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Trip Attraction Model at Elementary Schools in Suradita Valley Cisauk District Tangerang Municipal 2022

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Abstract

Activity in schools range found within the Suradita town zone has the potential to cause activity blockage since the schools begin time coincides with the rush hour for work. This can be due to the reality that the schools do not have assigned zone for dropping off travelers, which powers vehicles transporting understudies to halt or stop on the street, diminishing the road's capacity. The reason of this inquire about to decide trip fascination show, aggregates of trip fascination, and trip rate on SDN Rahayu, SDN Suradita, MIS Nurul Fallah range. The inquire about strategy utilized is meet to understudies, instructors, and staffs almost trip information, too auxiliary information a collection were sum of understudies, instructors, and staffs, arrive region, floor space, sum of classrooms, stopping range of SDN Rahayu, SDN Suradita, MIS Nurul Falah region. Information that has been collected at that point analyzed with different straight relapse strategy utilized SPSS 25.0 application with noteworthy level 95%. Trip fascination demonstrate of SDN Rahayu, SDN Suradita, and MIS Nurul Falah can be accomplished Ysmds = 0,998 + 0,199 JS + 0,067 JGK – 0,071 JRK with R^2(R square) = 0,636. Add up to of trip fascination that is produced by SDN Rahayu, SDN Suradita, MIS Nurul Falah range = 463 trip attraction/day. Based on t Test with critical level <0,05, therefore an influential factors are amount of students, teachers, and staffs, also amount of classrooms. Trip rate of SDN Rahayu, SDN Suradita, and MIS Nurul Falah = 0,9 people/m^2 or 9 people/100m^2.

Introduction

The development of activities in Tangerang Municipal has resulted in an increase in human needs in various sectors of life, one of which is eduaction. Nowadays, education is one of the basic needs that have to be fulfilled to create welfare and prosperity in social life. [1] [2] To support this case, an adequate transportation facility is needed. [3] [4] Students who live far from school will tend to choose a more efficient mode of transportation than walking to school. [5] [6] Whereas students whose residence location is close to school, most of them will choose to walk to school, but some still choose to use transportation modes. [7] This will have an impact on the increase in the number of vehicles that cause congestion on several sections at the school location. [8] [9] An example is an elementary school compound in Suradita Valley, Cisauk District, Tangerang Municipal. In this elementary school compound, there are 3 elementary schools including Rahayu State Elementary School, Suradita State Elementary School, and Nurul Falah Private Madrasah Ibtidayah.

School activities in Cisauk District, especially Suradita Valley, have a potential make traffic congestion. This happens because the activity time between the school and office area is the same. [10] [11] [12] The congestion that occurs in this elementary school compound in Suradita Valley is caused by the elementary school compound not having space to accommodate the large number of vehicles dropping off and picking up students. [13] [14] As a result, vehicles that drop off and pick up students stop and even park on the road, thus reducing the capacity of the road section in the elementary school compound. [15] [16] [17]

Based on the problems described, a study entitled "Trip Attraction Modelling at Elementary Schools in Suradita Valley, Cisauk District, Tangerang Municipal 2022" is considered important to be conducted to able to predict the amount of trip attraction at the elementary school compound in Suradita Valley. This study aims to determine the model of trip attraction, total of trip attraction, factors that influence trip attraction, and the amount of trip rate in the elementary school compound in Suradita Valley, namely SDN Rahayu, SDN Suradita, and MIS Nurul Falah..

