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Influence of Community Characteristics and Perception Against the Comfort Level of the Bike Path Sudirman Street, DKI Jakarta

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Abstract

The bicycle mode of transportation is an environmentally friendly vehicle, does not cause air pollution and supports sustainable development. Cycling is the second best mode of transportation after buses which will become a fashion in the future. Cities where bicycle infrastructure is added will increase bicycle users by 48 percent, and when compared to other cities that do not add bicycle lanes, this is already greater. In this study, multiple regression analysis was used to show the influence of characteristics as well as people's perceptions of the convenience of the bicycle lane on Jalan Sudirman, DKI Jakarta. The results showed that there was an influence of public perception on the level of comfort of the bicycle lane. The bicycle mode of transportation being the most inclusive and sustainable is the easiest and cheapest.

Keywords
Bicycle; environmentally friendly; sustainable development

I. Introduction

Communities, especially in urban areas, are faced with choices in using bicycle transportation modes. In general, cycling is considered healthy and has a positive impact on reducing traffic congestion and is environmentally friendly, on the other hand, it must pay attention to the comfort of cycling to reduce the risk of accidents. In fact, from a health perspective, cycling is very beneficial (Pucher et al., 2010). Cycling comfort and safety must be considered for the wider community. "safety in general" for cyclists (Jacobsen, 2003), the city is becoming more focused on increasing the convenience of cycling transportation modes.

Transportation is needed to accommodate the movement of people from origin to destination using either intermodal or multimodal transport (Jones et.al, 2000) which can provide comfort, safety, security and affordable prices. Common transportation problems are traffic jams and environmental problems (air and noise pollution). This phenomenon is often found in developing countries such as Indonesia, which has the capital city DKI Jakarta. As a result, the quality of non-motorized transportation (NMT) such as cycling has decreased.

Cycling transportation is now increasingly recognized by the Organization for Economic Co-operation and Development (OECD) as an important part of urban mobility, because cycling does not use fuel, is beneficial for health and reduces traffic congestion (OECD, 2013). By using a bicycle, transportation will provide health, social and environmental benefits (cycling to and from places) (Oja et al., 2011, Rojas-Rueda et al., 2011).

The Ministry of Transportation has issued Regulation of the Minister of Transportation Number 59 of 2020 regarding Cycling Safety on the Road. This regulation is a technical reference for local governments in implementing rules that regulate bicycle users in their activities on the highway. In addition, the facilities and utilization of bicycle lanes are also regulated in realizing the safety and comfort of cyclists on the road. There are several things that are regulated in the technical requirements, such as cycling procedures, and supporting facilities. Organizers of public facilities must pay attention to supporting facilities in the paths traversed by bicycles on city roads, such as road nodes, government and commercial buildings, schools, and other crowded places.

Apart from safety there are other reasons why riding a bicycle would benefit society (Aldred, Elliott, Woodcock, and Goodman, 2017). With GPS route selection data to confirm that preferences for highways differ depending on age and gender. For cities that want to improve bicycle comfort and facilities, it is important to identify preferences and perceptions between individuals, (Mistra and Watkins, 2018). Seeing the potential to evaluate to make it more appropriate for increasing bicycle users to build infrastructure with certain characteristics. In addition, today's cyclists have a perception of the level of comfort according to the different individual preferences of a given population. The cyclist community has a perception that is in accordance with the sociodemographic (including age, gender,

A crucial transportation problem in Jakarta is how to provide mobility services for all segments of society. One approach to this problem is to develop non-motorized such as bicycles as the main mode of use for low-income people. NMT here may include walking, cycling and some types of paratransit. These modes play an important role in an efficient transportation system. Walking is a basic human activity to provide basic mobility and serve many other functions. And cycling provides connections between modes, destinations and activities. Therefore, increasing this mode will also increase access by other modes. For short distances, NMT is the most efficient means of mobility, while for longer distances public transport or cars offer greater efficiency. Unfortunately, during the period of rapid motorization up to several years ago, there were no studies and policies that recognized the existence of NMT as part of the transportation system in Jakarta. Due to the lack of information regarding the potential use of NMT, there are several transportation studies that recommend facilitating the use of this mode (Rahmah, 2007).

