STUDY PRONE TO TRAFFIC ACCIDENTS ON DIPONEGORO STREET – SURABAYA

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ABSTRACT

This research entitled "Study of Prone to Traffic Accidents on Jalan Diponegoro - Surabaya. The purpose of this study was to analyze traffic accidents on Diponegoro Street in Surabaya to find important information such as accident rates, diponegoro road conditions and traffic accident factors. The method used to analyze is by Statistical Product and Service Solutions (SPSS) software. Based on the results of the analysis and discussion, the description of Diponegoro road conditions is very dense with a total of 11720 vehicles on holidays from 7:00 to 17:00. and for the results of simple linear regression models with the equation $Y = 112.668 + 0,00882X$ And the results of the Data from $t_{count} > t_{table} 2.276 > 1.984$ by looking at the significance level of $0.000 < 0.05$. Thus it can be concluded that the accident factor (X1) has an effect on the risk of accident (Y) on Diponegoro Street in Surabaya.

Keywords: accident factors, prone to traffic accidents on road Diponegoro

INTRODUCTION

Surabaya city as the second largest city in Indonesia certainly has a lot of dense area so that a wide range of activities such as industrial areas, educational areas and office area. With a wide range of activity is certainly interesting movement of the vehicle (traffic) moving towards of the region so that the road Diponegoro as a line connecting the town of Sidoarjo by Surabaya city almost every day experiencing congestion. Suprayitno (2018) states SSR assessment of network quality is closely related to the smooth road traffic, safety and comfort. The achievement of the safety of all road users to be one of the fundamental factors of success satau road operations management. The rider must be ensured safe way to travel departure from origin to destination desired location. In addition, the safety aspect is also a need to ensure non-riders to road users, such as pedestrians and other activities that are in the way. Traffic accident is an event that should be avoided in the operation because it can threaten the safety of road users.

The aim of this study was to analyze the traffic accident in Jalan Diponegoro Surabaya to find out important information such as the number of accidents and the fatality rate, the critical points of (blackspot), triggering factors, and patterns of occurrence of accidents. The study results can be used as the safety of road users in order to capture the necessary policies.

Based on these considerations, in order to obtain the accuracy of information should be carried out research identifying areas vulnerable to traffic accidents, which is located at Jalan Diponegoro Surabaya. Other research carried out thorough use of the number (rate) of accidents with data representing Events, potentials and local characteristics. Results from this study are expected not only a traffic accident-prone locations, but the best identification method that can be used as a common reference for implementers and if necessary obtain a new method and do not deviate from the study of civil engineering.

Definition of Traffic Accident

Accidents do not happen by chance, but there is. Therefore, there is cause, the accident must be analyzed and discovered, so that corrective action to cause it to do as well as the preventive measures more accidents can be prevented. Accidents are not direncanakan action and uncontrollable, when the actions and reactions of objects, materials, or radiation cause severe injury or possible injury. Based on the (Act No. 22 of 2009) on Traffic and Transportation, said the traffic accident is an event in the way of unexpected and unintentional involving vehicles with or without other road users which resulted in human casualties and / or loss of property object.

From the definition of traffic accidents can be disimpilkan that a traffic accident is an event on road traffic unexpected and unwanted difficult to predict when and where it happened, at least involving one vehicle with or without other road users who cause injury, trauma, disability , death and / or loss of property to the owner (the victim).

Let us identify the three (3) types of traffic accidents below so we are more vigilant while on the road:

1. Front with a front collision is a collision between the front of the vehicle with the front of the other vehicle. This type of accident becomes the largest contributor to total wreck, which is about 24%. Accidents of this kind by the community often called collision bullfighting.
2. Side front collision accident type is adrift thin with the first, which is 23% contribution to total accidents. Recorded every day there are about 60 cases of accidents of this type throughout Indonesia.
3. Forward collision rear contribution kinds of traffic accidents is about 17%. At least every day there 40s accidents of this kind. (Police Korlantas 2013)

Based on Government Regulation (No. 43 of 1993) on Infrastructure Highways and Traffic, the impact of traffic accidents can be classified according to the condition of the victim into three, namely:

1. Death is accident victims were ascertained died as a result of traffic accidents within a maximum period of 30 days after the accident.
2. Serious injury is is the accident victim for injuries suffered permanent disability or to be admitted to hospital in a period of more than 30 days since the accident. An event is classified as permanently disabled if a limb missing or can not be used at all and can not be recovered or restored for good.
3. Minor injuries are accident victims who suffered injuries that do not require hospitalization or to be admitted to hospital than 30 days.