Methods

The strategy utilized in this research is an interview survey of students, teachers, and employees related to trip data as well as secondary data collection in the form of amount of students, amount of employees, land area, floor area, amount of classrooms, and parking lot in the SDN Rahayu, SDN Suradita, and MIS Nurul Falah Area. The complete research stages are shown in Figure 1.
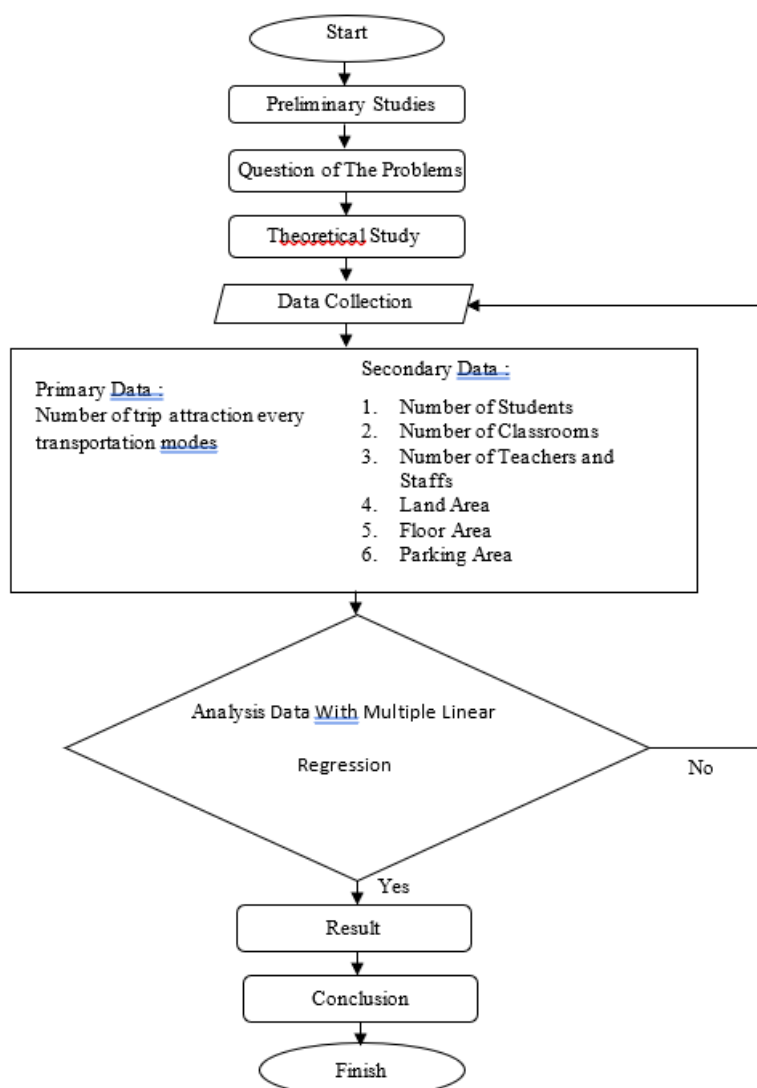

Figure 1. Research Flow Chart

The data used in this study are primary and secondary data. Primary data was gained by distributing questionnaires to students, teachers, and employees. The things that collected including the respondents name, age, gender, class, residential address, school name, distance from residence to school, time taken to school, and mode of transportation used. The total number of students, teachers, and employees who were used as respondents in this study was 443 respondents, with 350 student respondents and 93 teacher and employee respondents. Meanwhile, secondary data was obtained from each elementary school, including SDN Rahayu, SDN Suradita, and MIS Nurul Falah. Secondary data gained from each elementary school include data on number of students, data on the number of classrooms, data on the amount of teachers and employees, land area data, floor area data, and parking lot.

Analysis data used Statistical Program for Special Science (SPSS) 25.0 software with multiple linear regression method. Some of the tests carried out include the characteristic test, correlation test, normality test, reliability test, validity test, and multiple linear regression tests. The characteristic tetst is used to see the distribution of each variable in the questionnaire data obtained is in accordance with the number of samples. The correlation test aim

to determine the strength of the relation between the independent and dependent variables. The normality test is useful for knowing the distribution of all variables obtained, the realibilty test is useful for knowing the consistency of respondents answer to the questionnaire, and the validity test is useful for knowing the suitability of the questionnaire used to measure and obtain research data from respondents. And multiple linear regression test to predict the value of the dependent variable (variable Y) based on the known value of the independent variable (variable X). [18] [19] Independent and Dependent Variables are presented in Table 1. [20][21][22] Trip rate analysis is carried out after total of trip attraction and floor are have been known. [23][24][25]Trip rate value is presented by unit of people per m^2 or people per $100m^2$. [26][27][28] [29]

Table 1. Independent and Dependent Variables

No.	Independent Variables	Dependent Variable
1.	Amount of Students	Amount of Trip Attraction Every Transportation Modes
2.	Amount of Classrooms	
3.	Amount of Teachers and Staffs	
4.	Land Area	
5.	Floor Area	
6.	Parking Area	

Result and Discussion

The survey has been conducted and data obtained can be used for further analysis, resulting inseveral points, including the characteristics of respondents, correlation between variables, normality, validity, and reliability of questionnaire result, trip attraction model, and trip rate. The following respondent characteristics will be presented.

