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Correlation among Assessment of Accident Rate and Geometric Factors, Road Equipment, and Environment (Case Study on Muara Teweh-Puruk Cahu Road Segment)

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ABSTRACT: Increased mobility of land transportation for humans and goods that cause traffic accidents is inseparable from a negative aspect of human, road geometric, road equipment, and environment. Accidents that occur can cause a problem that must immediately get treatment as it may lead to damage, either in material or unwanted casualties. To see the relationship between the negative aspects of the accident, a linear regression test was conducted. From the results of the analysis, it can be seen that the correlation between dependent variables such as Accident Frequency, EAN (Equivalent Accident Number), Accident Rate (AR), or UCL (Upper Control Limit) and the independent variables, which are road geometric, environmental conditions and supporting facilities shows that the Accident Frequency and EAN produce a strong correlation. For Accident Frequency, the independent variables that influence it are Land Use and Road Pavement, while EAN shows a better correlation with the independent variables that influence it, which are Public Street Lighting, Land Use, and Road Pavement. For the AR and UCL the correlation value shows a moderate relationship, in the sense that when reviewed, the value of the AR and UCL is not good to be associated with the independent variable, as it has a multi-variant independent variable.

KEYWORDS: Accident Frequency, EAN, AR, UCL, Regression Analysis

I. INTRODUCTION

Muara Teweh is the Capital of North Barito Regency and Puruk Cahu is the Capital of Murung Raya Regency, where Murung Raya Regency is a division from North Barito Regency. Distribution and mobilization of the Muara Teweh and Puruk Cahu society begins to develop and the large number of vehicle sales has led to an increase in vehicle ownership. Traffic safety is one of the important parts. Law 38/2004 [1] on roads and road safety in Law 22/2009 [2] concerning traffic and road transportation is a condition for everyone to avoid the risk of accidents during traffic caused by humans, vehicles, roads, and/or the environment. The issue of road safety has become a global problem. Every year more than 1 million people die and more than 50 million people are injured due to road traffic accidents in the world. Seventy-five percent of them occur in developing countries. It is estimated that in 2020, traffic accidents are the third leading cause of death after cancer and stroke. The occurrence of a traffic accident on Muara Teweh-Puruk Cahu road section, if it is not handled immediately, it will only become news.

II. LITERATURE REVIEW

Public roads according to their functions are grouped into arterial roads, collector roads, local roads, and environmental roads [3][4]. Road Safety is the physical fulfillment of road elements against road technical requirements and environmental conditions that avoid or do not cause traffic accidents [5]. Road equipment as intended consists of: Traffic signaling equipment, traffic signs, road markings, street lighting equipment, safety fences, traffic mirror, delineator marks, rumble strip, and road user control devices [6]. Safety standards in the field of traffic and road transportation are a reference for the organizers of facilities and infrastructure in the field of traffic and road transportation which include: public motorized vehicles, traffic infrastructure and road transport, human resources in the field of traffic and road, operational and environmental transportation [7]. The urban/ semi-urban road segment has developed permanently and continuously throughout all or almost all roads, minimum on one side of the road, whether it is land development or not. Roads in or near urban centers with a population of more than 100,000 are always classified in this group. Roads in urban areas with a population of less than 100,000 are also classified in this group if they have permanent and continuous road side developments. Out-of-town road segments have no continuous developments on each side of the road, although there may be some permanent developments such as restaurants, factories or settlements [8].

Notion of Traffic Accidents

Article 1 of Law No. 22 of 2009 concerning Road Traffic and Transportation (*UULLAJ*) states the notion of traffic accidents is an unexpected and unintentional incident on road involving vehicles with or without other road users which results in human casualties and/or property losses. Accidents can also be defined as an incident that occurs in a certain time or period with conditions involving one's self or other people, vehicles, or other objects that can be detrimental if it results in human or object casualties. Accidents are caused by various kinds of accidental factors that occur (random multi factor events) in a certain time and cannot be predicted exactly where and when a traffic accident can occur. This accidental factor often affects the instincts of road users not to raise awareness in a series of actions to ensure their safety.

