The Influence of Day Time, Traffic Density and Rush Hour on Mobile Phone Use Among Indonesia Motorcyclist

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Abstract

Indonesia as a country with a large number of motorcycle users, has a high accident rate where human factors involved in most cases. The dangerous behavior committed by motorcyclists is alleged to be one of major reasons of the accidents and incidents. Among all possible dangerous behavior carried out by motorcyclists, mobile phone usage while riding could bring a horrible consequence to the road safety. The purpose of this study is to investigate the effect of time period, road density, and rush hour traffic on the use of mobile phones while riding. Field observation was conducted to assess motorcyclist' behavior in using mobile phone while riding. This research observed two level of road type based on its density. The observation on each type of road was carried out in the morning, afternoon, and evening by considering the rush hour at each observation. The prevalence of mobile phone use among the motorcyclist and passengers ranges between 1%~3%. A more detailed results on different observation variables will be discussed in this paper.

Keywords
Indonesia, Motorcyclist, Mobile Phone

1. Introduction

Accidents are one of the leading causes of death in the world where more than 1.2 million fatalities occurred worldwide every year on the road (WHO 2015)0. The number of death toll continues to increase to 1.35 million accidents in 2016 and most accident victims ranging from children to young adults aged 5-29 years (WHO 2018). According to (WHO 2015) data, there are ten countries with the highest accident rates, namely India, China, the United States, the Russian Federation, Brazil, Iran, Mexico, Indonesia, South Africa and Egypt, some of which are developing countries.

Pedestrians, cyclists, and motorcyclists are included in 54% of the death toll from traffic accidents occurred in the world (WHO 2018). Approximately 28% of these fatalities were experienced by motorcyclists and Southeast Asia became the most vulnerable region with 34% number of fatalities in 2015 and increased to 43% in 2018 (WHO 2015; WHO 2018). Traffic accidents not only result in injuries and deaths but also economic losses. The price of a motorcycle is one reason of widely used of motorcycle in developing countries, besides the fact that the motorcycle is also easier to use, flexible, and can pass through small and dense roads better than cars (Truong and Nguyen 2019; Truong et al. 2017). The Indonesian Central Statistics Agency reports that in 2018 there were around 120 million motorcycle users out of a total of 146 million vehicles in Indonesia, or approximately 81% of road users were motorcyclists.

The Indonesia National Police data shows that most accidents were caused by human factors, following by other factors such as poor infrastructure, dangerous environment condition, as well as technical failure of the vehicles. Specifically, for motorcycle accidents, the most common cause of accidents caused by driving more than two passengers, not wearing a helmet and using mobile phone while riding.

Several studies on the use of mobile phone while riding have been done in some other countries, the results of research conducted by (Truong et al. 2016) found that nearly 81% of students in Vietnam use mobile phone while riding. (Truong and Nguyen 2019) found that 91.6% of application-based motorcyclist used mobile phone while riding. Research by (Pérez-Núñez et al. 2013) showed 0.64% of motorcyclists using mobile phone while riding in three major cities of Mexico.

Several studies show the role of daytime in mobile phone use among motorcyclist. For example, research by (Pérez-Núñez et al. 2013) showed that the most common use of mobile phones occurred at 12.00-16.00 pm. In addition, research conducted by (Pérez-Núñez et al. 2013) shows 35% of accidents experienced by motorcyclist in Italy occur at 10.00 to 16.00. Most importantly, a study on road traffic accident rates in Indonesia based on National Transportation Safety Committee data from 2007-2016 (Saputra 2018) shows that the time of road accidents is mostly at 12.00-18.00, the reason for the accident was not told detail in data. Those findings show that the phone usage could be affected by different daytime (Collet et al. 2009). Another environmental condition which closely related with the daytime are the density of the road and busy hour (De Gruyter et al. 2017; Lipovac et al. 2017). Therefore, this study aimed to observe the influence of daytime, road density, and rush hour on the use of mobile phones while riding.

2. Method

This study used field observation as the primary method to investigate mobile phone use among motorcyclist. The observation was conducted in Bandung, one of major cities in Indonesia which has a high number of motorcyclists. Three independent variables were assessed: observation daytime, road density, and rush hour. The density of the road is justified by the number of vehicles that pass on the road at one time. Based on the density parameters, this research determined two different kinds of road as study location: Jalan Taman Sari (categorized as high-density road) and Jalan Lombok (low density road). Three specific periods of day time were assessed that are morning data collection, that are conducted at 06.30-07.30 (rush hour) and 08.00-09.00 (non-rush hour); afternoon data collection that are conducted at 12.00-13.00 (rush hour) and 14.00-15.00 (non-rush hour); and late afternoon data collection that are conducted at 16.00-17.00 (rush hour) and 15.00-16.00 (non-rush hour).

The observers are three graduate of Industrial Engineering Department, Bandung Institute of Technology. Before making direct observations on the road, all observers received training and simulation on how to collect data using a predetermined table format in a piece of paper. The training was given by the lecturers of Industrial Engineering Department who have expertise in Ergonomics and Work System Engineering research field, a day before the data collection process began. Data is collected on weekday (Monday-Friday) and three times at each determined place and time. The three observers take place on a pedestrian area for the reason of safety. The first observer is recording the information that seen by two other observers.