1) Amount of Students, Teachers, and Employees
   Based on the survey result, the number of students who became respondents from each elementary school was 104 students of SDN Rahayu (29,8%), 123 students of SDN Suradita (35,1%), and 123 students of MIS Nurul Falah (35,1%). Meanwhile, the number of teachers and employees who were respondents form each primary school was 26 teachers and employees of SDN Rahayu (28%), 33 teachers and employees of SDN Suradita (35,4%), and 34 teachers and employees of MIS Nurul Falah (36,6%). The survey result of the number of students, teachers, and employees of SDN Rahayu, SDN Suradita, and MIS Nurul Falah are presented in Table 1. and Table 2.

Table 2. Number of Students

No.	School Name	Number of Students	Percentage
1.	SDN Rahayu	104	29,8%
2.	SDN Suradita	123	35,1%
3.	MIS Nurul Falah	123	35,1%
	Total	350	100%

Table 3. Number of Teachers and Employees

No.	School Name	Number of Teachers and Employees	Percentage
1.	SDN Rahayu	26	28%
2.	SDN Suradita	33	35,4%
3.	MIS Nurul Falah	34	36,6%
	Total	93	100%

2) Modes of Transportation Used by Students of SDN Rahayu
   Based on results of the survey, the modes of transportation used by students at SDN Rahayu were 5 students by walking (4,8%), 2 students by using biclcles (1,9%), 93 students being transported by motorcycle (89,4%), 1 student being transported by car (1%), and 3 students using public transportation (2,9%). The results of the survey of transportation modes used by students at SDN Rahayu are presented in Table 3.

Table 4. Number of Transportation Modes Used by Students of SDN Rahayu

No.	Mode Used	Frequency	Percentage
1.	Walking	5	4,8%
2.	Bicycle	2	1,9%
3.	Motorcycle (escourted)	93	89,4%
4.	Car (escourted)	1	1,0%
5.	Public Transportation	3	2,9%
	Total	104	100%

3) Mode of Transportation Used by Students of SDN Suradita

Based on the results of the survey, the modes of transportation used by students at SDN Suradita were 8 students by walking (6,5%), 107 students being transported by motorcycles (87%), 5 students being transported by car (4,1%), and 3 students using public transportation (2,4%). The results of the survey of transportation modes used by students at SDN Rahayu are presented in Table 4 .

Table 5. Number of Transportation Modes Used by Students of SDN Suradita

No.	Mode Used	Frequency	Percentage
1.	Walking	8	6,5%
2.	Motorcycle (escourted)	107	87,0%
3.	Car (escourted)	5	4,1%
4.	Public Transportation	3	2,4%
	Total	123	100

4) Mode of Transportation Used by Students of MIS Nurul Falah

Based on the survey results, the modes of transportation used by students of MIS Nurul Falah were 14 students by walking (11,4%), 2 students using bicycles (1,6%), 102 students being transported by motorcycle (82,9%), 2 students being transported by car (1,6%), and 3 students using public transportation (2,5%). The results of the survey of transportation modes used by students at MIS Nurul Falah are presented in Table 5.

Table 6. Number of Transportation Modes Used by Students of MIS Nurul Falah

No.	Mode Used	Frequency	Percentage
1.	Walking	14	11,4%
2.	Bicycle	2	1,6%
3.	Motorcycle (escourted)	102	82,9%
4.	Car (escourted)	2	1,6%
5.	Public Transportation	3	2,5%
	Total	123	100%

5) Modes of Transportation Used by Teachers and Employees of SDN Rahayu

Based on the results of the survey, the mode of transportation used by teachers and employees at SDN Rahayu were 8 teachers and employees are being transported by motorcycle (30,8%), 17 teachers and employees uses motorcycle (65,4%), and 1 teachers uses car (3,8%). The results of the survey of transportation modes used by teachers and employees of SDN Rahayu are presented in Table 6.

Table 7. Number of Transportation Modes Used by Teachers and Employees of SDN Rahayu

No.	Mode Used	Frequency	Percentage
1.	Motorcycle (escourted)	8	30,8%
2.	Motorcycle (driven personally)	17	65,4%
3.	Car (driven personally)	1	3,8%
	Total	26	100%

6) Modes of Transportation Used by Teachers and Employees of SDN Suradita

Based on the survey results, the mode of transportation used by teachers and employees of SDN Suradita were 9 teachers and employees are transported by motorcycle (27,3%), 22 teachers and employees use

motorcycle (66,7%), and 2 employees by walking (6,0%). The results of the survey of transportation modes used by teachers and employees of SDN Suradita are presented in Table 7.

