

The Characteristic of Traffic Accidents Occurred On Mayjen Sungkono Street Malang due to Environmental Factors

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Abstract

The number of motor vehicles which persistently increases every year arises the impact of congestion issues and the increasing number of traffic accidents. According to the data obtained from the Traffic Police Corps of Malang District Police, Mayjen Sungkono Street which is located in Kedung Kandang, Malang, has a high accident rate since 2008 until 2012. The result of analysis indicates that several behaviours influencing traffic accident rate on Mayjen Sungkono Street include the occupation of perpetrators, in which 87% of them work as private entrepreneurs; the address of the perpetrators, in which 53,07% of them come from Malang Regency; the age of perpetrators, in which 46,296% of them aged between 26 and 45 years old; and the age of pedestrians involved in which 35,484% of them aged less than 17 years old or between 17 and 25 years old. Besides, according to the data, the highest accident rate occurs in 2011 with the total percentage of 38,89%.

Key words: Human behavior; Traffic accident; Malang-Indonesia; motor vehicles;

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1. Introduction

The number of motor vehicles, both two-wheelers, and four-wheelers, in Malang, is increasing every year. Based on the data issued by the Local Revenue Office of East Java Province, the number of motor vehicles in Malang reached 292.753 units in 2010. The next year, the number of motor vehicles increased to 340.753 units. It means that the number of the motor vehicle in Malang increases 48.000 units in a year with the percentage of 16% per year. It is linear with the fact which shows that the number of motor vehicles in Indonesia persistently increases. (Source: Local Revenue Office of East Java Province). The issues of traffic system such as congestion and the increasing number of the accidents might arise because of road users' poor behavior as well as the lack of sufficient road infrastructure improvement (Stopher, 2004).

Mayjen Sungkono Street located in Kedung Kandang, Malang is categorized as a primary local road. The number of road users and the risk of accident on Mayjen Sungkono Street are higher since this road is close to the settlements. Besides, this road is also close to several schools such as SMAN 6 Malang, SMPN 10 Malang, MI Diponegoro, MTs/MA Hamid Rusdi, TK NU 37, SDN Buring, TK Satap, SMP Darul Ulum Agung, SMA Darul Ulum Agung, and Integrated University as well as the other public facilities such as Hamid Rusdi Station, Ken Arok Sport Center and Cempaka Putih Housing 1, 2, and 3.

According to the law number 38 in 2004 about the road, a primary local road is a local-scaled road in particular region. Mayjen Sungkono Street, Kedung Kandang, Malang, has a width of ± 6 meters with the way down and steep grade at the end of its north side, but when we go to the south side of the road, it is widening to be ± 7 meters and there is no way down and steep grade. According to the data obtained from Traffic Police Corps of Malang District Police, Mayjen Sungkono Street, Kedung Kandang, Malang has an adequate high accident rate since 2008 up to 2012. Therefore, further research is needed to know the influence of weather on the characteristic of traffic accidents occurred on Mayjen Sungkono Street, Malang. The objective of this study is examining the influence of weather on the characteristic of traffic accidents occurred on Mayjen Sungkono Street, Malang. While the scope of this study includes two things, namely the influence of weather on the characteristic of traffic accidents occurred on Mayjen Sungkono Street, Malang and the Indonesian regulation

enforcement of the law number 22 in 2009 about Traffic and Public Vehicle which has certain effect on the characteristic of traffic accidents occurred on Mayjen Sungkono Street, Malang.

2. Theoretical Framework

According to the law number 22 in 2009, it is explained that everyone who uses the road is required to behave orderly and prevent the things which might impede or even endanger traffic safety and road transportation. In addition, road users also need to prevent things which might destruct the road (Peden, 2004). Everyone driving motor vehicles on the road has to drive properly and have to be concentrated. Motor vehicle drivers should prioritize others' safety such as pedestrians and cyclists (WHO, 2009). Besides, they have to comply with road marking and traffic lights as well as traffic signs and warning signs (Mogelmoose, Trivedi, and Moeslund, 2012). They also need to notice the traffic flow to manage their speed in driving motor vehicles. For the articulated vehicle such as a truck (trailer), the way those vehicles are attached or stick must be noticed as well.

