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THE EFFECT OF WALKABILITY, ACCESSIBILITY, AND CONNECTIVITY TOWARDS PASSENGER'S SATISFACTION: A STUDY OF TRANSJAKARTA TRANSPORT SYSTEM AND ITS SUPPORTING PEDESTRIAN FACILITIES

M Atallariq[1*], Finza Fatchi Al Banna[2], Aang Gunawan[3], Yolla Ayuntia[4]
[1,2,3,4] Institut Transportasi dan Logisik Trisakti, Jakarta, Indonesia
[*]Corresponding author: Atallariq21@gmail.com

Abstract. The main objective of Transjakarta is to be a solution to reduce congestion with fast transportation services for everyone. This study measured the walkability, accessibility, and connectivity of Transjakarta and its surrounding pedestrian facility effect on passenger's satisfaction. Walkability is basically how walker-friendly a facility is. Moreover, accessibility can be divided into two, namely passenger's access to the bus stop and access to various destinations. Also, connectivity is the ease of transit to other public transport services. This study took samples from Transjakarta passengers from corridor 1 (Blok M – Kota) with a non-probability technique which each population had the same opportunity to be chosen. The purpose of this study is to measure the effect of the aforementioned variables to the passenger's satisfaction so that the service can continue to grow in order to maintain its ridership.

Keyword: Transjakarta, Walkability, Accessibility, Connectivity, Passenger's Satisfaction

1. Introduction

Jakarta ranks at the 10th most congested city in the world according to annual traffic index of tomtom.com. One of the main contributors to the congestion is the staggeringly high number of private vehicles roaming the street every day, especially at weekday's rush-hour at approximately 16:00 – 19:00 p.m. when people are in a rush to get home from work, school, institution, etc. There are about 15 million of private vehicles consisting of motorcycles and private passenger cars in Jakarta with the average of 5.3% annual growth (databoks.kadata.co.id). In fact, Transjakarta was originally intended to combat traffic congestion by becoming the choice of transport modes for Jakarta citizens. However, with the continuous and steady growth of private vehicle ownership which contributes heavily to traffic congestion, it has inflicted some concerns in regards to how well the Transjakarta system is. As the first revolutionary rapid transit system in Indonesia, it has to satisfy the passengers in order to maintain its ridership. Passenger's satisfaction is based on customer's satisfaction theory that is applied to the context of transport service users which influence the loyalty and behavior towards a certain public transport system. There have been many studies concerning the effect of service quality to the passenger's satisfaction. Nonetheless, the more technical aspects surrounding the service, such as walkability, accessibility, and connectivity have not garnered much attention in terms of its effect on passenger's satisfaction. Walkability can be defined as how walker-friendly a pedestrian facility or infrastructure is to the pedestrians which directly influence the accessibility to reach certain places or, in this case, a public transport transit terminal. Accessibility refers to two perspectives. First, it is the ease of access related to the proximity of the transit terminal, and the second one refers to the number of activities that can be attained by the transport system. After getting off from Transjakarta, some passengers might need another mode of transportation to reach their destination more efficiently. Therefore, connectivity to other modes of transport can be a crucial decision to some people in

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order to get to their preferred destination that, otherwise, cannot be reached by Transjakarta. In actual practice, if the transport service is both accessible and have good connectivity, the passengers' life will be easier. As a result, they are more likely to repeat using the service. Therefore, achieving its goal to alleviate traffic congestion by decreasing the number of active private vehicles on the street is essential. This research aims at measuring the effect of walkability, accessibility, and connectivity of Transjakarta system and its surrounding pedestrian facilities. It is expected that this research will provide relevant data to assist city planners, local government, and PT. Transjakarta to improve the service and maintain its ridership.

Walkability

Walkability can be linked to the quality of built environment, the urban form and connectivity, safety and desirability to walk and accessibility of infrastructure (Gota et al. 2010). Walking is the most universal method of transport and can connect a person to various transportations (Litman 2018). (Saelens and Handy 2008) note the importance of walkable environment to support accessibility of a transport system and (Gota et al. 2010) also state the importance of walkablity to public transport transit terminals while criticizing some cities (Jakarta is included with low walkability score in the transport terminal segment of his research).

Accessibility

"The extent to which land-use and transport systems enable (groups of) individuals to reach activities or destinations by means of a (combination of) transport mode(s)" (Geurs and Ritsema van Eck 2001)—it is a popular and well-used definition of accessibility for transportation system in general. More specificaly, accessibility refers to two things. The first one is how well the the transport system accessibility is providing access to different activities or opportunities (Mavoa et al. 2012). The second one is the access time or distance of a terminal or stop (Murray 2001), and the latter is directly influenced by the walkability of the surrounding facilities or environment (Saelens and Handy 2008). (Woldeamanuel and Cyganski 2011) has proved that proximity of the transit terminals and the accessibility of activites does have a positive impact on passenger's satisfaction.