3. Results

In total, there were 25,013 vehicles observed. The number of mobile phone users as a function of day times, road densities, and busy hours is reported in Table 1. The comparison (in percentage) of mobile phone usage as a function of day times, road densities, and busy hours is reported in Table 2.

Table 1. The number of mobile phone use among motorcyclist as a function day times, road densities, and rush hour

		Morning				**Afternoon**				**Late Afternoon**				
		High Density Road		Low Density Road		High Density Road		Low Density Road		High Density Road		Low Density Road		
		Rush Hour	Non Rush Hour	Rush Hour	Non Rush Hour	Rush Hour	Non Rush Hour	Rush Hour	Non Rush Hour	Rush Hour	Non Rush Hour	Rush Hour	Non Rush Hour	**Total**
Phone User	**Rider**	63	58	12	21	50	69	19	28	53	64	47	35	519
	Passenger	71	70	18	16	84	71	22	36	147	103	48	40	726

Table 2. The percentage of mobile phone use among motorcyclist as a function day times, road densities, and rush hour

		Morning				Afternoon				Late Afternoon			
		High Density Road		Low Density Road		High Density Road		Low Density Road		High Density Road		Low Density Road	
		Rush Hour	Non Rush Hour	Rush Hour	Non Rush Hour	Rush Hour	Non Rush Hour	Rush Hour	Non Rush Hour	Rush Hour	Non Rush Hour	Rush Hour	Non Rush Hour
Phone User	**Rider**	12%	11%	3%	4%	10%	13%	4%	5%	10%	12%	9%	7%
	Passenger	10%	10%	3%	2%	12%	10%	3%	5%	20%	14%	7%	5%

Table 3. Prevalence of mobile phone usage among motorcyclist as a function day times, road densities, and rush hour

	Morning				Afternoon				Late Afternoon			
	High Density Road		Low Density Road		High Density Road		Low Density Road		High Density Road		Low Density Road	
	Rush Hour	Non Rush Hour	Rush Hour	Non Rush Hour	Rush Hour	Non Rush Hour	Rush Hour	Non Rush Hour	Rush Hour	Non Rush Hour	Rush Hour	Non Rush Hour
Number of Phone User	63	58	12	21	50	69	19	28	53	64	47	35
Number of Observed Motorcycle	3635	2702	1289	1045	2721	2610	975	1011	3435	2872	1449	1269
% of Phone User	2%	2%	1%	2%	2%	3%	2%	3%	2%	2%	3%	3%

To find out whether there is an influencer of daytime, road density, and rush hour on the behaviour of motorcyclist on mobile phone use during riding, a correlation test was conducted as can be seen in Table 4 and Table 5.

Table 4. Correlation among the mobile phone usage (rider and passenger) and daytime, road density, and rush hour

Daytime	* Mobile Phone	Usage	Road Density	* Mobile Phone	Usage	Rush Hour	* Mobile Phone	Usage
α	df	sig.	α	df	sig.	α	df	sig.
0.05	4	0.017	0.05	2	0.037	0.05	2	0.046

Table 5. Correlation among the mobile phone usage (rider only) and daytime, road density, and rush hour.

Daytime	* Mobile Phone	Usage	Road Density	* Mobile Phone	Usage	Rush Hour	* Mobile Phone	Usage
α	df	sig.	α	df	sig.	α	df	sig.
0.05	2	0.164	0.05	1	0,857	0.05	1	0,581

4. Discussions

The purpose of this study is to assess the effect of daytime, road density, and rush hour to the use of mobile phone on motorcyclist. In general, the prevalence of mobile phone use of the motorcyclist and passengers is between 1%~3%. The correlation tests of mobile phone usage among motorcyclist and passengers shows significant results, which means the daytime, road density, and rush hour have influence on mobile phone usage. The highest prevalence of mobile phone use among motorcyclist is reported from the low-density road in the late afternoon. Explanation of this might due to the 'slow pace' in low density road in the late afternoon, so that the motorcyclist tends to lower the attention and do multiple task due to perceived support condition in that conditions.

In addition, excluding the passenger from the further correlation test shows that the daytime, road density, and rush hour does not have a significant effect on mobile phone usage while riding. This result means that the motorcyclist

uses mobile phone regardless the daytime, road density, and rush hour.

Despite its limitation that the study only covering Bandung area, and bias as a result of manual observation, this present study is considered as the first study in the influence of daytime, road density, and rush hour in mobile phone use among motorcyclist. Further study in relation to the accident and other possible negative effect of the mobile phone use based on these variables are worth to be conducted as an effort to minimize motorcycle accident in relation to mobile phone use.

5. Conclusion

In conclusion, the field study found the prevalence of mobile phone use among the motorcyclist and passengers ranges between 1%~3%, and the variables daytime, road density, and rush hour have correlation among motorcyclist and passenger. Further research should to evaluate the decrease in alertness using mobile phone while driving.

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