Factors Causing Accidents

To make ends meet, people travel. Travel requires time, mode and place to move goods or services. Factors causing accidents can be classified in several parts, which are human factors, vehicle factors, road factors and environmental factors. These factors are part of a traffic accident as the main cause of death and material loss if the interaction that occurs does not function properly. Traffic accidents can result from conflict situations involving the driver and vehicle when the driver dodges or avoids something.

Types of Accidents

Types of accidents according to the Guidelines for Handling traffic accident-prone locations are based on the 5W + 1H approach, which are why (cause of accident), what (type of collision), where (accident location), who (road user involved), when (time of occurrence) and how (occurrence of accident) [9].

Equivalent Accident Number

Equivalent Accident Number is a way to prioritize the handling of accidents by weighting each accident class. The weighting figures are shown in Table 1.

Table 1. Equivalent Accident Number [9].

Accident Class	Remarks	Weight
Pass Away (MD)	Fatal accident	12
Severe Injuries (LB)	Accidents with severe injuries	6
Minor Injuries (LR)	Accident with minor injuries	3
Material Damage (K)	Only Experiencing Material Loss	1

EAN is determined by the formula:

$EAN = 12MD+6LB+3LR+1K$

Accident Rate

Accident Rate on a road segment is determined by dividing the frequency of accidents by several exposure measures (traffic volume, length of road, number of years of accidents) in the accident unit per 100 million Km of vehicle travel (100 JKPK) as follows [9]:

$$AR = \frac{(AF.10^{8})\ (100JPKP)}{L.n.LHR.365}$$

Where:

AR = Accident rate in 100 JPKP
AF = Frequency of accident in times
LHR = Average daily traffic rate in vehicles/day
L = Length of the road in Km
n = Number of years of accident

Accident-Prone Location

Determination of accident-prone locations uses quality control statistics as a control chart of Upper Control Limit [9]:

$UCL = \lambda + \psi \sqrt{((\lambda / m) + (0.829 / m) + (1/2m))}$

Where:

λ = average exposure level
m = exposure unit, can be used 100 million km of vehicle travel
ψ = probability factor, $\psi = 2.576$ for the probability level of 90%

Regression Analysis

Linear regression analysis is a statistical method that can be used to study the correlation between the nature of the problem being investigated. The linear regression analysis model can model the correlation between two variables or more. In this model there are dependent variables ($\boldsymbol{y}$) which have a functional correlation with one or more independent variables ($\boldsymbol{x_i}$) [10].

Research that correlates between accident-prone location and geometric paths using regression analysis has been carried out in Tapin District, South Kalimantan. The study aimed to determine the accident-prone location/areas (black spot) on roads, and analyze the geometric conditions of the road, and the road conditions factors for the occurrence of accidents on roads in Tapin District [11].

III. RESEARCH METHOD

Data Collection Phase

There were 2 (two) types of data used in analyzing this study, including the following: 1) Primary data obtained from direct surveys in the field include: geometric road / inventory surveys, vehicle traffic data. 2) Secondary Data obtained include: Data on traffic accidents in the last 5 (five) years of 2013-2017 from the North Barito Regency and Murung Raya Regency Police Resort. Good road data head to and pass the Muara Teweh-Puruk Cahu National Strategic Road from the Technical agency.

IV. DATA ANALYSIS

Accident Perpetrator

Accidents perpetrator in accident-prone areas are grouped by age, gender and profession from accident data. This condition will provide an overview of each of the incidents in 2013-2017, as shown in Table 2.

Table 2. Accident Perpetrators based on Age, Gender and Professional Muara Teweh-Puruk Cahu Road Section [12] [13].

