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Public Transportation User Movement Analysis of Passenger Satisfaction with SEM PLS Method at the Tangerang Selatan City Bus Terminal

Deni Riyanto[1], Nunung Widyaningsih[2]

[1]Postgraduate Student, Department Master of Civil Engineering, Mercu Buana University, Jakarta, Indonesia
[2]Postgraduate Lecturer, Department Master of Civil Engineering, Mercu Buana University, Jakarta, Indonesia

Corresponding Author: Deni Riyanto

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ABSTRACT

The characteristics of the movement of public transportation users in South Tangerang City must be reviewed and analyzed so that the use of public transportation can be used as one of the best alternatives in implementing an integrated city infrastructure service system. The purpose of this study is to identify the characteristics of public transportation users who use the terminal in South Tangerang City, to find out the factors that influence people's satisfaction in choosing a bus terminal, and to analyze the influence of movement, facilities and zones on bus terminal user satisfaction and perceptions of public transportation users. in the city of South Tangerang.

The research approach used is quantitative with primary data sources obtained from a questionnaire instrument to 160 users of Public Transportation Bus Terminals in South Tangerang City. The data analysis method used is Structure Equation Modelling (SEM) – Partial Least Square (PLS) with SmartPLS 3.0 program to measure the inner and outer models of this study and to assess the effect of exogenous variables on endogenous variables.

The results of the analysis show that the factor that has the most direct influence on user satisfaction is the mode facility variable with a t-statistic value of 5.377 > 1.87 while the zone variable has no positive and insignificant effect on the perception of public transportation users because it has a p-value of 0.187 > 0. .05 and t-statistic 1.32 < 1.87 or in other words that the perception of terminal users in South Tangerang City is not affected by zones or locations, so wherever the terminal is, if there is a demand from transportation users, it can be approved.

Keywords: bus terminal, SEM-PLS, customer satisfaction, user perception

INTRODUCTION

The South Tangerang City Government is one of the cities in Jabodetabek that has a transportation system development plan that will be directed at effective and sustainable regional spatial planning with efforts to increase regional productivity and efficiency of regional resources, through the use of space for the main function which includes the transportation terminal system. Where in the South Tangerang City Regional Regulation Number 15 of 2011 concerning the South Tangerang City Spatial Plan for 2011-2031, it is stated that the strategy for developing and improving transportation infrastructure based on public transportation is integrated and controlled. One way is to develop a terminal system within the city and build a terminal at the city limits consisting of: a) development of type A terminal in Pamulang District;

b) development of type B terminal in Ciputat District; and c) development of type C terminals in Serpong District, Setu District, and Pondok Aren District.

Figure 1. South Tangerang City Administration Map (Source: https://peta-hd.com/)

Terminal-based transportation services in the City of Jabodetabek are very necessary in order to build integrated and sustainable transportation in accordance with the strategy issues issued by the Jabodetabek Transportation Management Agency (BPTJ) in the 2019 report. BPTJ as the coordinator of transportation implementation in Jabotabek explained that there are 4 strategic issues regarding management Jabodetabek transportation, one of which is Terminal Development and Development. In this strategic issue, BPTJ explains that coordination and synchronization are needed in the preparation of provincial and city/district regional development plans and spatial plans against the Jabodetabek Transportation Master Plan in accordance with Presidential Decree No. 55 of 2018 as a guideline for the implementation of integrated Jabodetabek transportation in coordination with BPTJ.

Figure 2. Jabodetabek transportation strategic issues

With the creation of a terminal in the urban transportation system, it is hoped that it can become one of the community's alternatives in using public transportation modes. Many factors can underlie people's interest in using public transportation and choosing terminals as a place to stop in their daily activities. Therefore, the characteristics of urban communities in choosing public transportation modes need to be observed by local governments in taking a policy to improve the quality of urban transportation system services.

MATERIALS & METHODS

The type of data used in this study is primary data. Primary data was obtained from the distribution of instruments in the form of questionnaires to respondents at the terminal in the city of South Tangerang. The sample size was taken using the Hair Formula. The Hair formula is used because the population size is not known with certainty if the sample size is too large, then the method becomes very sensitive so it is difficult to get good goodness-of-fit measures (Hair, 2019). So it is suggested that the minimum sample size is 5-10 observations for each estimated parameter. With the number of indicators as many as 32 items and multiplied by 5 so that this study the number of samples was 160 people who came from Bus Terminal Users in South Tangerang City.

