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Analysis of the Effects of Traffic Sign Application at Brawijaya University

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Driving accidents at Brawijaya University are caused by several factors, not only the people of Brawijaya University using the infrastructure facilities, but also those from outside communities that use the infrastructure facilities. The method of data collection is a questionnaire that was distributed to 100 respondents. The results suggest that most motorbike riders violate existing traffic signs at Brawijaya University and most traffic violators are motorbike riders. These riders identify various reasons for their violations, one being the length of the route and the lack of traffic signs in the college area. Based on the high number of violations, an analysis was carried out using the JSA method, which is a method for analyzing a hazard in an activity and is used to develop solutions that can reduce and control hazards. Thus, the findings of this research can be given to Brawijaya University so as to enable them to minimize traffic accidents.

Key words: *Infrastructure, traffic, accident analysis, JSA, OHS.*

Introduction

Brawijaya University ("UB") is strategically located in the center of the city and is close to other tertiary environments, shopping centers, and community settlements. The area around UB is congested by motorized vehicles. Access to UB is not restricted to the academic community, the outside community can also travel through the campus area either to avoid congestion outside the campus or to shorten their travel distance. As a result, there is also a buildup of vehicles on campus, as well as irregular traffic within the campus, both of which can hamper existing activities on campus.

Traffic irregularities, such as traffic density and accidents, in the BU area have a negative impact on the campus itself. This is due to several factors, namely, only the UB academic

community properly understand the driving rules, lanes available for motorized vehicles, and the lack of signage within the UB area. However, a few drivers from the BU academic community also violate driving regulations for various reasons, primarily motorcycle riders aiming to shorten their travel time. Many people are not aware of their violations.

Many violations or motorist activities endanger the safety of other motorists or pedestrians around the UB area, these include: driving against the direction of the specified lane, parking in a prohibited spot, speeding, not give a sign when there is the project underway, and preventing others from entering the campus area. Therefore, traffic signs around the campus area and even within the campus itself, play an important role in maintaining campus security and safety for both drivers and pedestrians.

Based on the existing problems, this research is carried out in the hope of identifying the outcomes that might arise from a specific effect and then separating the root causes of irregular traffic conditions in the UB area through the fishbone method. This is done to understand what potential hazards exist in each activity drive at UB and to find out the controls using the JSA (Job Safety Analysis) method. Therefore, an assessment of the need for Occupational Health and Safety (OHS) aspects in every activity is undertaken so as to reduce the occurrence of accidents or potential hazards.

Literature

Hazard

A hazard can be interpreted as the potential for a series of events to occur that cause damage or loss. If one part of the chain of events is lost, then the event will not occur. Hazards can occur everywhere either at work or in the environment, but hazards will only have an effect if a contact or exposure occurs (Tranter, 1999).

A hazard is any condition that can cause harm either through injury or other loss. A hazard can also be interpreted as a source, situation, or action, which has the potential to harm humans, create diseases, or a combination of both (OHSAS, 2007). Hazards cannot be accurately measured, so that they cannot be controlled. It is important that hazards remain hazards that have no effect on work, unless they are exposed to workers, equipment or other things.

Traffic Sign

According to the Bina Marga (1991) in Procedures for Installing Urban Road Signs and Markings, traffic signs are the main tool in regulating, warning and directing traffic. An effective sign must fulfil the following:

1. Meet the needs.
2. Attract attention and get respect from road users.
3. Give a message that is simple and easy to understand.
4. Provide enough time for road users to respond.

Job Safety Analysis

Job safety analysis (JSA), according to Soeripto (1997), is a method used to examine work methods and determine hazards that have been previously ignored in planning factories or buildings and in the design of machines, work, materials, workplace environments, and processes.

JSA refers to both the analytical process of developing safer job procedures and to the document that is developed as a result of the analysis (NSC, 2009, p. 240). The most influential source for its format has been the National Safety Council's (NSC) form (Figure 1, p. 50). This form first appeared (albeit with different headings) in the fifth edition of the Accident Prevention Manual for Industrial Operations (NSC, 1964, p. 10), a "job breakdown" technique was described in the first edition (NSC, 1946, pp. 495-496) that related a job's "sequence of events" or "main steps" to its "safety factors" or "key points." ASSE's Dictionary of Terms Used in the Safety Profession makes no distinction between JSA and JHA (Lack, 2001, p. 58). This article uses JSA because that term has been in use longer and appears to be in current usage more than JHA. The various purposes of JSA are reflected in the chapters included in the Accident Prevention Manual (APM): safety training (NSC, 1964, p. 1), hazard control (NSC, 1974, p. 104) and hazard identification (NSC, 2009, p. 229). Other uses include incident investigation, employee involvement and supervisory education (Swartz, 2001, p. 2). Bird and Germain (1990, p. 148) summarize the benefits of correctly JSA-derived procedures as "among the most valuable tools imaginable for such important activities as job orientation, task instruction, task observation, group meetings, employee coaching, accident/incident investigation, skill training."

Research Method

This type of research is descriptive research, which aims to provide or describe a situation or phenomenon that occurs by using scientific procedures to answer the problem but is not used to make broader conclusions. The object of this research is the Brawijaya University area and it uses the Job Safety Analysis (JSA) method. The research was carried out from July 2019 to August 2019.