No	Accident Perpetrator	2013	2014	2015	2016	2017	Total
Based on Age							
1.	0 - 14 years old	2	2	-	1	-	5
2.	15 - 64 years old	20	26	23	32	17	118
3.	Above 65 years old	-	-	-	-	1	1
Total		22	28	23	33	18	124
Based on Gender							
1.	Male	20	25	22	25	15	107
2.	Female	2	3	1	8	3	17
Total		22	28	23	33	18	124
Based in Profession							
1.	Students	-	-	-	-	-	-
2.	Government Employees	1	3	1	3	1	9
3.	Private Sector	17	19	19	22	15	92
4.	College Students	4	6	3	8	2	23
Total		22	28	23	33	18	124

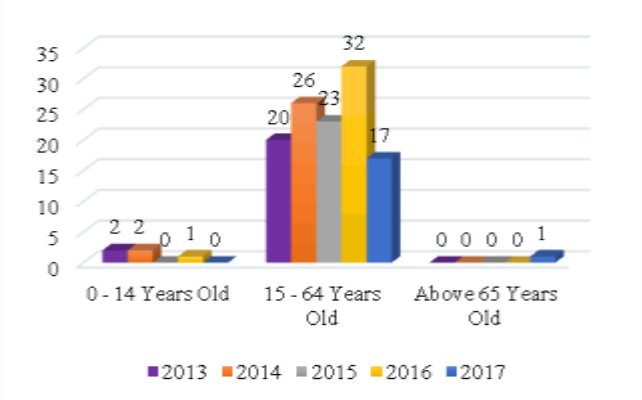

Figure 1. Accident Perpetrators Based on Age

In Figure 1, accidents based on age on the accident location in Muara Teweh-Puruk Cahu road are aged 15-64 years which fall into the category of productive age groups.

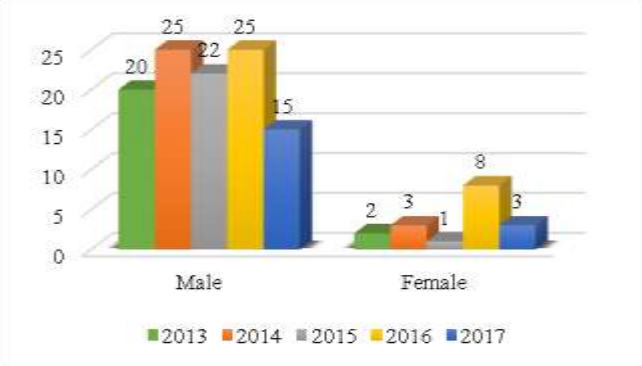

Figure 2. Accident Perpetrators Based on Gender

In Figure 2, accidents based on gender on the accident location in Muara Teweh-Puruk Cahu road section show that the male gender is the most dominant involved as an accident perpetrator in the period of 2014 and 2016.

Accidents based on profession on accident-prone locations in Muara Teweh-Puruk Cahu road section show that the private sector in the period of 2016 is most dominantly involved as accident perpetrators compared to the other three professions, shown in Figure 3.

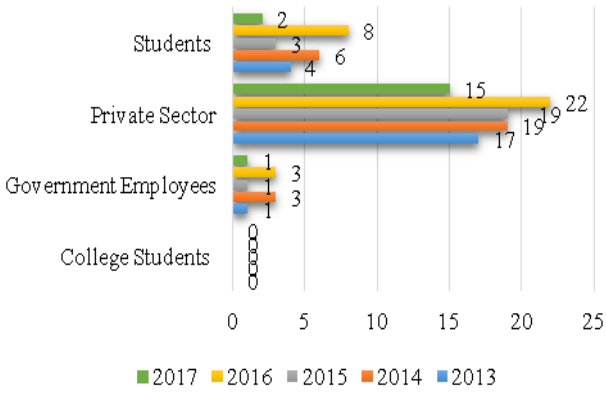

Figure 3. Accident Perpetrators Based on Professions

The number of accidents based on the time of occurrence in Muara Teweh-Puruk Cahu road section, is mostly in the afternoon with the number of accident cases is 34 incidents which can be seen in Figure 4.