The other important point is that motor vehicle drivers must have vehicle registration certificate (STNK)/ certificate of vehicle licensing (STCK), driving license (SIM), certificate of periodic commercial vehicle licensing, and any other pieces of evidence (certificate of confiscation as the temporary vehicle registration certificate). For the sake of safety, four-wheeler drivers must wear a safety belt, while two-wheeler drivers must wear a standard helmet (Trivedi and Rawal, 2011). According to the law number 22 in 2009, the traffic accident is an unexpected and unintentionally incident happened on the road involving vehicles or any other road users and caused the fall of victims and /or material loss. However, accidents are also categorized into various classifications according to cause and subject, i.e.:

2.1. Accident Classification Based on the Perpetrator of Accident:

2.1.1. Based on the Occupation of the Perpetrator

- a. Public Servant - It happens if the perpetrator of accident works in a government institution.
- b. Entrepreneur - It happens if the perpetrator of accident works outside the government institution.

- c. Indonesian Military and Indonesian National Police -It happens if the perpetrator of accident works in the military institution and police force.

2.1.2. Based on the Address of the Perpetrator

- a. In the Area of the Town - It happens if the perpetrator comes from the same town where the accident occurs.
- b. Outside the area of the town (Other Town or Regency) - It happens if the perpetrator comes from other town or regency.

2.1.3. Based on the Age of the Perpetrator

- a. Younger than or equal to 17 years old (≤ 17 years old) - It happens if the perpetrator's age is younger or equal to 17 years old.
- b. Between 17 and 25 years old (17-25 years old) - It happens if the perpetrator's age is between 17 and 25 years old.
- c. Between 26 and 45 years old (26-45 years old) - It happens if the perpetrator's age is between 26 and 45 years old.
- d. Older than or equal to 46 years old (≤ 46 years old) - It happens if the perpetrator's age is older or equal to 46 years old.

2.1.4. Based on the Age of Casualty

- a. Younger than or equal to 17 years old (≤ 17 years old) - It occurs if the casualty's age is younger or equal to 17 years old.
- b. Between 17 and 25 years old (17-25 years old) - It occurs if the casualty's age is between 17 and 25 years old.
- c. Between 26 and 45 years old (26-45 years old) - It occurs if the casualty's age is between 26 and 45 years old.
- d. Older than or equal to 46 years old (≤ 46 years old)- It occurs if the casualty's age is older or equal to 46 years old.

2.1.5. Based on the Age of Pedestrian Involved

- a. Younger than or equal to 17 years old (≤ 17 years old)- It happens if the pedestrian's age is younger or equal to 17 years old.
- b. Between 17 and 25 years old (17-25 years old)- It happens if the pedestrian's age is between 17 and 25 years old.
- c. Between 26 and 45 years old (26-45 years old)- It happens if the pedestrian's age is between 26 and 45 years old.

- d. Older than or equal to 46 years old (≤ 46 years old)- It happens if the pedestrian's age is older or equal to 46 years old.

2.2. The Characteristic of the Cause of Accident

Traffic is a result of vehicle movements due to human needs and goods-traffic (Behrends, Lindholm, and Woxenius, 2008). The aspects of the transportation system are all elements which might influence the traffic, i.e.:

2.2.1. Road User -

Road users are all people using road facilities such as drivers, pedestrians, and peddlers

2.2.2. Vehicle

The main factors which directly cause vehicle accidents are due to design limitations or disability arising from the lack of maintenance, bad adjustments and the destruction of some important components, for example, the brakes, tires, and lights (Hobbs, Mayou, Harrison, and Worlock, 1996)

2.2.3. Road and It's Supporting Facilities

- a. Geometric Design of the Road
- b. Pedestrian Facilities
- c. Road Marking/ Road Lines
- d. Traffic Lights

2.2.4. Environment

The situation around the road might give particular signs to the driver. Those signs are given by:

- a. The surrounding place which might be a flat, coastal area, beach, mountain range, etc.
- b. The surrounding weather which might be bright, rainy, foggy, dusty, smoky, etc.
- c. The situation regarding on traffic flow which might be heterogeneous, homogeneous, fast, stuck, etc.