An important effect of this chain of consequences is mobility inequality, where the gap between those who have and those who do not have access to private motorized vehicles is widening in terms of access to opportunities, safety, time efficiency and value for money. Previous studies on mobility inequality have identified that differences in mobility, or the ability to move, are both a manifestation of and a contributor to socio-economic inequality. Mobility serves as a means to access opportunities, thus, lack of mobility can reduce access to key functions. Differences in mobility are strongly associated with socioeconomic attributes such as income, gender, age, or migrant status. In Jakarta, a typical Southeast Asian city, the impact of mobility inequality is most likely related to marginalized groups and the urban poor, as around sixty percent of Jakarta residents with incomes of less than IDR 1,000,000, or around $70 per month, have no other choice apart from walking.

Mobility inequality is related to spatial patterns and structures in three different nuances: as a transport cost of a function of distance, as a mobility barrier for certain groups in a highly spatially separated city where low-income and minority neighborhoods

are not served by transport services, as a factor people who depend on cars and make bicycles the main alternative.

Patterns and structures are irreversible products of long-term interactions between transport-land use policies and societal processes, an understanding of which past policies depend can provide insights such as emerging mobility inequality. This understanding, however, is often described from an institutional perspective, and is rarely supported by spatial evidence. The absence of spatial evidence makes it difficult to visualize the influence of previous policies on current socio-spatial conditions, or to formulate future prognoses, which are considered important for urban and transport planning practices.

This paper aims to understand the urban transformation of Jabodetabek (hereinafter Jakarta) to identify indications of vehicle-oriented development as a manifestation of mobility inequality. Jakarta was chosen as a case study because it represents the rapid urbanization of Southeast Asian cities, including a high level of motorization, which as a result can lead to severe mobility effects. inequality, especially for marginalized groups. This paper uses a multi-method approach including (a) historical literature review to understand Jakarta's urban narrative, (b) computational analysis of Jakarta's road network over three periods (1940, 1959, and 2018), using spatial syntax to gain insight into Jakarta's spatial transformations.

II. Research Method

The data for this study comes from a survey of current and potential cyclists living in six urban communities in DKI Jakarta in the Jalan Jenderal Sudirman corridor. This study aims to assess the preferences of various types of bicycle facilities and the impact of these types on cycling comfort.

2.1 Survey Design

The survey was designed through a data collection process, data processing using multiple regression analysis in order to see the influence of characteristics and public perceptions on the comfort of bicycle lanes. To reduce the potential for response and non-response bias, the survey content was intentionally broadened beyond just cycling, to help ensure that participants remained interested and did not stray from the theme of the cycling comfort survey. As far as practical, questions were reused from previous surveys (Circella, Fulton, Alemi, Berliner, Tiedeman, & Mokhtarian, 2016; Neufeld & Mokhtarian, 2012), both to rely on previously tested and checked questions and to maximize opportunities for cross-questioning, compare results.

The primary method for measuring perceptions and preferences in this survey is the presentation of manipulated images created in Adobe Photoshop, as described in Clark et al. (2019). One common street setting was selected as the base image to control for the urban environment, weather, and other contextual variables. The images are designed in such a way that the background scenery can be recognized by urban residents as an inner city environment and by rural residents as a small urban environment. Each scenario exhibits moderate car traffic allowing near-free flow conditions along with a reasonable number of opportunities for automated cyclist interaction. Variations are made based on the different types of bicycle infrastructure, the presence or absence of on-street parking, and the number of car lanes.

Sixteen drawings of infrastructure on the road were prepared. For each of the four basic lane configurations (two lanes with parking, two lanes without parking, four lanes with parking, four lanes without parking) an image was prepared with each type of bicycle facility, including sharrow, bicycle lane, buffer bicycle lane, and lane barrier-protected bicycle lanes (also known as separate bicycle lanes or bicycle lanes). The two protected bicycle lanes are one-way, while the other two are two-way. Multi-purpose trails are also created, although due to the nature of this type of infrastructure, different road environments must be used.