Connectivity

Wilbur Smith Associates et al. define service connectivity as a customer's ease of transferring from one PT system to another. (Ceder and Teh 2010) measure good connectivity with how convenient and seamless public transport system reduce travel times, provide more reliable connections, and ensure that transfers are easy and safe. (Systems and Vuchic 2007) contend that intermodal transportation are often necessary, (Hadas and Ranjitkar 2012) argue that seamless connectivity helps expand the performance of intermodal system. Furthermore, (Wardman et al., 2001) explain that inconvenient transfer can reduce the passenger's satisfaction and (Ceder, Le Net, and Coriat 2009) explicate that poor connectivity may stop the passenger from repeating their use of the transport service.

Passenger's Satisfaction

Passenger's satisfaction stems from customer's satisfaction theory in the context of transport service, and it is a kind of psychological state which originates from the

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contrast between the passenger's expectation and perception of the transport service. (Zhang et al. 2019). (Rahim, 2017) through the findings in his research concludes that the passenger's satisfaction does extend to the passenger's loyalty, and according to (An and Noh 2009), satisfaction is essential to obtain loyalty from the passenger.

2. Method

The study used quantitative research, and the data was all collected from Transjakarta service users from corridor 1 (Blok M – Kota). The sample size was determined using Slovin's (1960)(Pereira 2015), the formula is as follows : $n = \frac{N}{1+Ne^2}$ from total population of 7.711.370 Transjakarta corridor 1 passengers (Passengers in October-December in 2019). A sample of 100 respondents was taken with a probability sampling which, according to (Sugiono 2017), probability sampling is a sampling technique that provides equal opportunities for each member of the poplutaion. The sampling technique used simple random sampling. According to (Sugiono 2017), simple random sampling technique is a technique of taking samples from members of participation conducted randomly without taking into account the strata that exist in that population. The research instrument was a questionnaire which was, then, distributed directly to the samples, and the Likert scale was used to obtain the passengers' perception.

3. Discussion and Result

Validity Test

Validity, according to (Sugiono 2017), is valid reseach results if there is a similarity between the data that was collected and the data that actually occurs on the objects under study. Each validity test must have a basis for making conlusions. In this validity test, the basis for decision-making is as follows:

a. If the R value is more than the R table, it can be concluded that the instrument is valid.
b. If R value is less than the R table, it can be inferred that the instrument is invalid.

Table 1. Walkability Validity

No.	Statement	R Table	R Value	Validity
1	Walkbility1	0,1966	0,666	Valid
2	Walkability2	0,1966	0,729	Valid
3	Walkability3	0,1966	0,758	Valid
4	Walkability4	0,1966	0,657	Valid
5	Walkability5	0,1966	0,525	Valid
6	Walkability6	0,1966	0,689	Valid
7	Walkability7	0,1966	0,773	Valid
8	Walkability8	0,1966	0,646	Valid

Source : SPSS 21 processing result

Table 2. Accessibility Validity

No.	Statement	R Table	R Value	Validity
1	Accessibility1	0,1966	0,492	Valid
2	Accessibility2	0,1966	0,589	Valid

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3	Accessibility3	0,1966	0,766	Valid
4	Accessibility4	0,1966	0,746	Valid
5	Accessibility5	0,1966	0,738	Valid
6	Accessibility6	0,1966	0,663	Valid
7	Accessibility7	0,1966	0,657	Valid
8	Accessibility8	0,1966	0,674	Valid
9	Accessibility9	0,1966	0,68	Valid

Source : SPSS 21 processing result

Table 3. Connectivity Validity

No.	Statement	R Table	R Value	Validity
1	Connectivity1	0,1966	0,754	Valid
2	Connectivity2	0,1966	0,789	Valid
3	Connectivity3	0,1966	0,523	Valid
4	Connectivity4	0,1966	0,502	Valid
5	Connectivity5	0,1966	0,715	Valid
6	Connectivity6	0,1966	0,807	Valid
7	Connectivity7	0,1966	0,816	Valid
8	Connectivity8	0,1966	0,831	Valid

Source : SPSS 21 processing result

Table 4. Passenger's Satisfaction Validity

No	Statement	R Table	R Value	Validity
1	PS1	0,1966	0,775	Valid
2	PS2	0,1966	0,790	Valid
3	PS3	0,1966	0,817	Valid
4	PS4	0,1966	0,831	Valid

Source : SPSS 21 processing result

Table 1, table 2, table 3 and table 4 show that all items become variables of each valid variable because R value is more than.the R table. Therefore, each item in the questionnaire is valid and can be used in this study.