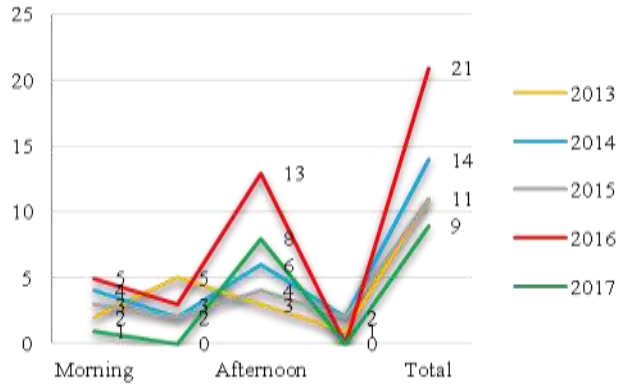

Figure 4. Number of Accidents Based on Time of Occurrence

From Figure 5, it can be seen that the number of motorized vehicles that are seen is quite prominent, amounting to 75 during the five year period.

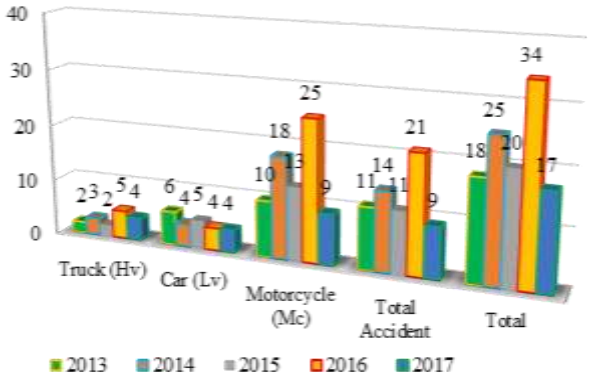

Figure 5. Number of Vehicles Involved in the Accident

The number of vehicle involved in accidents based on the types of collision shows that number of front-to-front collision type is quite prominent, which is 30 cases of accidents. The incidence of traffic accidents in the alignment of road segments shown in Figure 6 and Figure 7.

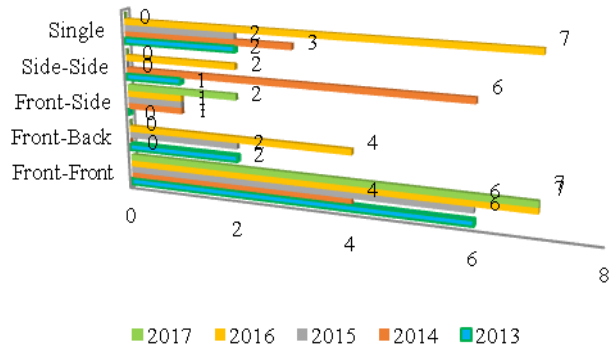

Figure 6. Number of Vehicle Accidents by Type of Collision

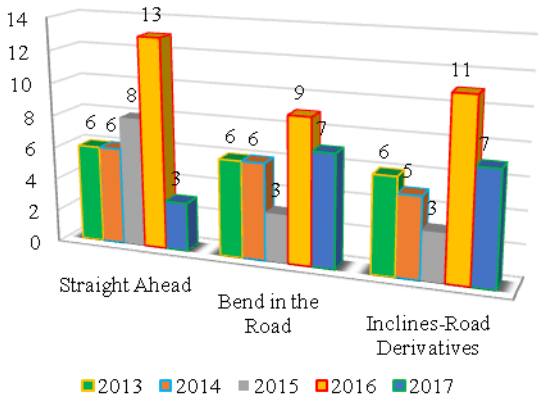

Figure 7. Traffic Accident on Road Alignment

Analysis of Influence Variables on Accident Rate

Statistical testing is needed to review the data that has been obtained:

Dependent Variables (Yn) will be analyzed based on data on the number of accident frequency, equivalent accident number, accident rate, Upper Control Limit.

Independent variables (Xn)/ influence factor from the data obtained is a qualitative value which is then quantified based on the accident frequency, Equivalent Accident Number, accident rate, Upper Control Limit that occurs in accident-prone locations.