Factors Affecting Traffic Accident

- Human factors

Humans as the riders have factors that affect driving, the psychological factors and physiological factors. Both are factors that affect human domina in driving on the highway. Psikolgis factors may be mental, attitude, knowledge, and skills. While physiological factors include pengeliatan, hearing, touch, smell, fatigue, and sisitem nerves.

Human behavior is influenced by interactions between environmental factors, vehicle, and the man himself. Then a combination of factors fidologis and psychological factors cause a reaction and action, namely the emergence of motorists drive response to stimuli from the environment drive. Characteristics of riders that influence the occurrence of traffic accidents, namely:

a. Age

Age is one of the important karakatersistik that can cause traffic accidents. People aged over 30 years old or more typically have a higher level of vigilance in the drive of the young people, the reason for the old aged people have more experience in driving and more wisely in driving compared with younger who sometimes menggebu-passionate and hasty in driving.

b. Gender

Gender men have a higher risk of traffic accidents and the death rate was higher than the female sex. This is because the mobility of male sex was higher than the female gender in highway driving. In addition the number of motorcyclists was higher in male sex than the female sex.

c. behavior

Behavioral factors also have an important role in determining the occurrence of a traffic accident on motorcyclists. Where the riders who behave not good when driving also affects the safety of the riders, such as not wearing a helmet or not wearing the appropriate helemyang that the recommended standards, disorderly when driving in violation of traffic signs and road markings.

d. SIM ownership

SIM is a proof that the rider had a decent drive on the highway, terkhususnya SIM C must be owned motorcyclists. A driver's license is valid for five years and can be extended SIM also obtained with an exam that includes theory practice driving skills, but it is also the driver must memenuhui some conditions, namely: to write and read the Latin alphabet, have knowledge of the traffic, meet the age limit minimum, and healthy spiritual body.

• factors Vehicles

Vehicle factors in this case that a motorcycle is one of the factors that cause traffic accidents laul. Choosing a motorcycle that fit the needs is an important decision that should be selected by a rider. Suitable motorcycle riders will give good control. Motorists should consider when choosing the size of the body of the motorcycle. Some large-sized motorcycles and very heavy. This may affect the ability to balance and control the bike. , Factors vehicle likely to cause a traffic accident on motorcycle riders, is:

a. Brake failure

Is an important component of the motorcycle which serves to slow or stop the motorcycle. Motorcycle has two brakes, the front brakes and rear brakes. The front brakes are more effective compared to the rear brakes even on slippery road surfaces. The only time in which the front brakes bleh used when the road is covered by ice. Good braking technique is to use both brakes to dismiss or reduce the speed of the motorcycle, and then lower the motorcycle transmission

b. Tire

Things that should be considered in the tire is the tire pressure and tire damage. Constraints on the tire includes a flat tire and a tire, flat tire is a condition in which the tire is less or reduced, despite being at the pump this can be caused by a tire valve rusakanya or loose. While a tire is a tire blowout suddenly which can be caused by a tire punctured by nails, sharp stones or other objects that could puncture the tires.

c. Skid

Skid is the loss of a vehicle wheel contact with the road surface or when braking wheels of the vehicle blocking so that the driver can not control the vehicle. Tire tread also affect vehicle wheel slippage, tire with uneven surfaces are things that can harm while driving, especially when crossing the road slippery. Tire tread should have a groove depth of at least 1mm. Each tire has a tire tread indicator. Side tire should not have more

than a width of the tire tread. If the tires begin to uneven motorists should be more careful in driving.

d. vehicle lights

Vehicle lighting is one of the factors that influence the occurrence of traffic accidents for motorcyclists mainly function at night. In Government Regulation No. 44 of 1993 article 41, reveals a motorcycle with or without sidecars must be equipped with lights and reflective covering:

1) The main lights

The main light terbagimenjadi two, namely near the main lights and headlights far. The main lights serves as a main torch for the rider and as a marker for the presence of other motorists.