Table 8. Number of Transportation Modes Used by Teachers and Employees of SDN Suradita

No.	Mode Used	Frequency	Percentage
1.	Motorcycle (escourted)	9	27,3%
2.	Motorcycle (driven personally)	22	66,7%
3.	Walking	2	6,0%
	Total	33	100%

7) Modes of Transportation Used by Teachers and Employees of MIS Nurul Falah

Based on the survey results, the mode of transportation used by teachers and employees of MIS Nurul Falah were 5 teachers and employees are transported by motorcycle (14,7%), 29 teachers and employees use motorcycle (85,3%). The survey results of transportation modes used by teachers and employees of MIS Nurul Falah are presented in Table 8.

Table 9. Number of Transportation Modes Used by Teachers and Employees of MIS Nurul Falah

No.	Mode Used	Frequency	Percentage
1.	Motorcycle (escourted)	5	14,7%
2.	Motorcycle (driven personally)	29	85,3%
	Total	33	100%

8) Normality, Validity, and Reliability Tests

The normality test was conducted on dependent variables that have a strong and moderate positive correlation with the independent variables. The dependent variables include the amount of students, the amount of teachers and employees, and the amount of classrooms. The results of the normality test, the significant value of number of students variable is $0,231 > 0,05$, thus, it is concluded that the residual value is normally distributed. The significant value of number of teachers and employees variable is $0,238 > 0,05$, thus, it is concluded that the residual value is normally distributed. The significant value of amount of classrooms variable is $0,416 > 0,05$, thus, it is concluded that the residual value is normally distributed. The normality test results of amount of students, amount of teachers and employees, and amount of classrooms are presented in Table 10, Table 11, and Table 12.

Table 10. Normality Test of Number of Students Variable

Tests of Normality						
	Kolgomorov-Sminornov			Shapiro-Wilk		
	Statistic	df	Sig	Statistic	df	Sig
Amount of Students	.231	350	.000	.796	350	.000
Trip Attraction	.	350	.	.	350	.
a. Liliefors Significance Correction						

Table 11. Normality Test of Number of Teachers and Employees

Tests of Normality						
	Kolgomorov-Sminornov			Shapiro-Wilk		
	Statistic	df	Sig	Statistic	df	Sig
Amount of Teachers and Employees	.238	93	.000	.796	93	.000
Trip Attraction	.	93	.	.	93	.
a. Liliefors Significance Correction						

Table 12. Normality Test of Number of Classrooms Variable

Tests of Normality	
Kolgomorov-Sminornov	Shapiro-Wilk

	Statistic	df	Sig	Statistic	df	Sig
Amount of Classrooms	.416	443	.000	.605	443	.000
Trip Attraction	.	443	.	.	443	.
a. Liliefors Significance Correction						

The validity test was carried out on all dependent variables, namely the amount of students, amount of teachers and employees, land area, floor area, amount of classrooms, and parking lot area. The results of the validity test, the R value of amount of students variable is 0,998 > 0,093 with significant value of 0,064 > 0,05. It can be concluded that the residual value is valid. The R value of amount of teachers and employees is 0,984 > 0,093, with significant value of 0,113 > 0,05, it can be concluded that the residual value is valid. The R value of land area variable is -0,445 < 0,093, with significant value of 0,706 > 0,05, it can be concluded that the residual value is invalid. The R value of floor area variable is -0,445 < 0,093, with significant value of 0,706 > 0,05, it can be concluded that the residual value is invalid. The R value of amount of classrooms variable is 0,445 > 0,093, with significant value of 0,706 > 0,05, it can be concluded that the residual value is valid. And the R value of parking lot area variable is -0,445 < 0,093, with significant value of 0,706 > 0,05, it can be concluded that the residual value is invalid. The validity test results of amount of students, amount of teachers and employees, land area, floor area, amount of classrooms, and parking lot area variables are presented in Table 13.