The independent variables include the following:

X_1 = Road marker Variable

Judging from the data obtained, the Road Marker variables are grouped into 2 groups, which are:

1) The presence of quantitative value = 0
2) Lost and faded quantitative values = 1

X_2 = Street lighting variable

Judging from the data obtained, the street lighting variables are grouped into 2 groups, which are:

1) The presence of quantitative value = 0
2) The absence of quantitative values = 1

X_3 = Road sign variable

Judging from the data obtained, the road sign variables are grouped into 2 groups, which are:

1) The presence of quantitative value = 0
2) The absence of quantitative values = 1

X_4 = Road narrowing variable

Judging from the data obtained, the road narrowing variables are grouped into 2 groups, which are:

1) The absence of quantitative value = 0
2) The presence of quantitative values = 1

X_5 = Road alignment variable

Judging from the data obtained, the road alignment variables are grouped into 2 groups, which are:

1) Straight road with quantitative value = 0
2) Junction, uphill/downhill road with quantitative value = 1

X_6 = Road pavement variable

Judging from the data obtained, the road pavement variables are grouped into 2 groups, which are:

1) The absence of quantitative value = 0
2) Hollow, slippery, bumpy road with quantitative value = 1
3) Damaged road with quantitative value = 2

X_7 = Land use variable

The road environment is classified into classes according to land use and road accessibility from the surrounding activities into 3 parts, which are: Commercial (shops, offices, restaurants, markets, schools), settlements, and limited access (empty land), So that it is grouped quantitatively into 3 groups:

1) Empty land with quantitative value = 0
2) Settlement with quantitative value =1
3) Commercial with quantitative value = 2

Statistical Testing

Data needs to be analyzed so that a relationship can be obtained between the objectives of the study and the results of the study.

The equivalent accident number method is an accident-weighted rating that refers to the cost of an accident. Based on the weighting of the victims due to the accident, a new accident rating list will be obtained where the value of material loss (K) in this study is excluded, which can be seen in Table 3.

Table 3. Level of Fatality of Accidents and Victim Conditions of 2013-2017

No	Road Segment	On Segment	Victim Condition (2013-2017)			AEK
			MD	LB	LR	
1.	A.Yani Street		1	4	15	81
2.	Y.Sinseng Street		2	3	7	63
3.	M.T. - P.C. Highway	Km.3 - Km.4	1	5	-	42
4.	M.T. - P.C. Highway	Km.8 - Km.9	1	5	5	42
5.	M.T. - P.C. Highway	Km.15 - Km.16	3	-	1	39
6.	M.T. - P.C. Highway	Km.47 - Km.48	2	-	2	30
7.	M.T. - P.C. Highway	Km.6 - Km.7	-	3	3	27
8.	M.T. - P.C. Highway	Km.34 - Km.35	1	2	1	27
9.	M.T. - P.C. Highway	Km.75 - Km.76	2	-	-	24
10.	M.T. - P.C. Highway	Km.12 - Km.14	-	2	2	18
11.	M.T. - P.C. Highway	Km.53 - Km.54	1	1	-	18
12.	M.T. - P.C. Highway	Km.59 - Km.60	1	1	-	18
13.	M.T. - P.C. Highway	Km.1 - Km.2	-	2	1	15
14.	M.T. - P.C. Highway	Km.21 - Km.22	-	1	3	15
15.	M.T. - P.C. Highway	Km.25 - Km.26	-	2	-	12
16.	M.T. - P.C. Highway	Km.28 - Km.29	-	2	-	12
17.	M.T. - P.C. Highway	Km.32 - Km.33	1	-	-	12
18.	M.T. - P.C. Highway	Km.40 - Km.41	-	1	2	12
19.	M.T. - P.C. Highway	Km.62 - Km.63	1	-	-	12
20.	M.T. - P.C. Highway	Km.4 - Km.5	-	1	1	9
21.	M.T. - P.C. Highway	Km.18 - Km.19	-	1	1	9
22.	M.T. - P.C. Highway	Km.23 - Km.24	-	1	1	9
23.	M.T. - P.C. Highway	Km.26 - Km.27	-	1	1	9
24.	B.Katamso Street		-	-	2	6
25.	M.T. - P.C. Highway	Km.41 - Km.42	-	1	-	6
26.	M.T. - P.C. Highway	Km.79 - Km.80	-	-	2	6
27.	M.T. - P.C. Highway	Km.70 - Km.71	-	-	1	3
28.	M.T. - P.C. Highway	Km.72 - Km.73	-	-	1	3

(M.T. - P.C. = Muara Teweh-Puruk Cahu)

Dependent Variable Analysis is based on Equivalent Accident Number, while independent variables are in the form of road markers, public street lighting, road signs, road narrowing, road alignment, pavement and land use which can be seen in Table 4.