2) The indicator light / turn signal

These lights must have a motorcycle that is located in front of the motor pair and another pair behind the motor. Functions as petunjuk way to tell where we are to motorists behind us or the vehicle in front of us but it also can be used when going to change lanes.

3) brake lights

Brake lights serves to inform other motorists on the back to reduce speed and as a sign that the vehicle reduces the rate of speed.

• Factors Physical Environment (Road)

Physical environmental factors are external factors that influence the occurrence of traffic accidents, the physical environment is the purpose consists of two elements, namely roads and environmental factors. Factors road includes the condition of damaged roads, potholes, slippery, dark, with no markings / signs, and bend / incline / derivative sharp, otherwise the road as in the city or outside the city (rural) and traffic volumes also affect the incidence traffic accidents. Here is a description of the physical environmental factors that can cause traffic accidents on motorcyclists.

a. Potholes

Potholes are kondisidimana uneven road surface due to the basin into which has a depth and diameter is not patterned, is due to the coating system is less than perfect. Traffic accident on a motorcycle caused by potholes mostly because motorists trying to avoid a sudden hole in a high speed. Another example is when a tire wheel motorcycle through the hole with a diameter and depth large enough to interfere with the rider maintain balance and control capabilities sepada bike.

b. Damaged roads

Damaged road is a condition where the road surface is not smooth due to the road has not been paved, the road that there are rocks, gravel or other materials that are on the road surface which is annoying when driving, and asphalt roads have been damaged. Damaged roads can reduce the control of the drive and disrupt the balance of motorcyclists, for the rider should reduce speed when passing through the road with a damaged condition.

c. Slippery road / Wet

Slippery road surface can be caused by other material covering the surface of the road such as oil spills, mud, or wet ground because of the rain. Conditions such as these can cause a traffic accident on motorcycle riders, because keseimbangan when the drive will be reduced when crossing the road slippery, and motorcycles can be derailed.

METHODOLOGY

Data needed to resolve this are grouped in two types: primary data and secondary data.

Primary data

Data obtained by direct observation in the study site, among others:

1. Survey traffic safety facilities in road Dipnegoro

2. Processing data from the results of questionnaire respondents using SPSS
3. Observing the daily traffic conditions on the road diponegoro Surabaya

Secondary data

Secondary data is data obtained from the department or relevant agencies in this case the data laka Surabaya Traffic Police from the year 2013 to 2017.

RESULTS AND DISCUSSION

Based on data obtained from Traffic accident Surabaya from year 2013 to 2017. Includes the number of accidents, the accident victim class, time of the accident, the type of kendaaran involved in this type of crash (crash) that occurred.

Efforts to address location identified as the location of the accident-prone areas in Surabaya diponegoro aims to minimize the occurrence of traffic accidents and to minimize the impact of traffic accidents. The impact in this case, including the rate of accidents, fatalities, and the number of victims. Determining the type of action carried out with the basic handling of the incident or the type of accidents that often occur or potential events that can occur with the predicted characteristics of existing roads.

Daily Traffic Conditions

Based on field research conducted over 2 days, 1 day and 1 day off work. In the first observation condition Monday at Diponegoro street looks solid in the morning and afternoon because the activity of either work or to school. Meanwhile, during the day at 12.00 looks crowded smoothly.

In the second observation paddy Sunday (weekend) the condition of traffic flow on the street Diponegoro Surabaya normal observed in the morning, afternoon and evening due to work activities maupuun school holidays.