A variable is a construct whose properties have been assigned values in the form of numbers, or concepts that have two or more values on a continuum. Variables can also be defined as factors that play a role in the events to be studied:

a. Independent Variables (X): Movement Characteristics (X1), Transportation Mode Facility Characteristics (X2) and Zone Characteristics (X3)

b. The dependent variable and as a mediating variable (Y1) : User Satisfaction

c. Dependent variable (Y2) : Public Transportation User Perception

Table 1. Research variable

No	Variable	Indicator	Code
1	Movement (X1)	Travel time to the terminal	X1.1
		The total cost of the trip to the destination	X1.3
		Travel destination	X1.4
		Number of Transits	X1.5
2	Facilities (X2)	Punctuality	X2.1
		Cleanliness in the area	X2.2
		Security in the area	X2.3
		Comfort in the area	X2.4
		Parking space availability	X2.5
		Availability of service information	X2.6
3	Zone (X3)	Terminal Location	X3.1
		Travel distance	X3.2
		Easy access to terminal	X3.3
		Availability of public transportation	X3.4
4	User Satisfaction (Y1)	Service received	Y1.1
		The existence of the terminal reduces congestion	Y1.2
		Terminal is well managed	Y1.3
		Public transportation makes arriving at the destination faster	Y1.4
		Choosing public transportation	Y1.5
		Route selection makes it easy	Y1.7
		The terminal provides easy access to vehicles	Y1.8
		Terminal service information can be obtained easily	Y1.9
5	User Perception (Y2)	Need a new bus terminal	Y2.1
		Requires a bus terminal in every district	Y2.2
		The terminal to be built has good public transportation access	Y2.3
		The terminal to be built has security and convenience	Y2.4
		The terminal to be built has sufficient parking space	Y2.5
		The terminal to be built has varied travel routes	Y2.6

The research hypothesis was tested using a Structural Equation Model (SEM) approach based on Partial Least Square (PLS). PLS is a component or variance based structural equation model (SEM). Structural Equation Model (SEM) is a field of statistical study that can test a series of relationships that are relatively difficult to measure simultaneously. SEM is a multivariate analysis technique which is a combination of factor analysis and regression analysis (correlation), which aims to test the relationship between variables that exist in a model, both between indicators and their constructs, or relationships between constructs (Santoso 2014).

Outer Model

The outer model is often also called (outer relation or measurement model) which defines how each indicator block relates to its latent variable. This analysis is carried out to ensure that the measurement used is feasible to be used as a measurement (valid and reliable).

a. Convergent validity

Convergent validity testing of each construct indicator calculated by PLS (Partial Least Square). According to Ghozali (2014), an indicator is said to have good validity if it is greater than > 0.70, while the loading factor value of 0.50 to 0.60 is considered sufficient.

b. Discriminant validity

Discriminant validity testing, reflective indicators can be assessed based on crossloading between indicators and their constructs. An indicator is declared valid if it has the highest loading factor value to the target construct compared to the loading factor to other constructs, then the latent construct predicts the size of their block better than the size of the other blocks.

c. Average Variance Extracted (AVE)

Another method to assess discriminant validity is to compare the square root of average variance extracted (AVE) of each construct with the correlation between the construct and other constructs in the model. Assessing the validity of a construct by assessing the AVE of each construct whose value is greater than 0.05.

d. Composite reliability

Composite reliability testing aims to test the reliability of the instrument in a research model. The construct is declared to have good reliability or the questionnaire used as a research tool is consistent, if the

composite reliability and Cronbach alpha values of all variables are 0.70.

Inner Models

Inner models (inner relations, structural models and substantive theory) describe the relationship between latent variables based on substantive theory.

a. R-square value (R2)

Look at the R-square value which is the goodness-fit model test. The results of R2 of 0.67, 0.33 and 0.19 for endogenous latent variables in the structural model indicate that the model is "strong", "moderate" and "weak". The R2 test was carried out to explain the variance of the dependent variable (Hair et al., 2011).

b. Predictive relevance (Q2)

This test is carried out to assess the model that must be able to predict each indicator on latent endogenous variables measured from the Q2 value using the blindfolding method (Hair et al., 2019). If the value of Q2 is greater than 0 then the research model has predictive relevance. The magnitude of Q2 has a value range of 0 < Q2 <1, where the closer to 1 means the better the model. The quantity of Q2 is equivalent to the coefficient of total determination in path analysis.

c. f2 (effect size)

The f2 (effect size) test is also carried out to evaluate changes in the value of R2 when certain predictor constructs are removed from the model and specially to find out how much influence the omitted construct has on endogenous constructs. Hair Jr, et al (2019) categorized the level of influence into 4, namely 0.35 (Large), 0.15 (Medium), 0.02 (Small) and <0.02 (None).