Table 4. Dependent Variables Based on the Equivalent Accident Number (Y_1) and Independent Variables (X_1-X_7)

No	AEK	Marker	PSL	Signs	Narrowing	Road Alignment	Road Pavement	Land Use
	Y_1	X_1	X_2	X_3	X_4	X_5	X_6	X_7
1.	81	1	0	0	0	1	0	2
2.	63	1	0	0	1	1	0	2
3.	42	0	1	0	0	0	0	2
4.	42	1	0	0	1	1	0	2
5.	39	1	1	0	1	1	1	1
6.	30	0	0	0	0	0	0	1
7.	27	0	0	0	1	1	1	1
8.	27	1	1	1	1	1	1	2
9.	24	1	1	1	0	1	0	0
10.	18	1	1	1	0	1	1	0
11.	18	1	1	1	0	1	0	0
12.	18	1	1	1	0	0	1	0
13.	15	1	1	1	0	1	1	0
14.	15	1	1	1	1	1	1	0
15.	12	1	1	1	1	0	1	0
16.	12	1	1	1	0	1	0	0
17.	12	1	1	1	0	1	1	2
18.	12	1	1	1	1	1	1	0
19.	12	1	1	0	0	0	0	0
20.	9	1	1	1	0	0	0	0
21.	9	1	1	1	0	1	1	0
22.	9	1	1	0	1	1	2	1
23.	9	1	1	0	1	1	1	0
24.	6	0	1	1	1	1	1	0
25.	6	0	1	1	1	0	1	0
26.	6	1	1	0	1	1	2	0
27.	3	0	1	0	1	1	1	1
28.	3	1	1	1	0	1	1	1

Based on data analysis, a linear regression test was carried out with a Stepwise method for each of the dependent variables (Y*1*) and independent variables (X_1-X_7). The results of the tests can be seen in Table 5.

Table 5. Regression Test Results on Dependent Variables (Y_1) and Independent Variables (X_1-X_7)

No	Dependent Variables (Y_1)	Independent Variables (X)	R	Coeff., t(Sig.)	ANOVA, F(Sig.)
1.	**Freq.**	Land Use (X_7),	0,721	3,938 (0,001)	13,502 (0,000)
		Road Pavement (X_6)		-2,472 (0,021)	
2.	**EAN**	Public Street Lighting (X_2),	0,826	-2,703 (0,012)	17,193 (0,000)
		Land Use (X_7),		2,823 (0,009)	
		Road Pavement (X_6)		-2,121 (0,044)	
3.	**AR**	Land Use (X_7)	0,525	3,142 (0,004)	9,875 (0,004)
4.	**UCL**	Land Use (X_7)	0,525	3,144 (0,004)	9,885 (0,004)

From Table 5, it can be seen that the correlation between the dependent variable (*Y1*), Accident Frequency, EAN, AR, or UCL on the independent variables which are road geometric, environmental conditions, and supporting facilities shows that the Accident Frequency and EAN produce strong correlation. For Accident Frequency of 0.721 (R) with the independent variables that influence it which are Land Use (X_7) and Road Pavement (X_6), while the EAN shows a better correlation of 0.826 (R) with the independent variables that influence it which are Public Street Lighting (X_2), Land Use (X_7), and Road Pavement (X_6). For the AR and UCL, the correlation value shows a moderate one, in the sense that if the value of the AR is 0.525 (R) and UCL 0.525 (R), it is not good to be associated with the independent variable (*X*), it has an independent variable a multi variant.

Discussion

Accidents are incidents vents that occur within a certain time or period with conditions involving one's self or other people, vehicles, or other objects that can be detrimental if they result in human or object casualties. Accidents are caused by various types of unintentional factors (random multi factor events). In Muara Teweh-Puruk Cahu road section, the causes of accidents can be grouped in: human, vehicle, road, and environment.