Calculation Results LHR

Table 1. Data Number of Vehicles Directions

Diponegoro		Today Sunday, April 28, 2019			
No.	Transportation type	Time			total
		7:00 to 8:00 a.m.	12:00 to 13:00	16:00 to 17:00	
1	Car	1352	1729	2082	5163
2	Tuck	37	49	29	115
3	pedicab	5	5	3	13
4	Motorcycle	2046	2257	1930	6233
5	Bike	32	14	2	48
6	Public transportation	44	31	51	126
7	Bus	8	9	5	22
Total		3524	4094	4102	11720

Table 2. Data Number of Vehicles Directions Dr. Soetomo

		Today Sunday, April 28, 2019			
No.	Transportation type	Time			total
		7:00 to 8:00 a.m.	12:00 to 13:00	16:00 to 17:00	
1	Car	1691	1627	1591	4909
2	Tuck	21	13	13	47
3	pedicab	8	9	6	23
4	Motorcycle	1689	2279	2390	6358

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5	Bike	11	3	3	17
6	Public transportation	19	15	20	54
7	Bus	2	2	4	8
Total		2441	3948	4027	11416

Table 3. Data Number of Vehicles

Directions Diponegoro

Today Monday, April 29, 2019

No.	Transportation type	Time			total
		7:00 to 8:00 a.m.	12:00 to 13:00	16:00 to 17:00	
1	Car	1892	2400	2595	6887
2	Tuck	98	127	101	326
3	pedicab	6	4	6	16
4	Motorcycle	3282	2396	2516	8194
5	Bike	4	3	4	11
6	Public transportation	50	62	92	204
7	Bus	8	9	5	22
Total		5340	5001	5319	15 660

Table 4.Data Number of Vehicles Dr.Soetomo

Today Monday, April 29, 2019

No.	Transportation type	Time			total
		7:00 to 8:00 a.m.	12:00 to 13:00	16:00 to 17:00	
1	Car	1977	1728	2489	6194
2	Tuck	22	28	45	95
3	pedicab	7	9	9	25
4	Motorcycle	2825	4005	3323	10153
5	Bike	3	11	11	25
6	Public transportation	25	46	28	99
7	Bus	3	2	0	5
Total		4862	5829	5905	16 596

Based on the research of data for 2 days 1 day off and 1 working day menunjukan observations highest number of vehicles on Monday from the street Dr.Soetoma reach a total of 16 596 within a period of 3 hours. Of the four tables will be in total to determine daily traffic average was calculated as follows:

$$LHR = \frac{\text{Jumlah Lalu lintas Selama Pengamatan}}{\text{Waktu Pengamatan}}$$

$$LHR = \frac{(11720 + 11416 + 15660 + 16596) \text{ Kendaraan}}{6 \text{ Jam}}$$

$$\text{Hourly vehicles LHR} = 9237 \frac{(55422) \text{ Kendaraan}}{6 \text{ Jam}} =$$

So Daily Traffic Average in Jalan Diponegoro in Surabaya is 9237 mph.

Data Traffic Police Surabaya

Table 5. Number of traffic accidents Over the past 5 years

No .	Year	Number of traffic accidents / Year	percentage %
1	2013	28	17%
2	2014	24	15%
3	2015	30	18%
4	2016	36	22%
5	2017	47	28%
total		165	100%

Source: Data Traffic Police Surabaya

In Table 5. visible frequency traffic accident in Jalan Diponegoro was highest in 2017 at 28% with 47 accidents and the lowest in 2014, with a tender 24-incident event with the percentage reached 15%. Here's an overview chart peristiwa number of traffic accidents on the road Diponegoro during the 5 years from 2013 to 2017.

Table 6. Total Casualties In 5 Years

No.	Year	Die	serious wound	Minor injuries	Total Victim / Year
1	2013	2	15	28	45
2	2014	8	6	26	40
3	2015	4	5	30	39
4	2016	4	2	42	48
5	2017	2	10	44	56
total		20	6	170	196
percentage%		10%	3%	87%	100%

Source: Data Traffic Police Surabaya

In Table 6 shows that the fatality rate of road traffic accidents Diponegoro Surabaya from year 2013 to 2017 gives a figure high enough. In 2017 the total death toll reached 56 with a total of 196 casualties during the 5 years of the victim.