Hypothesis Test

According to Ringle, Sarstedt, Mitchell, and Gudergan (2018), to test hypotheses in research using PLS-SEM, researchers can do this by comparing the p-values in path analysis between variables (path analysis) or path coefficients.) where the value is obtained by bootstrapping method.

The significance level is set at 0.05 (p-values <0.05; = 5%) so that the criteria for testing the hypothesis in this study are:

a. The research hypothesis is supported if the T-table or t-value > 1.96 and the p-values are less than 0.05 (p-values < 0.05).

b. The research hypothesis is not supported if the T-table or t-value < 1.96 and the p-values are more than 0.05 (p-values > 0.05).

RESULT

Characteristics of Respondent Description

The characteristics of this respondent are used to determine the diversity of terminal users in South Tangerang City, which is mostly domiciled in Pondok Aren (29%), with productive age 20-50 years (82.5%), male users are more (59%), level of education D3-S1 (74%), income 3-5 million (58%), expenditure 1-3 million (62.5%), the largest vehicle ownership is motorbike (78%), travel destination for work (68%) as for user perception terminal related to the location where the terminal will be built, namely Pondok Aren district (35%).

Outer Model Evaluation

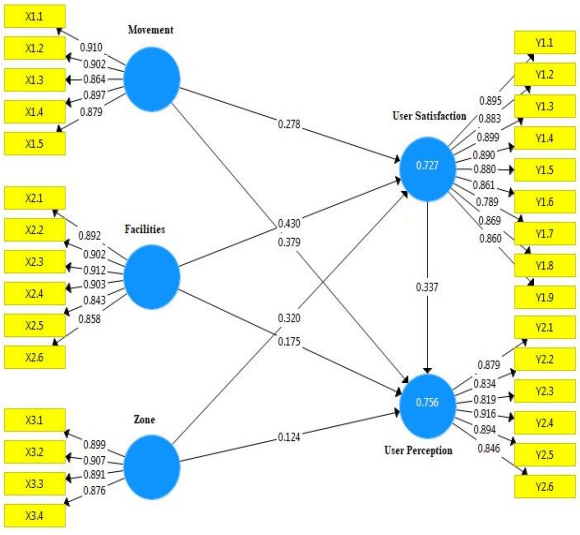

Figure 3. PLS Model Outer Diagram

Convergent Validity Test

Ghozali and Latan (2015) said "Convergent Validity Testing of each construct indicator, an indicator is said to be valid if the value is greater than 0.7". these are the outer loadings values for each construct indicator:

Table 2. Convergent Validity Test Results

Variable	Code	*Outer Loadings*	Result
Movement (X1)	X1.1	0.910	Valid
	X1.2	0.902	Valid
	X1.3	0.864	Valid
	X1.4	0.897	Valid
	X1.5	0.879	Valid
Facilities (X2)	X2.1	0.892	Valid
	X2.2	0.902	Valid
	X2.3	0.912	Valid
	X2.4	0.903	Valid
	X2.5	0.843	Valid
	X2.6	0.858	Valid
Zone (X3)	X3.1	0.899	Valid
	X3.2	0.907	Valid
	X3.3	0.891	Valid
	X3.4	0.876	Valid
User Satisfaction (Y1)	Y1.1	0.895	Valid
	Y1.2	0.883	Valid
	Y1.3	0.899	Valid
	Y1.4	0.890	Valid
	Y1.5	0.880	Valid
	Y1.6	0.861	Valid
	Y1.7	0.789	Valid
	Y1.8	0.869	Valid
	Y1.9	0.860	Valid
User Perception (Y2)	Y2.1	0.879	Valid
	Y2.2	0.834	Valid
	Y2.3	0.819	Valid
	Y2.4	0.916	Valid
	Y2.5	0.894	Valid
	Y2.6	0.846	Valid

Average Variance Extracted (AVE) Test

Comparing the square of AVE for each construct with the correlation value between constructs in the model is another way that can be used to test discriminant validity. "The acceptable AVE value must be greater than 0.5" (Ghozali and Latan, 2015). this is the AVE value for each variable

Table 3. Avarage Variance Extracted (AVE) Test Results

Variable	(AVE)	Result
Movement (X1)	0.793	Valid
Facilities (X2)	0.784	Valid
Zone (X3)	0.798	Valid
User Satisfaction (Y1)	0.757	Valid
User Perception (Y2)	0.749	Valid

Discriminant Validity Test

"Discriminant validity can see the extent to which a construct is really different from other variables. The discriminant validity of a measurement model with reflective indicators is assessed based on the results of crossloading measurements with the construct. It is expected that each measured latent variable can be compared with indicators for other latent variables" (Ghozali and Latan, 2015).