1) Human Factors/Road Users

Human factors, which are road users, can be divided into two groups: drivers, including drivers of non-motorized vehicles; and pedestrians.

Drivers, it can be said that almost all traffic accidents involving vehicles are caused by drivers because of various factors inherent in the driver, for example: physical fitness, mental readiness while driving, carelessness, fatigue, drowsiness, the influence of alcoholic beverages and drugs, lacking skilled, inability to keep distance, and driving too fast. These things are examples of the driver's fault in general which opens a great opportunity for severe accidents, in addition to endangering the safety of other road users on the Muara Teweh-Puruk Cahu road section.

Age-based traffic accidents are seen at the age of 15-64 years, based on gender, it is the males who are the most dominant involved as an accident perpetrator, and based on the profession, it can be seen that those in private sector are the dominant perpetrators in the 2013-2017 period on the Muara Teweh-Puruk Cahu road section.

Pedestrians, the mistakes of pedestrians in general are due to negligence, non-compliance with laws and regulations and neglect of traffic manners. For example, they cross not where they should or in a sudden situation, or walk using a vehicle lane (due to negligence or by force), or other errors. The driver's treatment of pedestrians and the obligations of pedestrians in traffic was not obeyed on Muara Teweh-Puruk Cahu road which later caused an accident.

2) Vehicle Factors

Vehicle is recorded to be the cause of traffic accidents that have severe consequences. Traffic accidents occur as a result of damage to the brakes that often occur and ignorance to the signaling device (generally in the form of signal lights) as a vehicle. The device may not work, or even the highlight is increased so that it disturbs other drivers who pass by. Sometimes the device is added with decorative lights that confuse other drivers. There are still many other things that violate applicable laws and regulations. Vehicle design can also be a big factor for the severity of an accident. The use of seat belts and other safety equipment still lacks attention and is often seen as disturbing. Based on the types of vehicle collisions, the types of front-to-front collisions and motorized vehicles are seen in a fairly prominent number based on the analysis of the period 2013-2017 on the Muara Teweh-Puruk Cahu road section. Accident prevention efforts can be carried out by applying special lanes for motorbikes, special lanes for non-motorized vehicles, and standardizing vehicle designs.

3) Road Factors

Road conditions can also be one of the causes of traffic accidents. Nevertheless, everything goes back to the human road user itself. Engineering network systems and road design are done to influence the behavior of road users and to reduce or prevent actions that endanger traffic safety. Junctions that are too sharp, especially when obstructed by fences or buildings and without road markings, are places prone to accidents. A sharp angle on a steep incline can be a place of accident. Wide road, on the one hand provides comfort for vehicle traffic, but on the other hand can be a safety threat because of the speed of the vehicle. Intersections, narrow roads, uncontrolled access, poor/unclear road markings, absence of speed limit signs, and slippery road surfaces can also be accident-prone places. Traffic accidents in all road segments occur on straight roads, uphill/downhill road, and junctions. The availability of road equipment facilities in the form of markers, both edge markers and center markers are not complete on each road segment. The availability of traffic signs is not maximal for each road segment. Road lighting is very limited and there are even roads that have no lighting. Road width, median, road shoulder, sidewalk: ± 12m two-way, sidewalk: ± 1.80m, median: ± 1m and road width: ± 6m two-way, road shoulder: ± 1m. Narrowing of road segments are grouped on its presence and absence on the road on the Muara Teweh-Puruk Cahu road section. Roads need to be equipped with various road fittings to help regulate traffic flow, including: road markings, traffic islands, dividing lines, traffic lights, safety fences, and other traffic engineering. No less important is the determination of road alignment, both horizontal (junction and intersection) and vertical (incline), which greatly influences the freedom of view of the driver. Complete safety factors in road planning

design are needed to minimize the occurrence of traffic accidents.

