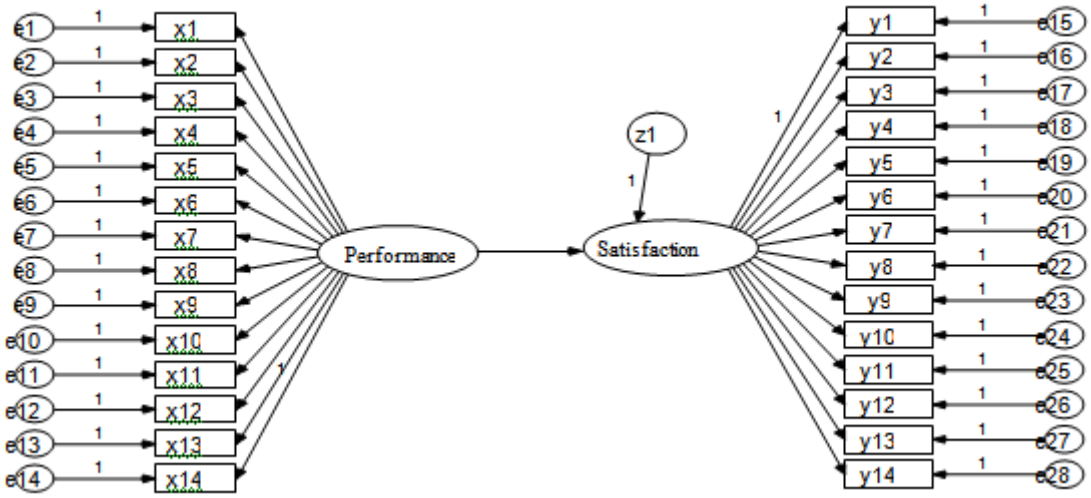


Figure 5. Diagram Development Path Makassar City

Application of Structural Equation Modeling analysis (SEM) conducted several stages: test assumptions, test measurement models through confirmatory factor analysis, structural relations model analysis and testing hypotheses constructed in the study. The next estimate the value of each indicator variable loading and influence between these variables is done with the help of Sofware Analysis of Moment Structural (AMOS).

1. Structural equation modeling test assumptions

The initial step in the application of structural equation modeling analysis is to test assumptions in order to assess whether the data obtained to meet the assumptions of structural equation models. Assumptions underlying the structural equation model are normality, outliers, multicollinearity and linearity can be described as follows:

a. Data Normality Test

Normality test is performed to determine whether the distribution of the collected data has a normal distribution or not both multivariate and univariate. Data normality test results with the help of AMOS software is shown in Table 4.

Table 4. Assessment of normality (Group number 1) in Makassar City

Variable	Min	Max	Skew	c.r.	Kurtosis	c.r.
y14	,444	4,000	,917	2,238	-,856	-2,447
y13	,421	4,167	,942	2,382	-,726	-2,076
y12	,583	4,286	1,144	1,536	-,215	-,614
y11	,571	4,167	,907	2,183	-,900	-1,572
y10	,667	4,667	,948	2,421	-,818	-2,337
y9	,333	4,250	1,038	1,931	-,424	-1,213
y8	,667	4,333	1,045	1,974	-,470	-1,343
y7	,700	4,667	1,031	1,893	-,373	-1,066
y6	,538	4,000	,911	2,205	-,869	-2,482
y5	,563	3,600	,846	1,834	-1,124	-2,211
y4	,533	4,000	,949	1,425	-,765	-2,186
y3	,526	3,333	,977	1,581	-,741	-2,117
y2	,444	3,667	1,054	2,027	-,697	-1,992
y1	,556	4,667	1,288	2,360	,228	,651
x1	1,667	4,667	,737	2,211	-,838	-2,394

x2	1,333	3,667	,417	2,383	-1,238	-1,539
x3	1,667	3,333	,397	2,270	-1,028	-1,938
x4	1,600	4,000	,443	1,532	,164	,469
x5	1,400	3,600	-,055	-,316	-,956	-1,731
x6	1,750	4,000	,601	2,437	-,637	-1,820
x7	1,000	4,667	,231	1,322	1,779	2,083
x8	1,000	4,333	,502	1,869	,378	1,080
x9	1,000	4,250	,637	1,641	-,066	-,189
x10	1,333	4,667	,276	1,575	-,448	-1,281
x11	1,000	4,167	-,365	-2,084	,243	,695
x12	1,800	4,286	,459	1,623	-,580	-1,658
x13	1,333	4,167	,267	1,526	,381	1,088
x14	1,000	4,000	,101	,575	-1,043	-1,979
Multivariate					,695	1,738