Table 13. Validity Test

Correlation								
		Amount of Students	Amount of Teachers and Employees	Land Area	Floor Area	Amount of Classrooms	Parking Lot Area	Trip Attraction
Amount of Students	Pearson Correlation	1	.994	-.506	-.506	.506	-.506	.998
	Sig. (2 tailed)		.069	.662	.662	.662	.662	.064
	N	443	443	443	443	443	443	443
Amount of Teachers and Employees	Pearson Correlation	.994	-.596	-.596	-.596	.596	-.596	.984
	Sig. (2 tailed)	.069		.593	.593	.593	.593	.113
	N	443	443	443	443	443	443	443
Land Area	Pearson Correlation	-.506	-.596	1	1.000**	-1.000**	1.000**	-.445
	Sig. (2 tailed)	.662	.593		.000	.000	.000	.706
	N	443	443	443	443	443	443	443
Floor Area	Pearson Correlation	-.506	-.596	1.000**	1	-1.000**	1.000**	-.445
	Sig. (2 tailed)	.662	.593	.000		.000	.000	.706
	N	443	443	443	443	443	443	443
Amount of Classrooms	Pearson Correlation	.506	.596	-1.000**	-1.000**	1	-1.000**	.445
	Sig. (2 tailed)	.662	.593	.000	.000		.000	.706
	N	443	443	443	443	443	443	443
Parking Lot Area	Pearson Correlation	-.506	-.596	1.000**	1.000**	-1.000**	1	-.445
	Sig. (2 tailed)	.662	.593	.000	.000	.000		.706
	N	443	443	443	443	443	443	443
Trip Attraction	Pearson Correlation	.998*	.984	-.445	-.445	.445	-.445	1
	Sig. (2 tailed)	.044	.113	.706	.706	.706	.706	
	N	443	443	443	443	443	443	443
*.Correlation is significant at the 0.05 level (2-*tailed*).								
**.Correlation is significant at the 0.01 level (2-*tailed*)								

Reliability test were conducted on dependent variables that have strong and moderate positive correlation with independent variables. The dependent variable include the amount of students, the amount of teachers and employees, and the amount of classrooms. The results of reliability test, the Cronbach's alpha value of number of students variable is 0,999 > 0,093, thus it is concluded that the residual value is reliable. The

Cronbach's alpha value of amount of teachers and employees variable is 0,205 > 0,093, thus it is concluded that the residual value is reliable. The Cronbach's alpha value of amount of classrooms variable is 0,271 > 0,093, thus it is concluded that the residual value is reliable. The reliability test results of amount of students, amount of teachers and employees, and number of classrooms are presented in Table 14, Table 15, Table 16.

Table 14. Reliability Test of Amount of Students Variable

Reliability Statistics	
Cronbach's Alpha	N of Items
.999	2

Table 15. Reliability Test of Amount of Teachers and Employees Variable

Reliability Statistics	
Cronbach's Alpha	N of Items
.205	2

Table 16. Reliability Test of Amount of Classrooms Variable

Reliability Statistics	
Cronbach's Alpha	N of Items
.271	2

9) Model and Amount of Trip Attraction

The dependent variables used in form of trip attraction modelling are variables that have a strong and moderate positive correlation, namely the amount of students, the amount of teachers and employees, and the number of classrooms. The trip attraction model was created using multiple linear regression method with the help of SPSS 25.0 software. Some of the trip attraction models are presented in Table 17.

Table 17. Trip Attraction Model

No.	Regression Equation	R	R^2
1.	$Y_{walking} = 0,018 - 0,001 X_2$	0,011	0,000
2.	$Y_{walking} = 0,099 - 0,004 X_1 - 0,013 X_2$	0,057	0,003
3.	$Y_{walking} = 0,009 + 0,033 X_1$	0,100	0,010
4.	$Y_{walking} = -0,128 + 0,017 X_1 + 0,008 X_5$	0,104	0,011
5.	$Y_{walking} = -0,174 - 0,027 X_2 + 0,014 X_5$	0,115	0,013
6.	$Y_{walking} = -0,236 - 0,014 X_1 - 0,015 X_2 + 0,017 X_5$	0,131	0,017
7.	$Y_{bicycle} = 0,013 - 0,001 X_1$	0,007	0,000
8.	$Y_{bicycle} = 0,019 - 0,002 X_1 - 0,002 X_2$	0,047	0,002
9.	$Y_{bicycle} = -0,027 - 0,006 X_2 + 0,002 X_5$	0,057	0,003
10.	$Y_{bicycle} = -0,046 - 0,004 X_1 - 0,002 X_2 + 0,003 X_5$	0,075	0,006
11.	$Y_{bicycle} = -0,139 - 0,019 X_1 + 0,009 X_5$	0,080	0,006
12.	$Y_{car (escourted)} = 0,018 + 0,003 X_1$	0,013	0,000
13.	$Y_{car (escourted)} = 0,256 + 0,031 X_1 - 0,014 X_5$	0,089	0,008
14.	$Y_{car (escourted)} = 0,050 + 0,000 X_1 - 0,016 X_2$	0,095	0,009
15.	$Y_{car (escourted)} = 0,049 - 0,016 X_2 + 0,000 X_5$	0,095	0,009
16.	$Y_{car (escourted)} = 0,051 + 0,000 X_1 - 0,016 X_2 + 0,000 X_5$	0,095	0,009
17.	$Y_{public transportation} = 0,030 - 0,002 X_1$	0,011	0,000
18.	$Y_{public transportation} = 0,011 - 0,004 X_1 + 0,001 X_5$	0,011	0,000
19.	$Y_{public transportation} = 0,032 + 0,002 X_2 - 0,001 X_5$	0,013	0,000
20.	$Y_{public transportation} = 0,022 - 0,010 X_1 + 0,013 X_2$	0,089	0,008
21.	$Y_{public transportation} = -0,021 - 0,012 X_1 + 0,012 X_2 + 0,002 X_5$	0,093	0,009