4) Environmental Factors

Environmental factors both natural environment and built environment, which are the works of human engineering, are very influential for traffic safety. Trees or hills that obstruct the view, steep uphill/downhill roads, and sharp turns are natural factors that deserve serious attention in traffic management. There is a natural environment that can be changed based on the demands of traffic security and safety, but some are not possible to change because of the consideration of environmental sustainability itself and/too expensive costs. Another natural factor that cannot be changed is the position of the sun against the driver which causes glare from the view. Bad weather greatly affects the smooth flow of traffic, even in various occurrences, traffic accidents are caused by bad weather. Heavy or foggy rain limits the driver's view so that there is easy anticipation error. In addition, the road can be very slippery. Everything can be returned to human factors, on the awareness and caution in all weather conditions. The built environment, sometimes can also be the cause of traffic accidents. It is in the form of a yard fence or a building on a road junction that reduces driver's view, roads which suddenly narrow, sharp intersections, and billboards that cover or obscure the meaning of traffic signs. The number of accidents based on the time of the accident occurrence on Muara Teweh-Puruk Cahu road segment is dominantly during the afternoon period of 2013-2017.

Traffic management of road equipment is useful to help regulate traffic flow: road markings, traffic islands, signs, dividing lines, public street lighting, traffic lights, safety fences, road safety facilities/tools and other traffic engineering. Efforts to enforce the law (Enforcement), engineering, Inspection of roads and the environment, cleaning up the area belonging to the road on the Muara Teweh-Puruk Cahu road requires improvement. From the analysis data concerning the 2013-2017 Accident Fatality Level and Victim Conditions, the Equivalent Accident Number is 12MD (Death) + 6LB (Severe Injury) + 3LR (Minor Injury). Based on the analysis data obtained from dependent variables based on EAN (*Y1*) and independent variables (X_1-X_7), street lighting data on the Muara Teweh-Puruk Cahu road segment are grouped into 2 groups, namely: if the street lighting is present on the road segment then the quantitative value = 0, and if there is no street lighting on the road, the quantitative value = 1. From the 28 (twenty eight) road segments based on the analysis, the majority of it do not have street lighting on the Muara Teweh-Puruk Cahu road section. Furthermore, from the analysis data obtained by the dependent variable based on EAN (*Y1*) and independent variables (X_1-X_7) related to land use in Muara Teweh-Puruk Cahu road section, land use variables are grouped quantitatively into 3 groups: If the road is empty land then the quantitative value = 0, if the settlement in the area of the road is getting denser then the quantitative value = 1 and for commercial buildings the quantitative value = 2. 28 (twenty eight) road segments based on analysis of land use are dominated by empty land on the Muara Teweh-Puruk Cahu road section. The data analysis obtained related to dependent variable of road pavement based on EAN (*Y1*) and independent variables (X_1-X_7) on Muara Teweh-Puruk Cahu road section for pavement variables are grouped into 3 groups: If the road section has no damage then the quantitative value = 0, if the road is in a hollow, slippery and bumpy condition then the quantitative value = 1, and if the road condition is damaged then the quantitative value = 2. 28 (twenty eight) road segments from the analysis of road pavement are dominated by hollow, slippery and bumpy roads on the Muara Teweh-Puruk Cahu road section. Based on the results of the regression analysis, the EAN shows a better correlation of 0.826 (R). Judging from the results of the coefficient value t (Sig.), ANOVA F (Sig.), Correlation, and the number of variables that influence it, the correlation that can be used to show the influence of independent variables on accident assessment is among the variables of Public Street Lighting, Land Use, and Road Pavement. Public Street Lighting, Land Use, and Road Pavement can refer to existing standards, regulations and guidelines in terms of enhancing and handling the Muara Teweh-Puruk Cahu road section.

V. CONCLUSION

It can be concluded from this study that accident-prone areas based on road segments are 28 (twenty eight) segments from 66 (sixty six) cases of accidents in the period 2013 to 2017 on the Muara Teweh-Puruk Cahu road segment. The main causes of traffic accidents are human factors, in addition to other factors, namely: roads, vehicles, and the environment. Geometric conditions, complete road construction, road alignment (horizontal and vertical), and road environment should meet traffic safety requirements. Improvement is needed regarding Public Street Lighting, Land Use, and Road Pavement on the Muara Teweh-Puruk Cahu road section. Handling aimed at improving safety conditions at accident locations can be done through road engineering, traffic engineering and traffic management.

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