III. Results and Discussion

3.1 Data Description

This study uses primary data from respondents who use bicycles or who have used bicycles in DKI Jakarta. The data was obtained through a questionnaire (questionnaire) which was distributed to the respondents through the google form platform. Data were obtained from respondents who were cyclists on holidays in the Sudirman area of DKI Jakarta. General description of the results of data processing using SPSS version 28.0 as shown in the following table:

Table 1. General Description of Research Data

	N	Minimum	Maximum	Mean		Std. Deviation	Variance
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic
Usia (Xa)	29	1	6	3.86	.339	1.827	3.337
Pendidikan (Xb)	29	1	3	2.38	.135	.728	.530
Domisi (Xc)	29	0	1	.69	.087	.471	.222
Pekerjaan (Xd)	29	1	3	1.62	.152	.820	.672
Persepsi (X2)	29	1	3	1.97	.136	.731	.534
Kenyamanan (Y)	29	1	3	1.66	.134	.721	.520
Valid N (listwise)	29						

Source:SPSS 28.0 (2021) Outputs

In Table 1. shown that in general, there is a fairly high variation in each variable data. The variability is mainly in the mean and standard deviation. The existence of these variations is due to differences in the value of each variable which is influenced by the measurement indicators used.

The number of respondents in the study had 29 respondents from a total population of 190 people according to the sampling technique in the previous section. The number of samples is 15.26% of the population.

3.2 Data Validity and Reliability Test

a. Data Validity Test

The next stage that must be done is to test the validity of the data to ensure that each processed data unit is valid. The results of the calculation of the validity of the data using SPSS version 28.0 are:

Table 2. Data Validity Test Output

Correlations

		Usia (Xa)	Pendidikan (Xb)	Domisi (Xc)	Pekerjaan (Xd)	Persepsi (X2)	Kenyamanan (Y)	Karakteristik (X1)
Usia (Xa)	Pearson Correlation	1	.578**	-.135	.274	-.111	-.173	.184
	Sig. (2-tailed)		.001	.486	.151	.568	.369	.339
	N	29	29	29	29	29	29	29
Pendidikan (Xb)	Pearson Correlation	.578**	1	-.270	.010	-.109	-.150	.117
	Sig. (2-tailed)	.001		.157	.958	.574	.437	.546
	N	29	29	29	29	29	29	29
Domisi (Xc)	Pearson Correlation	-.135	-.270	1	.054	-.136	-.011	-.051
	Sig. (2-tailed)	.486	.157		.780	.482	.955	.792
	N	29	29	29	29	29	29	29
Pekerjaan (Xd)	Pearson Correlation	.274	.010	.054	1	.097	-.048	.506**
	Sig. (2-tailed)	.151	.958	.780		.618	.805	.005
	N	29	29	29	29	29	29	29
Persepsi (X2)	Pearson Correlation	-.111	-.109	-.136	.097	1	.722**	-.109
	Sig. (2-tailed)	.568	.574	.482	.618		<.001	.575
	N	29	29	29	29	29	29	29
Kenyamanan (Y)	Pearson Correlation	-.173	-.150	-.011	-.048	.722**	1	-.302
	Sig. (2-tailed)	.369	.437	.955	.805	<.001		.112
	N	29	29	29	29	29	29	29
Karakteristik (X1)	Pearson Correlation	.184	.117	-.051	.506**	-.109	-.302	1
	Sig. (2-tailed)	.339	.546	.792	.005	.575	.112	
	N	29	29	29	29	29	29	29

**. Correlation is significant at the 0.01 level (2-tailed).

Source:SPSS 28.0 (2021) Outputs

The r-table value for the significance level of 0.01 and n as much as 29 is 0.3550. Based on Table 4.2 above, it can be seen that the r-count value for each variable is greater than the r-table value. For this reason, it can be concluded that the data used in this study are valid.

b. Data Reliability Test

Data reliability is a test of complete and accurate data, and is an important foundation for building data trust. Ensuring data reliability is a key goal of data integrity initiatives, which are also used to maintain data security, data quality, and compliance with regulations in the field.

According to Ghozali, (2009), he explained that reliability is a questionnaire measuring instrument which is an indicator of the construct. Questionnaires can be reliable or reliable if they have a fixed answer to the same question and are stable over time. The reliability of the test looks at the degree of stability, consistency, predictability, and accuracy. Measurements with high reliability are measurements with reliable data results. An alpha value > 0.7 means sufficient reliability, an alpha > 0.80 indicates that all items are reliable, and all tests are consistently strong.

Table 3. Data Reliability Test Output

Reliability Statistics

Case Processing Summary

		N	%
Cases	Valid	29	96.7
	Excluded[a]	1	3.3
	Total	30	100.0

a. Listwise deletion based on all variables in the procedure.