Normality test is done using criteria critical ratio of 2.58 ± 0.01 significance level (1%), so it can be concluded that there is no data to deviate. Normality test data for each indicator proved to be normal. So the data used in testing the influence of the performance of public transport to the satisfaction of the community in the city of Makassar in this study had a normal distribution.

b. **Data outler Test**

Outlier is an observation or data that has unique characteristics that look very different from observation - other observations and appears in the form of extreme value for a single variable or combination of variables. Outliers test data in this study is often also called the data research test (extreme). In this study the test outliers using *Mahalanobis* distance criteria distence at probability levels less than $\alpha = 0.05$ or 95%. *Mahalanobis* distance is evaluated using the X2-free degree by the number of indicator variables (observed variables) were used in the study of 8 manifest variables. When the value *mahalanobis* distance > X2 value at the probability level of $\alpha = 0.05$ or 95%, then there is univariate and multivariate outliers. Outlier tests the data to determine pentilan extreme observations.

Number of indicator variables (observed variables) in this study is 14 indicator variables with 196 samples so that the value of X^2 (0.05, 196) = 229.6632 (can be calculated through the program MS Excel = CHIINV (0.05, 196)). All data that has a value greater than the distance *mahalanobis* X^2 = 229.6632 mean going univariate and multivariate outliers. Outliers test results output data using AMOS software shows no value *Mahalanobis* distance greater than X^2 = 229.6632 at the 95% confidence level. *Mahalanobis* distance is the maximum value of 136.462 on observation or sample to-5 and the minimum distance was *Mahalanobis* value of 22.229 at the 89th observation.

c. **Linierity Test**

The resulting estimate of the linearity testing performed in this study by using a scatter plot diagram to provide additional regression line and scatter plots show only the relationship between two variables only, then the test is carried out in pairs every two indicators and latent variables. Output test using SPSS software seems scatter plot diagram of couples all variables showed a trend toward regression line is starting from the bottom left corner to right toward the top.

Based on the results of test data normality, outliers, multicollinearity and linearity of data it can be concluded that the data analyzed in this study met the assumptions of structural equation models that can be tested further by an analysis of the measurement model (confirmatory factor analysis), test the structural relationship model design and testing hypotheses in this study constructs.

2. **Measurement Model (*confirmatory factor analysis*)**

Measurement model with Confirmatory Factor Analysis (CFA) in this research aims to assess the indicator variable (observed variables) that defines a construct or latent variable that can not be measured indirectly. Measurement model to variable indicators that form latent variables or constructs are latent in this research is satisfaction (X) and performance (Y). Need to be understood in the measurement models through confirmatory factor analysis, there are two basic tests, namely: (1) test the suitability of the measurement model and (2) Test the significance weighting factor (factor loading / lambda (λ)).

Terms of confirmatory factor analysis measurement using a significance test weighting factor (factor loading / lambda (λ) by reason of a latent variable test is used to confirm that a variable can be formed together with indicators of other variables explain a latent variable is assessed using criteria lambda values (λ) or factor

loading required (cut off point) must reach ≥ 0.40 or 40%. When the value of lambda (λ) or factor loading lower than 0.40 or 40% considered indicators of the formation of these variables with the same dimensionless variables other indicators to explain a variable. Calculation measurement model through confirmatory factor analysis for each latent variable model is built and based on the measurement indicators in this study can be described as follows:

a. Estimation of latent variable loading factors forming satisfaction

Estimation results satisfaction latent variable measurement model consists of the four manifest variables (observed variables), namely: Quadrant I, Quadrant II, Quadrant III and Quadrant IV. Measurement model confirmatory factor analysis for each of the observed variables can be known from the satisfaction factor loading values and probabilities that reflect the level of significance and the contribution / role in the formation of a latent variable satisfaction through standardized regression weights shown in Figure 6.