3. Methodology

This survey conducted on Mayjen Sungkono Street, Kedung Kandang, Malang. Below is an overview of the map where the survey took place. The data used for this research are the primary data include the geometric data of the road and the secondary data include the data of traffic accidents.

Figure 1: Mayjen Sungkono Street, Kedung Kandang, Malang



Source: Goggle Map, 2016

4. Discussion

4.1. Analysis of the Type of Traffic Accidents

The perpetrators of an accident are highly influenced by their maturity in which age and gender are very influential on their emotion and reflex in facing a problem (Hauber, 1980). Besides, the level of education might also influence the way they think while driving on the road. The occupation of the perpetrators might reflect the level of intelligence and thinking ability on the road (Lefebvre, 2004). If one's occupations require them to think of problem critically, the way they drive will be more careful and they will also be thoughtful in making a decision while driving.

4.1.1. Based on the Occupation of the Perpetrator

The number of accidents happened on Mayjen Sungkono Street, Kedung Kandang, Malang, based on the occupation of the perpetrator are presented in the table below:

Table 4.1: Accident Classification Based on the Occupation of the Perpetrator

No	SPECIFICATION	YEAR					TOTAL	%
		2008	2009	2010	2011	2012		
1	PUBLIC SERVANT	0	0	0	1	0	1	1,851852
2	INDONESIAN MILITARY-INDONESIAN NATIONAL POLICE	0	1	0	0	0	1	1,851852
3	PRIVATE ENTREPRENEUR	7	6	9	19	6	47	87,03704
4	STUDENT	4	0	0	1	0	5	9,259259
TOTAL		11	7	9	21	6	54	100

The table indicates that people frequently suffering an accident on Mayjend Sungkono Street are the ones whose occupations are private entrepreneurs. It is proven by the total of 87,073% or around 47 incidents presented in the table.

4.1.2. Based on the Address of the Perpetrator

The address of the perpetrators will also influence their emotional level (Goldberg, Lerner, and Tetlock, 1999). According to the data obtained from the Traffic Police Corps of Malang District Police, the number of accidents occurred on Mayjen Sungkono Street, Kedung Kandang, Malang, for the period of 2008 until 2012 can be seen in the following table:

Table 4.2: Accident Classification Based on the Address of the Perpetrator

No	CLASSIFICATION	YEAR					TOTAL	%
		2008	2009	2010	2011	2012		
1	MALANG CITY	6	6	2	8	0	22	4,074,074
2	MALANG REGENCY	5	1	7	11	5	29	537,037
3	OTHER CITIES	0	0	0	2	1	3	5,555,556
TOTAL		11	7	9	21	6	54	100
TOTAL								

The table shows that the most frequent people suffering accidents on Mayjend Sungkono Street come from Malang Regency. It is proven by the total percentage of 53,704% or around 29 incidents written in the table.

4.1.3. Based on the Age of the Perpetrator

The number of accidents occurred on Mayjen Sungkono Street, Kedung Kandang, Malang, in 2008 until 2012 based on the age of the perpetrator are presented in the table below:

Table 4.3: Accident Classification Based on the Age of the Perpetrator

No	CLASSIFICATION	YEAR					TOTAL	%
		2008	2009	2010	2011	2012		
1	<17 years old	1	0	0	0	0	1	1,851852
2	17-25	5	2	4	9	3	23	42,59259
3	26-45	5	4	3	10	3	25	46,2963
4	≥ 46 years old	0	1	2	2	0	5	9,259259
TOTAL		11	7	9	21	6	54	100
TOTAL								

The table indicates that the total of 46,29% or about 25 accidents occurred on Mayjend Sungkono Street is suffered by people aged between 26 and 45 years old.

4.1.4. Based on the Age of Pedestrian Involved

According to the data obtained from the Traffic Police Corps of Malang District Police, the number of accidents happened on Mayjen Sungkono Street, Kedung Kandang, Malang, based on the age of pedestrian involved in 2008 until 2012 are presented in the table below:

Table 4.4: Accident Classification Based on the Age of Pedestrian Involved

No	CLASSIFICATION	YEAR					TOTAL	%
		2008	2009	2010	2011	2012		
1	<17 years old	4	1	3	1	2	11	35,48387
2	17-25	5	2	2	0	2	11	35,48387
3	26-45	3	0	1	3	0	7	22,58065
4	≥ 46 years old	1	0	1	0	0	2	6,451613
TOTAL		13	3	7	4	4	31	100
TOTAL								

Several accidents occurred on this road are frequently suffered by pedestrians aged both less than 17 years old, and between 17 and 25 years old. It is mentioned in the table with the total percentage of 35,484% or about 11 incidents in the latest five years.