Cronbach`s Alpha	N of Items
.91	7

Source:SPSS 28.0 (2021) Outputs

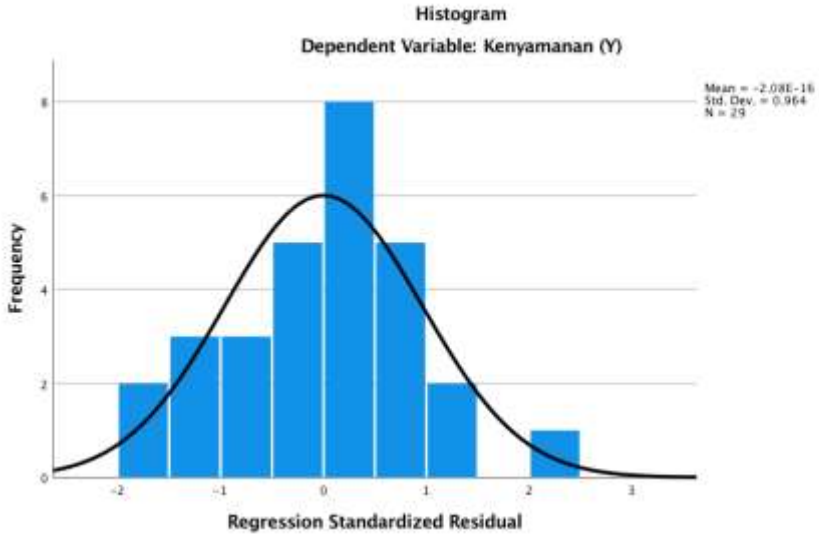
The results of the data reliability test show the Cronbach's alpha value of 0.91. From the test criteria, the alpha value is greater than 0.70 so it can be seen from the data that is reliable or reliable.

3.3. Classic assumption test

The next testing stage is the classical assumption test, which can be of four types of tests, namely the data normality test, heteroscedasticity test, multikolinearity test and autocorrelation test. Each type of test is described as below:

a. Normality Test

The normality test is used to see if the data set is well modeled by a normal distribution and calculates how likely the random variables from the data set are normally distributed. The normality test is used to find data that is normally distributed from a normal population.



Source:SPSS 28.0 (2021) Outputs

***Figure 1**. Data Normality Test Output*

Based on the results of data processing using SPSS version 28.0 as shown in Figure 1 above, it can be concluded that the data are normally distributed. This is evidenced by the distribution of data which is entirely under the bell curve and there are no outliers in the data.

b. Heteroscedasticity Test

The concept of heteroscedasticity testing - the inverse of homoscedasticity is used in statistics, such as linear regression in time series analysis, in order to explain the case that the variance of the model error is not the same in the observations made, although the basic assumption in modeling is that the variance is homogeneous and the model error is distributed uniformly. identical.

In the test, it is calculated through the correlation of the absolute value of the residual on the independent variables, with the test criteria, namely:

If the significance value (sig) is greater than 0.05, there is no symptom of heteroscedasticity in the regression model.

If the significance value (sig) is less than 0.05, there is no symptom of heteroscedasticity in the regression model.

Table 4. Heteroscedasticity Test Output

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.105	.535		3.935	<.001
	Karakteristik (X1)	-.002	.001	-.251	-1.325	.197
	Persepsi (X2)	-.182	.234	-.147	-.778	.444

a. Dependent Variable: Abs_Res

*Source:*SPSS 28.0 (2021) Outputs

Based on the test results with the Glejser method, Table 4.4. above shows that the significance value for the two independent variables is 0.197 for X1 and 0.444 for X2, respectively, which is greater than the 0.05 threshold. Thus, it can be concluded that there is no heteroscedasticity symptom in the regression model.

c. Multicollinearity Test

Multicollinearity is a situation where there is a close relationship between two or more independent variables in the multiple linear regression model. Table 4.5. Multicollinearity Test Output

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	.469	.292		1.609	.120		
	Karakteristik (X1)	-.001	.001	-.226	-1.749	.092	.988	1.012
	Persepsi (X2)	.688	.127	.697	5.402	<.001	.988	1.012

a. Dependent Variable: Kenyamanan (Y)

Source:SPSS 28.0 (2021) Outputs

If the VIF value is less than 10 and in other words the Tolerance value is more than 0.01, it can be concluded firmly that there is no multicollinearity problem. Table 4.5 shows that the VIF value for the two independent variables is 1.012 and the Tolerance value is 0.988. That way it can be said that there is no multicollinearity problem in the regression equation.

d. Autocorrelation Test

Autocorrelation test is intended to be able to see the correlation of variables in the prediction model related to changes in time. The autocorrelation test in this study used the Durbin-Watson method. The Durbin Watson test can make the Durbin Watson (DW) value which in the end can be compared with two (2) Durbin Watson Table values, namely Durbin Upper (DU) and Durbin Lower DL).