Table 7. Vehicle type The Colliding

No.	Year	Motorcycle	Car	Freight cars	Bus	Special vehicles	Total Per Year
1	2013	40	7	0	1	0	48
2	2014	34	7	1	0	1	43
3	2015	46	7	1	1	0	55
4	2016	60	4	4	0	0	68
5	2017	64	10	5	0	0	79
total		244	35	11	2	1	293
percentage%		83%	12%	4%	1%	0%	100%

Source: Data Traffic Police Surabaya

The type of vehicle involved in the road traffic accident Diponegoro Surabaya can be seen in Table 7. Type of vehicle involved in the accident highest during 2013-2017 due to the motorcycle as much as 83%.

Table 8. Genesis Time Traffic Accident at Jalan Diponegoro Surabaya

No.	Year	Genesis Time Accident				Total Per Year
		00:00 to 06:00	06:00 to 12:00	12:00 to 18:00	18:00 to 00:00	
1	2013	7	9	7	5	28
2	2014	4	10	5	5	24
3	2015	4	13	7	6	30
4	2016	1	15	12	8	36
5	2017	1	20	16	10	47
total		17	67	47	34	165
percentage%		10%	41%	28%	21%	100%

Source: Data Traffic Police Surabaya

8. In the table can be seen when the incidence of traffic accidents on the road Diponegoro Surabaya. The table shows that the frequency of the highest traffic accident occurred at 06.00 - 12-00 pm by 41%. While overall that a traffic accident that occurred at 12:00 to 00:00 gives results that are not too different.

Data Processing with SPSS

To complement this study the authors made a questionnaire distributed to respondents to the questionnaire distributed number as many as 100. Here a description of the characteristics of respondents by gender, age, occupation, type of vehicle, and frequency to pass through Jalan Diponegoro:

Table 9. Gender Respondents

Gender	respondents	Percentage
Man	63	63%
female	37	37%
Total	100	100%

Source: Primary Data in Sports

Table 10. Respondents age

Age	Frequency	Percentage
17-25 Years	69	69%
26-35 Years	18	18%
36-45 Years	1	1%
46-55 Years	11	11%
> 55 Years	1	1%
Total	100	100%

Source: Primary Data In Sports

Table 11. Respondents job

Type of work	respondents	Percentage
Student / Student	25	25%
Private employees	65	65%
entrepreneurial	10	10%
Total	100	100%

Source: Primary Data in Sports

Table 4.12 Vehicle Type of Respondents

Transportation type	respondents	Percentage
Bike	1	1%
Motorcycle	81	81%
Transport Online	5	5%
Car	13	13%
Total	100	100%

Source: Primary Data in Sports

Table 13. The frequency of passing Jalan Diponegoro

Frequency	total	Percentage
Often	54	54%
Ever	37	37%
Rarely	9	9%
Total	100	100%

Source: Primary Data in Sports

variable Description

Table 14. Respondents answer Statement Concerning Accident factor (X1)

No.	Statement	Respondents					mean	total
		SS	S	N	TS	STS		
1	As it passes through Diiponegoro way I feel signs - traffic signs are adequate (X1.1)	15	68	15	1	1	2.05	100
		15%	68%	15%	1%	1%		
2	I always break through traffic lights when the streets of Diponegoro Sepi (X1.2)	1	16	29	26	28	3.64	100
		1%	16%	29%	26%	28%		
3	I think the factor of traffic accidents on the road Diponegoro is a vehicle (X1.3)	10	28	46	16	0	2,68	100
		10%	28%	46%	16%	0%		
4	I think the factors of road accidents Diponegoro is damaged roads / perforated (X1.4)	5	12	32	43	8	3.37	100
		5%	12%	32%	43%	8%		
5	I think the factors of road accidents Diponegoro is the rider's own (human) (x1.5)	40	47	0	12	1	1.75	100
		40%	47%	0%	12%	1%		
6	I think Diponegoro factors of road accidents is speed / no orderly traffic (X1.6)	31	43	25	1	0	1.96	100
		31%	43%	25%	1%	0%		

Source: processed writer

Table 15. Statement Regarding Respondents answer prone to accidents (Y)

No.	Statement	Respondents					mean	total
		SS	S	N	TS	STS		
1	I think Diponegoro Surabaya road accident- prone areas (Y)	37	34	27	2	0	1.94	100
		37%	34%	27%	2%	0%		

Source: processed writer

Table 16. Crash Test Results Validity Factor (X1)