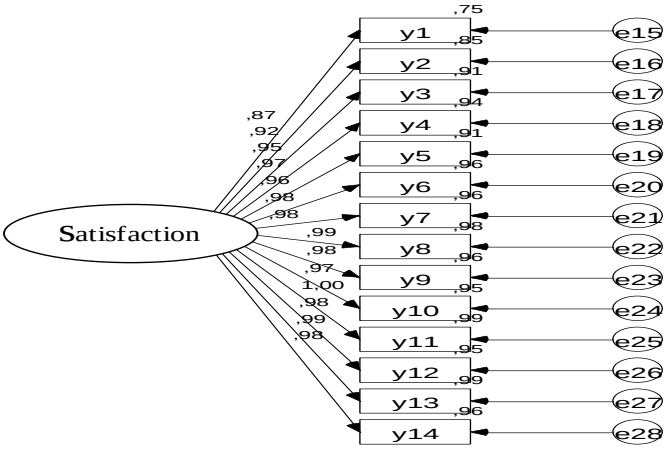


Figure 6. Confirmatory factor latent variable model of satisfaction in Makassar

Based on Figure 6, the structural model can be incorporated into the following equation:

Y = λ Y + e

Y1 = 0,869Y1+e15	Y8 = 0,990Y8+e22
Y2 = 0,919Y2+e16	Y9 = 0,982Y9+e23
Y3 = 0,953Y3+e17	Y10=0,973Y10+e24
Y4 = 0,970Y4+e18	Y11=0,996Y11+e25
Y5 = 0,956Y5+e19	Y12=0,975Y12+e26
Y6 = 0,979Y6+e20	Y13=0,993Y13+e27
Y7 = 0,981Y7+e21	Y14=0,978Y14+e28

Estimation results satisfaction latent variable measurement model using confirmatory factor analysis appear in Figure 6, the formation consists of fourteen manifest variable has a value of loading factor (λ) and the probability of the entire indicator variables still above the barrier (cut off point) of 0.40 or 40% and a probability value below α = 0.05. Further summary of the results of computational models of latent variables satisfaction measurements are shown in Table 5.

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Table 5. Satisfaction measurement model variables in Makassar City

			Estimate	**C.R.**	**P**
y1		Satisfaction	,869	20,345	,000
y2		Satisfaction	,919	19,543	,000
y3		Satisfaction	,953	21,331	,000
y4		Satisfaction	,970	22,375	,000
y5		Satisfaction	,956	21,558	,000
y6		Satisfaction	,979	22,976	,000

			Estimate	C.R.	P
y7		Satisfaction	,981	23,075	,000
y8		Satisfaction	,990	23,706	,000
y9		Satisfaction	,982	23,147	,000
y10		Satisfaction	,973	22,558	,000
y11		Satisfaction	,996	24,097	,000
y12		Satisfaction	,975	22,679	,000
y13		Satisfaction	,993	23,882	,000
y14		Satisfaction	,978	22,854	,000

Based on the loading factor obtained confirmed that the fourteen indicator variables that have an important role or contribution to the formation of the satisfaction variables. Referring to the results of confirmatory factor analysis indicator variable formation fourteenth overall satisfaction variable has a value of loading factor (λ) is still above the barrier (cut off point) of 0.40 or 40% overall yield and construct probability value is smaller than $\alpha = 0.05$. Authenticate that the correlation among all of positive variables observed and significant with the establishment of satisfaction latent variables because they still have the range of the interval values loading factor (λ) among 0.869 to 0.993.

a. Estimation of latent variable form factor loading performance

The estimation results of the performance measurement model latent variables consist of fourteen manifest variables (observed variables), namely: safety, accessibility, affordable rates, capacity, orderly, swift and fast, on time, integrated, efficient, easy, orderly, safe, convenient and low pollution. Measurement model confirmatory factor analysis for each of the observed variables can be seen from the performance factor loading values and probabilities that reflect the level of significance and the contribution / role in the formation of a latent variable satisfaction through standardized regression weights shown in Figure 7.

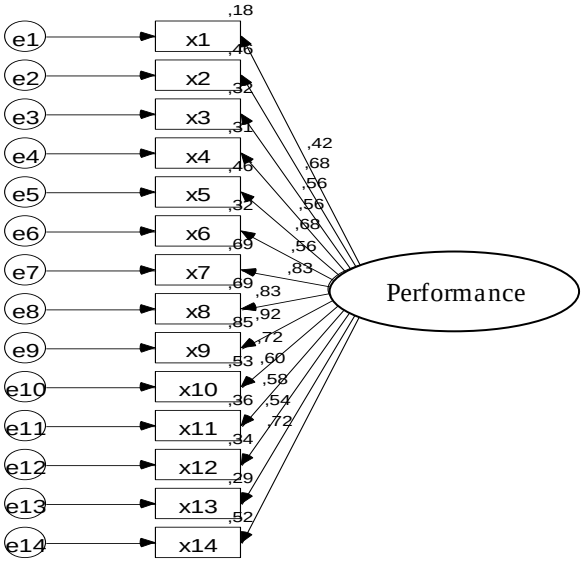

Figure 7. Confirmatory factor latent variable model of performance in the city of Makassar