Table 5. Autocorrelation Test Output

Model Summary[b]

Model	Durbin-Watson
1	1.813[a]

a. Predictors: (Constant), Perception (X2), Characteristics (X1)a
b. Dependent Variable: Convenience (Y)b
Source:SPSS 28.0 (2021) Outputs

It is stated that there is no autocorrelation if the value of DW > DU and (4-DW) > DU or can be written as: (4-DW) > DU < DW. Durbin-Watson autocorrelation test, carried out with the following conditions:

If the DW number is below -2, it means that there is a positive autocorrelation
If the number D – W is between -2 to 2, it means that there is no autocorrelation
If D – W is above 2, it means that there is a negative autocorrelation

For n = 29 and k = 3 in the Durbin-Watson table, the values of dL = 1.197 and dU = 1.649 are obtained. Table 4.6 above shows that the result of the Durbin-Watson calculation is 1.813, which means it is between the values of -2 and 2. Thus, it can be said that there is no autocorrelation problem in the regression equation.

3.4. Model Interpretation

The analytical method used in this research is multiple linear regression of two independent variables and one dependent variable. Each independent variable is Community Characteristics (X1) and Community Perception (X2). The dependent variable in this study is the level of comfort (Y) of cyclists on the bicycle lane on Jalan Sudirman, DKI Jakarta.

Table 6. Output Regression Equation Model

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients			90.0% Confidence Interval for B		Correlations		
		B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound	Zero-order	Partial	Part
1	(Constant)	.469	.292		1.609	.120	-.028	.967			
	Karakteristik (X1)	-.001	.001	-.226	-1.749	.092	-.003	.000	-.302	-.324	-.225
	Persepsi (X2)	.688	.127	.697	5.402	<.001	.471	.905	.722	.727	.693

a. Dependent Variable: Kenyamanan (Y)

*Source:*SPSS 28.0 (2021) Outputs

Based on the output in the table above, a regression equation can be formed:

Y = a + b1X1+ b2X2+…..+ e …. (1)

= 0.469 + (-0.001X1 + 0.688X2) + e

Std error = (0.292) (0.001) (0.127)

Sig. = (0.120) (0.092). (0.001)

Referring to the regression equation model that has been formed, it is known that the Community Characteristics variable (X1) has a negative effect on the Comfort Level (Y) of cyclists, while the Community Perception variable (X2) has a positive effect on the Comfort Level (Y) of cyclists on Jalan Sudirman DKI. Jakarta. The constant value formed in the equation model is 0.469, which means that if each independent variable is fixed, then the Convenience Level (Y) of bicycle lane users on Jalan Sudirman DKI Jakarta is positive but very low.

a. Correlation coefficient

The correlation coefficient is the bheta value of each independent variable, which reflects the magnitude of the effect and the direction of the correlation on the dependent variable. The direction of the correlation of the independent variable to the dependent variable, is positive or negative.

a. The Effect of Community Characteristics (X1) on the Comfort Level (Y) of Cycling Users

Based on the regression equation that has been formed, it is known that the correlation coefficient value of the Community Characteristics variable (X1) is -0.001 and is significant at the 0.092 level. This means that this variable has a negative effect on the Comfort Level (Y) of bicycle lane users on Jalan Sudirman, DKI Jakarta.

This is influenced by indicators such as education level and domicile address of each respondent. The higher the level of education, the higher the respondent's expectation of providing better bicycle lanes. Likewise with the domicile indicator. Respondents who predominantly live in the DKI Jakarta area, have a high need for bicycle lane facilities to support sports activities on weekends.

b. The Effect of Public Perception (X2) on the Comfort Level (Y) of Cycling Users

Based on the regression equation that has been formed, it is known that the value of the correlation coefficient for the variable Public Perception (X2) is 0.688 and is significant at the 0.001 level. That is, the public's perception of bicycle lanes on Jalan Sudirman DKI Jakarta, which is influenced by the indicators of the scenery around the bicycle lane, the dividing line and the bicycle lane signpost.