No.	Statement	Correlation coefficient	significance	Information
1	X1.1	.417	0,000	VALID
2	X1.2	0.494	0,000	VALID
3	X1.3	0,462	0,000	VALID
4	X1.4	0.505	0,000	VALID
5	x1.5	0.494	0,000	VALID
6	X1.6	.487	0,000	VALID

Source: Validity Test Results (Sports SPSS)

- Explained that for the accident factor variable statement items (X1) is valid. This is because the level of correlation > 0.4 and significance < 0.05.
- Reliability Testing Results:

Results of testing the reliability of the accident factor variable (X1) = 0.802 and Accident Prone (Y) = 0.994. can be explained that the value of Cronbach Alpha of the questionnaire is greater than 0.7. It can be concluded that all item questionnaire for each variable has been reliable.

- Simple Linear Regression Analysis

The aim is simple linear regression to determine the effect of an independent variable (independent variable) on the dependent variable (dependent variable). In addition, simple regresi also be used to predict the value of the dependent variable in symbolized by Y, based on the value of the independent variables in simbolkan with X.

Table 17. Results Analysis

Coefficientsa					
Model		Coefficients unstandardized		standardized Coefficients	
		B	Std. Error	beta	
1	(Constant)	112 668	.565		1,182
	X1	.882	.036	.994	2,276
					Sig.
					.024
					.001

Source: Sports Results SPSS Data

untuk determine whether or not the influence of variables accident factor (X1), prone to accidents (Y) then used a simple linear regression model analysis model with the

following equation:

$$Y = 112.668 + 0,0882X$$

In the output table for singnifikanya $t \ 0.001 > 0.05$ then stated factors influence the accident-prone road accidents Diponegoro Surabaya.

• Test of Influence (t-Test)

Based on the test, it can be seen in Table 4:15. Influence Factors Accidents (X1) against accident-prone (Y) the following calculation:

$$DF1 = K = 1$$

$$DF2 = n - K - 1 = 100 - 1 - 1 = 98$$

$$T \text{ table} = 1.98447 \text{ to } 1.984$$

$$T \text{ count} = 2,276$$

Picture

1. Distribution Curve Crash Test T Influence Factor (X1) Against Accident Prone (Y)

Because $t \text{ count} > t \text{ table}$ is $2,276 > 1,984$ and has a significance level of $0.000 < 0.05$. It can be concluded that the accident factors affect terhadap swamp road accidents Diponegoro Surabaya.

CONCLUSION

Based on the results of the discussion of the study areas prone to traffic accidents on the road Diponegoro - Surabaya can pull conclusions as follows:

1. Daily traffic conditions on the road is very congested Diponegoro total vehicles on holidays reaches 11720 from hours 7:00 to 17:00 from Diponegoro street while the direction Dr. Soetomo reach 11416 by calculating the same clock that dominates the vehicle is a motorcycle.
2. Factors affecting swamp traffic accident in Jalan Diponegoro many motorists are not orderly while driving or break through the lights, drowsiness and red neglect the human factor and the factor dominant over the speed limit and cause the street Diponegoro - Surabaya become accident-prone roads. Based on the above discussion perhitungan regresi result of these simple linear model of the equation $Y = 112.668 + 0,0882x$. Based on the results of the data analysis dari $t > t \text{ table}$ $2,276 > 1,984$ to see signifikansi level of $0.000 < 0.05$. Based on the test, it can be seen in Table 17. Influence Factors Accidents (X1) on the accident-prone.
3. With this effort must be undertaken to minimize the occurrence of road accidents Diponegoro is party satalantas socialization from Surabaya to motorists corresponding appropriate speed limit traffic signs, on Street Diponegoro, obey rules such as not running red lights.

Suggestion

1. Pengendara for motorcycles is expected to be more careful when driving orderly while on the road and driving the appropriate speed according to the traffic signs to remember victims of accidents which dominate in the way Diponegoro- Surabaya is motorcyclists.
2. Need to do maintenance for signs that are not visible because of blocked twigs should be followed up so that the rider while passing through the street could see clearly.
3. Mensosialisasikan-traffic regulations to the public when the driver's license road users.

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