Based on Figure 7, the structural model can be incorporated into the following equation:

$X = \lambda X + e$

X1 = 0,425X1+e1
X2 = 0,677X2+e2
X3 = 0,563X3+e3
X4 = 0,559X4+e4
X5 = 0,678X5+e5
X8 = 0,829X8+e8
X9 = 0,920X9+e9
X10=0,725X10+e10
X11=0,603X11+e11
X12=0,580X12+e12

X6 = 0,564X6+e6 X13=0,537X13+e13
X7 = 0,830X7+e7 X14=0,721X14+e14

The estimation results of the performance measurement model with latent variables using confirmatory factor analysis appear in Figure 7, formation of four manifest variables have a value of loading factor (λ) and the probability of all indicator variables are still above the barrier (cut off point) of 0.40 or 40 % and a probability value below $\alpha = 0.05$. Further summary of the results of computational performance measurement model latent variables are shown in Table 6.

Table 6. Variable performance measurement models in Makassar City

			Estimate	**C.R.**	**P**
x1		Performance	,425	5,678	,000
x2		Performance	,677	9,372	,000
x3		Performance	,563	7,673	,000
x4		Performance	,559	7,454	,000
x5		Performance	,678	9,176	,000
x6		Performance	,564	7,493	,000
x7		Performance	,830	11,474	,000
x8		Performance	,829	11,298	,000
x9		Performance	,920	12,739	,000
x10		Performance	,725	10,159	,000
x11		Performance	,603	8,033	,000
x12		Performance	,580	7,687	,000
x13		Performance	,537	7,057	,000
x14		Performance	,721	6,652	,000

Based on the loading factor obtained confirming that the four indicator variables that have an important role or contribution to the formation of performance variables. Referring to the results of confirmatory factor analysis the four indicator variables forming the overall performance of the variable has a value of loading factor (λ) is still above the barrier (cut off point) of 0.40 or 40% overall yield and construct probability value is smaller than $\alpha = 0,05$. Authenticate that the observed correlations between all the variables positively and significantly with the establishment of latent variable performance because it still has a loading factor values range interval (λ) among 0.425 to 0.920.

a. Goodness of Fit Test (Suitability Model)

Suitability test (fit model) is used to measure the degree of correspondence between the models with the data presented. At this step is evaluated the suitability of the model through the study of various criteria of goodness of fit. The first step is to evaluate whether the data is used to meet the assumptions of SEM. For this test the suitability and needed some index cut-off value for use in testing a model. The suitability of the model test results shown in Table 7.

Table 7. Conformance Testing Results Model in Makassar City

Goodness of Fit Index	**Cut of Value**	**Results of the Analysis**	**Evaluation Model**
Chi Square	Kecil	23,064	Small
Probabability	≥ 0,050	0,305	Good
CMIN / DF	≤ 2,000	1,680	Good
GFI	≥ 0,900	0,964	Good
AGFI	≥ 0,900	0,909	Good
TLI	≥ 0,950	0,953	Good
CFI	≥ 0,950	0,961	Good
RMSEA	≤ 0,080	0,047	Good

Test of the hypothesis model indicated that this model fit the data or fit the available data as seen from the level of significance of the chi-square of 23.064 models. Index values CMIND / DF, RMSEA, GFI, TLI, AGFI and GFI were expected ranges. Because the chi-square value and CMIN / DF is at a good value then this model is acceptable due to the captured data is authentic data from the field and the resulting model can be used to predict community satisfaction with the public transport service in the city of Makassar.

e. Structural relations model test

Tests on the structural relationship model to examine the association between indicators of the latent variables or relationships among latent variables are designed in this study. After obtaining the results of all significant indicators in the measurement model using confirmatory factor, for each latent variable in the analysis, then see the results of structural models for the answer on the way hypotheses. Based on the structural model testing framework, then in general there are two sub-structural relationships to be tested in this study, the effect of satisfaction on performance is shown in Figure 8.