22.	Ymotorcycle (escourted) = 0,013 – 0,001 X1	0,076	0,006
23.	Ymotorcycle (escourted) = 1,000 – 0,024 X1 – 0,004 X5	0,077	0,006
24.	Ymotorcycle (escourted) = 0,656 – 0,082 X2	0,155	0,024
25.	Ymotorcycle (escourted) = 0,981 – 0,201 X2 +0,008 X5	0,355	0,126
26.	Ymotorcycle (escourted) = 1,208 – 0,145 X1 – 0,043 X2	0,529	0,280
27.	Ymotorcycle (escourted) = 0,182 – 0,175 X1 – 0,051 X2 + 0,052 X5	0,565	0,319
28.	Ymotorcycle (driven personally) = 0,204 + 0,104 X2	0,187	0,035
29.	Ymotorcycle (driven personally) = 0,089 + 0,239 X2 – 0,020 X5	0,508	0,258
30.	Ymotorcycle (driven personally) = -0,389 + 0,158 X1 +0,057 X2	0,726	0,527
31.	Ymotorcycle (driven personally) = 0,998 + 0,199 X1 + 0,067 X2 – 0,071 X5	0,797	0,636
32.	Ycar (driven personally) = -0,010 + 0,003 X1 + 0,004 X2	0,091	0,008
33.	Ycar (driven personally) = 0,122 – 0,020 X2	0,109	0,102
34.	Ycar (driven personally) = 0,049 + 0,009 X2 – 0,003 X5	0,112	0,012
35.	Ycar (driven personally) = 0,072 + 0,005 X1 + 0,005 X2 – 0,004 X5	0,139	0,019

Based on Table 17., it can be concluded that the best trip attraction models is Ymotorcycle (driven personally) = 0,998 + 0,199 X1 + 0,067 X2 – 0,071 X5, with an R value of 0,797 and an R^2 value of 0,636. The total students of three schools are 2311 students, total of teachers and employees from three schools are 93 people, and total classrooms of three schools are 64 classrooms. Therefore, the total of trip attraction, Ymotorcycle (driven personally) = 0,998 + 0,199 (2311) + 0,067 (93) – 0,071 (64) = 463 trips/day.

10) Trip Rate Analysis

Based on the total trip attraction and floor area, the trip rate = total trip attraction/floor area = 463/5352 = 0,9 people/m^2. It can be concluded that the trip rate generated by three schools namely SDN Rahayu, SDN Suradita, and MIS Nurul Falah is 0,9 people/m^2 or 9 people/100 m^2.

Conclusion

The objectives of this research have been taken. Some points that can be concluded focus on trip attraction modelling in SDN Rahayu, SDN Suradita, and MIS Nurul Falah area among others :

1. The best trip attraction model is Ymotorcycle (driven personally) = 0,998 + 0,199 X1 + 0,067 X2 – 0,071 X5, with R value = 0,797 and R^2 value = 0,636,
2. The total trip attraction of SDN Rahayu, SDN Suradita, and MIS Nurul Falah are 463 trips/day,
3. Factors that influence trip attraction based on correlation analysis, normality test, validity test, and reliability test are number of students (X1), number of teachers and employees (X2), and number of classrooms (X5),
4. The trip rate generated by SDN Rahayu, SDN Suradita, and MIS Nurul Falah area are 0,9 people/m^2 or 9 people/100 m^2.

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