Table 4. Discriminant Validity Test Results

	(X1)	(X2)	(X3)	(Y1)	(Y2)
X1.1	**0.91**	0.35	0.55	0.57	0.65
X1.2	**0.90**	0.39	0.53	0.59	0.66
X1.3	**0.86**	0.35	0.54	0.57	0.63
X1.4	**0.89**	0.45	0.58	0.63	0.73
X1.5	**0.87**	0.32	0.52	0.54	0.65
X2.1	0.45	**0.89**	0.47	0.64	0.59
X2.2	0.35	**0.90**	0.49	0.62	0.56
X2.3	0.37	**0.91**	0.53	0.66	0.63
X2.4	0.36	**0.90**	0.51	0.65	0.57
X2.5	0.43	**0.84**	0.52	0.67	0.58
X2.6	0.23	**0.85**	0.38	0.55	0.46
X3.1	0.55	0.42	**0.89**	0.63	0.60
X3.2	0.58	0.49	**0.90**	0.66	0.67
X3.3	0.55	0.52	**0.89**	0.65	0.61
X3.4	0.50	0.53	**0.87**	0.65	0.60
Y1.1	0.58	0.64	0.65	**0.89**	0.73
Y1.2	0.62	0.68	0.67	**0.88**	0.73
Y1.3	0.57	0.66	0.68	**0.89**	0.76
Y1.4	0.57	0.63	0.65	**0.89**	0.71
Y1.5	0.56	0.59	0.58	**0.88**	0.66
Y1.6	0.53	0.64	0.59	**0.86**	0.62
Y1.7	0.52	0.55	0.53	**0.78**	0.60
Y1.8	0.56	0.66	0.66	**0.86**	0.72
Y1.9	0.59	0.58	0.64	**0.86**	0.69
Y2.1	0.67	0.55	0.59	0.65	**0.87**
Y2.2	0.61	0.53	0.56	0.66	**0.83**
Y2.3	0.62	0.53	0.61	0.68	**0.81**
Y2.4	0.67	0.62	0.66	0.76	**0.91**
Y2.5	0.65	0.59	0.63	0.70	**0.89**
Y2.6	0.65	0.51	0.55	0.68	**0.84**

Reliability Test

"To test the reliability of the instrument in a research model, composite reliability testing is needed. If all latent variable values have a composite reliability value > 0.7 and Cronbach's alpha > 0.7, it means that the construct has good reliability or the questionnaire used as a tool in this study reliable or consistent" (Ghozali and Latan, 2015).

Table 5. Composite Reliability Test Results

Variable	*Composite Reliability*	Result
Movement (X1)	0.950	Reliable
Facilities (X2)	0.956	Reliable
Zone (X3)	0.940	Reliable
User Satisfaction (Y1)	0.966	Reliable
User Perception (Y2)	0.947	Reliable

R Square (R^2)

"To check the effect of the independent latent variable on the dependent latent variable, whether it has a substantive effect, it can be seen from the change in the R-square value. The R2 results of 0.67, 0.33 and 0.19 for endogenous latent variables in the structural model indicate that the model

has strong, medium and weak classification" (Ghozali and Latan, 2015).

Inner Model (Structural Model) Evaluation

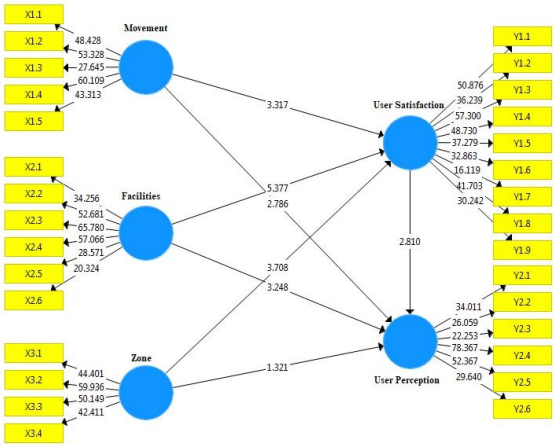

Figure 4. Inner Model Diagram (Bootstrapping)

Table 6. Value of R Square (R2)

Variable	R Square	R Square Adjusted
User Satisfaction (Y1)	0.727	0.721
User Perception (Y2)	0.756	0.750

Effect Size (F^2)

"To evaluate whether the removal of exogenous variables has a substantive impact on endogenous variables, the value of effect size (f2) can be used. F2 values of 0.02, 0.15, and 0.35 can be interpreted as whether the latent predictor variable has a small, medium, and large effect on structural level" Ghozali and Latan (2015).