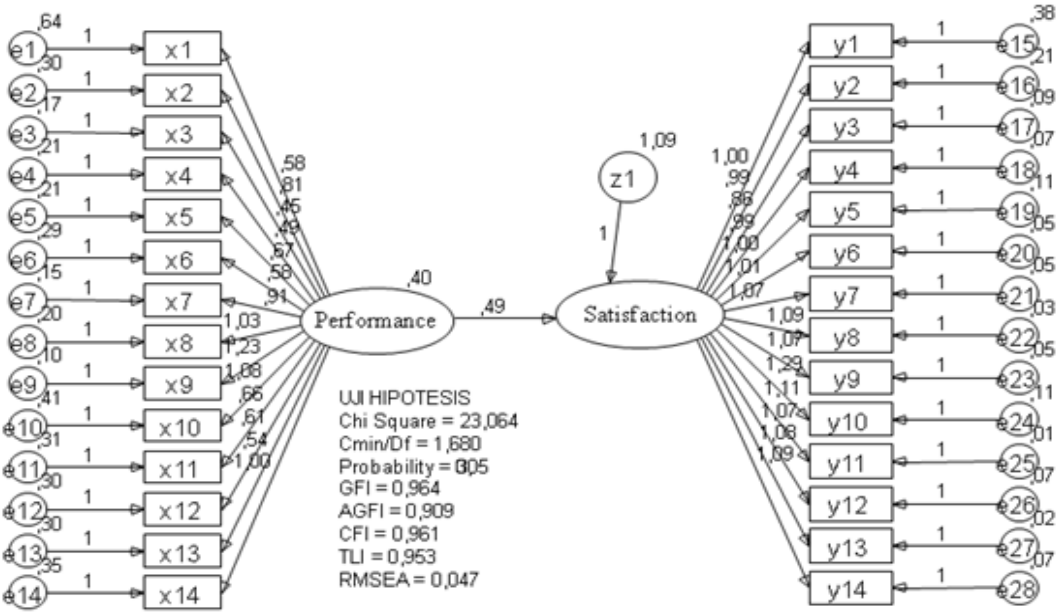

Figure 8. Full diagram models of Makassar City

Based on Figure 8, shows the relationship between the latent variables and the influence of exogenous variables on endogenous variables. Results of data analysis showed that the relationships built in this study had a positive and significant relationship. Besides the structural model above shows the structural relationship of latent variables, also described the relationship with the latent variable and the observed variable measurement error each observed variable. The results of the structural model is built spesific analysis as a basis for analyzing the relationship between latent variables by the value of the standardized regression weights in order to know the relationship between latent variables and relationships signifingkansi levels shown in Table 8.

Table 8. Standardized regression weights directly influence the latent variable

			Estimate	**S.E.**	**C.R.**	**P**	**Explanation**
Satisfaction	<---	Performance	,488	,129	3,797	,000	Significant

The estimation results of the standardized regression weights, it can be seen the effect coefficient, cr (critical ratio) is the same as the t-test on regression analysis and probability levels respectively direct relationship between latent variables. Table 9 and Figure 8 show a direct relationship, namely: the performance of public transport significantly influences people's satisfaction in Makassar City.

By Amos output, then the influence of Satisfaction (X) on the Performance (Y) values obtained Yyx = 0.488, so that mathematically can be expressed in the following equation:

Y=0,488X+e
Where,
X = Performance
Y = Satisfaction

e = Variable error

Based on the equation above shows that the estimated values for the performance was positive, amounting to 0.488. This implies that the performance of public transport has a positive effect on community satisfaction with the public transport service in the city of Makassar.

V. CONCLUSIONS AND RECOMENDATIONS

5.1. Conclusions

Based on the results of research and discussion, it can be concluded analysis of the performance of urban public transport services as follows:

1. Indicators of service performance in Makassar City who assessed that the public is not satisfied with the indicator of accessibility, affordable rates, and efficient integration. The biggest gap is efficient indicator (64.69), accessibility (66.39) and low pollution (67.59). Based on the value of CSI for public transport services in the city of Makassar is 0.53, still lower than the standard value of CSI 0.81 - 1.00.
2. Based on SEM analysis obtained equation Y = 0.488 X + e, that the estimated value for the performance was positive, amounting to 0.488 that the performance of public transport in the city of Makassar positive impact on community satisfaction with the public transport services

5.2. Recomendations

1. Performance appraisal of public transport services should be made on the basis of the corridor / route towards public transport users and to improve urban public transport services by building a reliable transportation system and integrated with one another that connects all service centers in order to improve the quality and accessibility of the distribution of population movement in turn can support production systems linkages throughout the urban area.
2. Transportation needs in urban areas need to be improved, as well as the provision of infrastructure and transportation facilities. International integration and intermodal transportation is largely lacking / low, due to the lack of transport facilities to transition modes, schedules poor transport services, the limited number of fleet services at the vertices of inter / intra mode, and limited network infrastructure and services linking inter-region.

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