The community of cyclists on Jalan Sudirman considers that the availability of these various indicators will determine the Comfort Level (Y) when cycling, especially on weekends. The better the supporting facilities available along Jalan Sudirman DKI Jakarta, the more comfortable cyclists will be on that road.

b. Coefficient of Determination

The coefficient of determination (R2) is an indicator used to explain the number of variations in a model. From the value of R2, it can be seen the level of significance or the suitability of the relationship between the independent variable and the dependent variable in linear regression

Table 7. Output Coefficient of Determination

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.756[a]	.572	.539	.490

a. Predictors: (Constant), Persepsi (X2), Karakteristik (X1)

b. Dependent Variable: Kenyamanan (Y)

Source:SPSS 28.0 (2021) Outputs

Table 4.8 shows the coefficient of determination (R2) is 0.572 while the adjusted R Square is 0.539. That is, all changes in the dependent variable 53.9% can be determined by the independent variables contained in the model. While the rest, 46.1% of all changes in the dependent variable, are influenced by factors not included in the regression model. This is a residual value that is not included in the equation model.

3.5. Model Significance Test

a. Partial Significance Test (t Test)

Significance is a statistical test and sample distribution through the null hypothesis statistic. In the processing of the t statistical test, the aim is to show the effect of the independent variables on the dependent variable individually.

Table 8. Partial Significance Test Output

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	.469	.292		1.609	.120
	Karakteristik (X1)	-.001	.001	-.226	-1.749	.092
	Persepsi (X2)	.688	.127	.697	5.402	<.001

a. Dependent Variable: Kenyamanan (Y)

Source:SPSS 28.0 (2021) Outputs

The test is calculated by comparing the t-table and t-count values for each independent variable contained in the model. The t-table value at the significance level of 0.10 for df = nk = 29-3 = 26 is 1.315. Meanwhile, the t-count for the Community Characteristics variable (X1) is -1.749 with a significance level of 0.092 and Community Perception (X2) is 5.402 with a significance level of 0.001.

That is, partially X2 variable has no effect on the independent variable (Y) because the t-count value is -1.749 < t-table 1.315. Meanwhile, the public perception variable (X2) has a partial effect on the independent variable (Y), because the t-count is 5.402 > t-table is 1.315. The X2 variable has a very strong significance on the Comfort Level (Y) of cyclists on Jalan Sudirman, DKI Jakarta.

b. Simultaneous Significance Test (F Test)

Simultaneous Test (F test) is used to simultaneously test whether or not the influence of the independent variable on the dependent variable can be seen through the F test. The reference used is the test criteria:

H0 is accepted if Fcount < Ftable

Ha is accepted if Fcount > Ftable, with = 10%

Table 9. Simultaneous Significance Test Output

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	8.320	2	4.160	17.355	<.001[b]
	Residual	6.232	26	.240		
	Total	14.552	28			

a. Dependent Variable: Kenyamanan (Y)

b. Predictors: (Constant), Persepsi (X2), Karakteristik (X1)

Source:SPSS 28.0 (2021) Outputs

From the results of data processing as shown in table 4.10 above, the F-table value of 17.355 is significant at the 0.001 level. The F-table value for df1 = 1 and df2 is 2.91. Therefore, F-count (17.355) > F-table (2.91) can be stated if there is a simultaneous effect of the two independent variables (X1 and X2) on the dependent variable (Y).

V. Conclusion

Comfort in cycling is the hope of every bicycle lane user on Jalan Sudirman DKI Jakarta. From the results of data processing using the multiple linear regression analysis method, it can be stated as follows:

There is an influence of community characteristics and perceptions on the comfort level of bicycle lane users on Jalan Sudirman DKI Jakarta

Community characteristics have a negative but not significant effect on the comfort level of bicycle lane users on Jalan Sudirman DKI Jakarta with a correlation coefficient value of -0.001. Public perception has a positive effect on the comfort level of bicycle lane users on Jalan Sudirman DKI Jakarta with a correlation coefficient value of 0.688.

Simultaneously, the variables of Community Characteristics (X1) and Public Perceptions (X2) affect the Comfort Level (Y) of bicycle lane users on Jalan Sudirman DKI Jakarta.

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