Table 7. Effect Size Value (F2)

	(Y1)	(Y2)
Movement (X1)	0.173	0.306
Facilities (X2)	0.461	0.059
Zone (X3)	0.192	0.027
User Satisfaction (Y1)		0.127

Predictive Relevance (Q^2)

To validate the model can use the predictive relevance test (Q2). This measurement can be used if the endogenous latent variable has a reflective measurement model. The qualifications for the Q2 predictive relevance scores were 0.002 'weak', 0.15 'moderate' and 0.35 'strong'. The relevance predictive result (Q2) is said to be good if the value is > 0, which means the exogenous latent variable is good as an explanatory variable capable of predicting endogenous variables and vice versa if the relevance predictive result (Q2) < 0, proves that the model has no predictive relevance.

Table 8. Construct Cross-Validation Redundancy Test Results

	SSO	SSE	Q^2 (=1-SSE/SSO)
Movement (X1)	800.000	800.000	
Facilities (X2)	960.000	960.000	
Zone (X3)	640.000	640.000	
User Satisfaction (Y1)	1,440.000	706.804	**0.509**
User Perception (Y2)	960.000	457.339	**0.524**

Hypothesis Test

"In testing the research hypothesis, the t-statistics coefficient can be used. The results/output of the bootstrap command produces t-statistics values. Indicators that have a t-statistics value > 1.96 are said to be significant" (Ghozali and Latan, 2015). "An indicator can also be said to be influential if it has a p-value "<0.05 (Haryono, 2017).

Table 9. Direct Effect Hypothesis Testing

	Original Sample (O)	*Sample Mean (M)*	Stan-Dev	*T-stat*	*P-Val*
X1>Y1	0.278	0.283	0.084	3.317	0.001
X2>Y1	0.430	0.415	0.080	5.377	0.000
X3>Y1	0.320	0.325	0.086	3.708	0.000
X1>Y2	0.379	0.348	0.136	2.786	0.006
X2>Y2	0.175	0.173	0.054	3.248	0.001
X3>Y3	0.124	0.145	0.094	1.321	0.187
Y1>Y2	0.337	0.353	0.120	2.810	0.005

CONCLUSION

From the results of the analysis above, it can be concluded:

1. User satisfaction and perceptions of public transportation users are influenced directly or indirectly by the variables of movement, facilities and zones. Based on the results of the analysis, all variables are acceptable and have a positive and significant effect, only the zone variable on user perception does not have a positive and insignificant effect on the perception of public transportation users because it has a p-value of 0.187> 0.05 and a t-statistic of 1,32 < 1.87 or in other words that the perception of terminal users in South Tangerang City is not affected by the zone or location, so wherever the terminal is, if there is demand from transportation users, it

can be fulfilled.
2. The dominant variable in influencing the satisfaction of bus terminal users can be seen from the t-statistic value, the greater the value, the greater the effect. From the results of the analysis, it can be concluded that the facilities have a major effect on user satisfaction with a t-statistic value of 5.377 > 1.87 or in other words that the facilities available at the terminal greatly affect the level of satisfaction of terminal users in South Tangerang City.

SUGGESTIONS

Based on the conclusions of this study, the following suggestions can be made:
1. Academics or further research
Further research is also recommended to develop other dimensions of the indicators of Movement, Mode of Transportation Facilities and Zones, so that they can carry out a more in-depth analysis to determine the level of user satisfaction and User Perceptions of Public Transportation Bus Terminals in South Tangerang City.
2. Terminal operators
• Terminal users in South Tangerang City, if seen, the majority are of a productive age and have lower-middle income with the purpose of their journey being to work so that the routes for these workers can be developed so that there are more terminal users in South Tangerang City.
• The users of this terminal also have private vehicles, the majority of which are motorbikes, so parking can also be developed for these motorbike users so that terminal users feel more comfortable when leaving their vehicles at the terminal.
• The facility variable seems to be very influential in user satisfaction. This can be used as a consideration for terminal operators to be able to maintain and also develop existing facilities in the terminal so that the level of user satisfaction can be maintained.
3. Government
• With this research terminal development plan, it can be used as a reference, the majority of terminal users are in Pondok Aren District and also the user's perception of the next terminal development being in Pondok Aren District can be used as an option for determining the next location. But this needs to be studied first in depth so that later it can be made the right and accurate decision.
• Judging from the conclusion data, the majority of terminal users are private vehicle owners with the majority being motorcycle owners. With the strategic plan for the development and improvement of public transportation-based transportation facilities, public transportation routes to the terminal can be expanded so that terminal users no longer need to bring their personal vehicles to the terminal.

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