4.1.5. Based on the Age of Casualty

Based on the data obtained from the Traffic Police Corps of Malang District Police, the number of accidents occurred on Mayjen Sungkono Street, Kedung Kandang, Malang, based on the age of casualty in 2008 until 2012 can be seen in the table below:

Table 4.5: Accident Classification Based on the Age of Casualty

BASED ON THE AGE OF CASUALTY								
No	CLASSIFICATION	YEAR					TOTAL	%
		2008	2009	2010	2011	2012		
1	<17 years old	5	1	0	1	0	7	6,730769
2	17-25	7	3	7	3	0	20	19,23077
3	26-45	14	16	4	4	2	40	38,46154
4	≥ 46 years old	11	8	6	8	4	37	35,57692
TOTAL		37	28	17	16	6	104	100
TOTAL								

The table shows that numerous accidents happened on this road are frequently suffered by people aged between 26 and 45 years old, with the total percentage of 38,461% or about 40 incidents in the recent five years.

4.1.6 Based on the Age of Pedestrian Involved

According to the data obtained from the Traffic Police Corps of Malang District Police, the number of accidents happened on Mayjen Sungkono Street, Kedung Kandang, Malang, based on the age of pedestrian involved in 2008 until 2012 are presented in the table below:

Table 4.6: Accident Classification Based on the Age of Pedestrian Involved

No	CLASSIFICATION	YEAR					TOTAL	%
		2008	2009	2010	2011	2012		
1	<17 years old	4	1	3	1	2	11	35,48387
2	17-25	5	2	2	0	2	11	35,48387
3	26-45	3	0	1	3	0	7	22,58065
4	≥ 46 years old	1	0	1	0	0	2	6,451613
TOTAL		13	3	7	4	4	31	100
TOTAL								

Several accidents happened on this road are commonly suffered by pedestrian aged less than 17 years old or aged between 17 and 25 years old. It is proven by the total of 11 incidents or about 35,484% in the latest five years as mentioned above. It happens since there are many schools, both elementary school, and high school, or even university which is located in this area. Hence, pedestrian aged less than 17 years old, or between 17 and 25 years old are frequently found there. Moreover, the times they go to school, as well as the time they go home, are considered as the most crowded hours that accident might frequently occur.

4.1.7. Accident Rate Analysis per Year

The increase and the reduction of accident rate every year can be measured by the enforcement of the traffic safety system (Retting, Ferguson, and McCartt, 2003). If there is a reduction of accident rate, the implemented system can be considered as an effective way. On the contrary, if there is an increase, there must be further research conducted to reduce the existing accident rate. The results of research presented on the table and the histogram regarding on the accident rate per year is as follows:

Table 4.7: Accident Rate Analysis per Year

YEAR	THE NUMBER OF TRAFFIC ACCIDENT	PERCENTAGE PER YEAR %
2008	13	18,056
2009	11	15,278
2010	13	18,056
2011	28	38,889
2012	7	9,722
TOTAL	72	100

Data Source: Traffic Police Corps of Malang District Police, 2011

The highest number of traffic accident occurred in 2011 with the total percentage of 38,889% or around 28 incidents.

5. Conclusion

Several factors which influence the number of traffic accidents on Mayjen Sungkono Street, Malang include occupation, address, and the age of the perpetrator as well as the age of pedestrian involved. The result of

analysis indicates that several behaviours influencing traffic accident rate on Mayjen Sungkono Street include the occupation of perpetrators, in which 87% of them work as private entrepreneur; the address of the perpetrators, in which 53,07% of them come from Malang Regency; the age of perpetrators, in which 46,296% of them aged between 26 and 45 years old; and the age of pedestrians involved in which 35,484% of them aged less than 17 years old or between 17 and 25 years old. Besides, according to the data, the highest accident rate occurs in 2011 with the total percentage of 38,89%.

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