Research Results

Based on the questionnaire distributed to 100 respondents, 79% of respondents indicated that they had committed traffic violations in the UB area.

Table 1: Job Safety Analysis of Traffic Accident

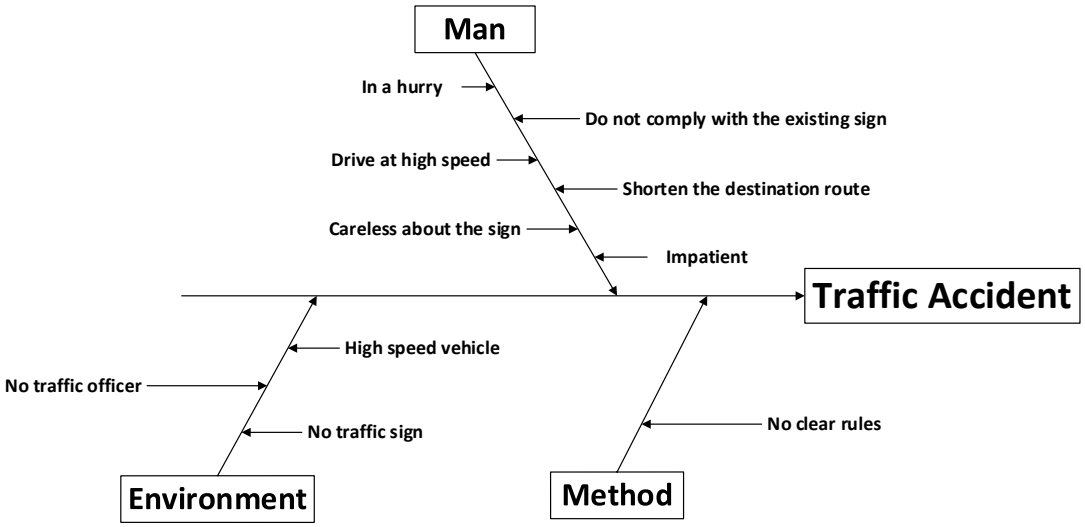
No.	Location	Potential Hazard	Cause of Hazard	Solution
1.	Veteran Gate	- Crash between vehicle	- No traffic sign	- Installation of traffic sign
2.	Rectorate roundabout	- Crash between vehicle	- No traffic sign - Rush between rider - Many crossroads	- Installation of "slow down" sign
3.	Economics and Business Faculty crossroad	- Crash between vehicle	- Hectic crossroad - Human factor	- Installation of "20 km speed" sign - Installation of "no left turn" sign and "one way" traffic sign
4.	Engineering faculty canteen	- Crash between vehicle	- No traffic sign - Rush between rider - Human factor	- Installation of "one way" sign, "no left turn" sign from Watugong street, and "no right turn" sign from **Faculty of Administrative Science street** - Human factor
5.	Al-Hadid Mosque Project (Engineering Faculty)	- Fall of heavy material	- No traffic sign	- Installation of "be careful, there is project" sign and "20 km speed" sign - Installation of safety cone/traffic cone before the project site
6.	Industrial engineering crossroad	- Crash between vehicle	- Hectic crossroad - Human factor	- Installation of "20 km speed" sign

Table 1: Job Safety Analysis of Traffic Accident

No.	Location	Potential Hazard	Cause of Hazard	Solution
7.	Faculty of Administrative Science	- Cars park on prohibited area	- Human factor	- Installation of traffic cone at the prohibited area
8.	Widyaloka and Law Faculty crossroad	- Crash between vehicle	- No traffic sign - Human factor - Hectic area	- Installation of "20 km speed" sign
9.	In front of Faculty of Engineering park area	- Crash between vehicle	- No traffic sign - Human factor	- Installation of "no right turn" sign and "one way" traffic sign
10.	Samantha Krida crossroad (behind the Agriculture Faculty)	- Crash between vehicle	- No traffic sign - Human factor	- Installation of traffic sign
11.	Panjaitan gate roundabout	- Crash between vehicle	- High speed of vehicle	- Installation of "20 km speed" sign before the roundabout

Picture 1. shows the analysis of the traffic accident in the UB area using fishbone analysis.

Picture 1. Fishbone Diagram



There are several critical points of traffic accidents in the area of UB: Veteran Gate, Rectorate roundabout, Economics and Business Faculty crossroad, Engineering Faculty canteen, Al-Hadid Mosque Project, Industrial Engineering crossroad, Faculty of Administrative Science, Widyaloka and Law Faculty crossroad, Faculty of Engineering parking area, Samantha Krida crossroad (behind the Agriculture Faculty), and Panjaitan Gate roundabout.

The high number of traffic accidents in the area of Brawijaya University is mostly caused by human factors, i.e most people are in a hurry, especially in the morning and evening, then they act carelessly by driving their vehicle at high speed, not complying with existing signs, shortening their driving route, and acting impatiently. Besides human factors, there are environment factors such as high speed vehicles, no traffic officer, no traffic sign, and method factors such as no clear rules in UB, especially for strangers to the UB area.

Conclusion

Based on the results of the research, it is concluded that 83% of the sampled road users in UB do not comply with existing traffic signs. The high number of traffic violations can lead to traffic accidents for motorcyclists who use infrastructure access at UB and it can also create irregular traffic conditions. The highest number of traffic sign violations occurred at the Veteran gate, this intersection involves public roads around UB.

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