Reliability

(Lubs, Salim, and Jefi 2020) argue that reliability test is used to obtain valid and reliable research results and is used to measure many times to produce the same data (consistency). In making reliability test decisions, the conditions are as follows:

a. If the Cronbach's Alpha value is above 0,60, the qustionnaire items can be conluded to be reliable or consistent.
b. If the Cronbach's Alpha value is below 0,60, the questionnaire items can be inferred to be unreliable or inconsistent.

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Tabel 5. Variabel X and Y Reliability Test

No.	Variabel	Cronbach's Alpha	R Table	Reliability
1	Walkability	0,836	0,60	Reliable
2	Accessibility	0,838	0,60	Reliable
3	Connectivity	0,868	0,60	Reliable
4	Passenger Satisfaction	0,814	0,60	Reliable

Source : SPSS 21 processing result

Table 5 presents that the Cronbach's Alpha value of all variables are above 0,60, it can be concluded that all variables are reliable or consistent.

Linear Regression Model

Tabe 6. Cofficient of Determination
Model Summary

Model	R	RSquare	Adjusted RSquare	Std. Error of the Estimate
1	,639[a]	,408	,389	2,021

a. Predictors: (Constant), Connectivity, Accessibility, Walkability

b. Dependent Variable: Passenger's Satifaction

In table 6, R Square is of 0.408, which means that the connectivity, accessibility and walkability variables affect passenger's satisfaction by 40.8%; whereas, 59.2% other variables that influence in this study are not discussed.

Tabel 7. F Test (simultaneous test)
ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	270,234	3	90,078	22,048	,000[b]
	Residual	392,206	96	4,085		
	Total	662,440	99			

a. Dependent Variable: Passenger's Satisfaction
b. Predictors: (Constant), Connectivity, Accessibility, Walkability

Based on table 7, the calculated F value is of 22,048 and the significance value is of 0.000. Since the significance value is smaller than 0.005, it can be concluded that walkability, accessibility, and connectivity have a significant influence simultaneously on the passenger's satisfaction.

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Tabel 8. Coefficient

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	4,081	1,595		2,558	,012
	Walkability (X1)	,150	,061	,277	2,472	,015
	Accessibility (X2)	,129	,057	,249	2,263	,026
	Connectivity (X3)	,104	,063	,203	1,660	,100

a. Dependent Variable: Passenger Satisfaction (Y)

Table 8 indicates the results of the regression equation with the formula of Y = 4.081 + 0.150X1 + 0.129X2 + 0.104X3. In this equation, the constant value is 4.081. Meanwhile, the coefficient X1 of 0.150 states that each additional 1% level of walkability (X1) will increase passenger's satisfaction (Y) of 0.150. The coefficient X2 of 0.129 states that each addition of 1% level of accessibility (X2) will increase passenger's satisfaction by 0.129. The coefficient X3 of 0.104 states that each additional 1% level of connectivity (X3) will increase passenger's satisfaction by 0.104.

It is identified that the value of the significance of the effect of walkability on customer's satifaction is 0,015 which is less than 0,05, and t value is of 2,472 which is more than t table of 1,984. Hence, it can be stated that walkability has a partially significant effect on customer's satifaction. Then, the significant value of accessibility on customer's satifaction is 0,026 smaller than 0,05, and the t value is of 2,263 which is above t table of 1,984. Thus, it can be stated that accessibility has a significant effect on Y. Lastly, the significant value for the effect of X3 on Y is 0,100 greater than 0,05, and t value is of 1,660 below t table of 1,984. Therefore, it can be stated that X3 has no significant effect on Y

4. Conclusion

Based on the results and data analysis, it can be concluded that the effect of walkability, accessibility, and connectivity on Transjakarta passenger's satisfaction is as follows:

a. From the result of multiple regression tests in table 6, R square is 0.408. It states that walkability, accessibility, and connectivity have an effect of 40.8% and 59.2% influenced by other factors.
b. Based on the results from table 7, a significant value is of 0,000 <0.005, which means that walkability, accessibility and connectivity altogether affect passenger's satisfaction.
c. The result of the regression equation is Y = 4.081 + 0.150X1 + 0.129X2 + 0.104X3 which can be concluded that each unit in variable X1 (walkability) to Y (passenger's satisfaction) will increase by 0.150. Then, each unit in variable X2 (accessibility) to Y (passenger's satisfaction) will increase by 0.129. At last, each unit in variable X3 (Connectivity) to Y (passenger's satisfaction) will increase by 0.104

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d. The results of the hypothesis test are that t value of X1 is above t table, t value of X2 is above t table, and t value of X3 is below t table. Hence, X1 (walkability) has a significant effect on Y (passenger's satisfaction), X2 (accessibility) has a significant impact on Y (passenger's satisfaction), X3 (connectivity) has no significant influence on Y (passenger's satisfaction). 2

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