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**IDENTIFICATIONS OF PROBLEMATIC
ROAD SIDE ENVIRONMENT FACTORS AT
SIGNALIZED INTERSECTION IN KUANTAN TOWN**

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AA12152

**Report submitted in partial fulfilment of the requirements for the award of the
degree of Bachelor of Civil Engineering (Transportation and Highway)**

Faculty of civil Engineering and Earth Resources

UNIVERSITI MALAYSIA PAHANG

JUNE 2016

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LIST OF SYMBOL

N Number of observation used in correlation analysis

LIST OF ABBREVIATIONS

ASEAN	Association of Southeast Asian Nations
FHWA	Federal Highway Administration
ITF	International Transport Federation
MIROS	Malaysian Institute of Road Safety Research
MoW	Ministry of Work
MS Excel	Microsoft Word Excel
OECD	Organisation for Economic Cooperation and Development
PDRM	Polis Di Raja Malaysia
PWD	Public Work Department
SPSS	Statistical Package for Social Science
WHO	World Health Organization

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ABSTRACT

Road safety has been a serious issue along with the rapid modernization in the whole world that is subjected to road fatality up to 1.25 million per year. Road crash happened for many reasons and factors. One of the factors is road environment condition at signalized intersection. Some of the problems regarding road environment are road side object such as small trees and poles which called as the fixed-object found along the section of the road. To date, there were no studies strictly focusing on road side environment at signalized intersection specifically. Thus, this study has been carried out to find out which problematic road side environment parameters that relates to the road crash statistics. Signalized intersections with highest traffic volume capacity within 5 km radius from Kuantan town have been identified. The road side environment parameters that are observed are the objects and factors that existed within 100m radius from the center of the intersection and only applicable during the day from 8.00 in the morning until 7.00 in the evening. According to Mustafa (2009) in the his journal, the four-way intersections combined with cut-through traffic are the most significant contributors to increased collisions or crash. He mainly stated about the condition of intersection's design in Malaysia. This study began with determination of study areas, road crash data collection, road side environment parameters data collection, analysis of frequency distribution and lastly analyzing the correlation between number of crash and the parameters using SPSS software. Two highest traffic volume capacity at signalized intersection within Kuantan has been identified which are Tanjung Lumpur-Kuantan intersection and Indera Mahkota-Kuantan intersection. By referring to research in journals, books and articles, 10 out of many problematic road side environment chosen to be parameters in this study. Therefore, it is found in this study that the width of pedestrian walkway has the highest correlation to number of crash. The width of pedestrian walkway was problematic in a way most probably because the width was built not in accordance with the standard guideline by authority. Since there are many factors of how road crash could happen, there are also many ways that can prevent it. Based on the disclosure of this study, road users can raise awareness about the possible problematic road side environment at their place and authorities can do observation and make improvement on the road side environment at signalized intersection.

ABSTRAK

Keselamatan jalan raya telah menjadi salah satu isu yang serius selaras dengan pembangunan yang pesat di seluruh dunia yang mencatatkan sehingga 1.25 juta kemalangan jalan raya dalam masa setahun. Isu ini berlaku akibat daripada pengaruh beberapa sebab dan faktor. Salah satu faktor adalah keadaan jalan dan persekitaran di persimpangan berlampu isyarat. Beberapa masalah mengenai persekitaran jalan raya seperti objek tepi jalan iaitu pokok-pokok kecil dan tiang-tiang dijumpai di sepanjang bahagian jalan raya sekitar persimpangan. Setakat ini, masih tiada kajian tegas dan tumpuan diberikan terhadap persekitaran di persimpangan berlampu isyarat secara khusus. Oleh itu, kajian ini dijalankan bagi mengetahui masalah-masalah di persekitaran persimpangan jalan raya berlampu isyarat yang boleh mengakibatkan peningkatan statistik kemalangan jalan raya. Persimpangan lampu isyarat yang mempunyai jumlah kapasiti tertinggi dalam lingkungan 5 km radius dari bandar Kuantan telah dikenal pasti parameter yang dikaji adalah infratraktur dan objek yang terdapat di persekitaran kawasan kajian dalam lingkungan 100 meter radius dari pusat persimpangan. Kajian hanya dilakukan pada siang hari bermula pada jam 8.00 pagi sehingga 7.00 petang. Menurut Mustafa (2009) dalam jurnalnya, persimpangan empat hala digabungkan dengan kawasan trafik merupakan penyumbang paling utama kepada peningkatan pelanggaran atau kemalangan. Beliau menyatakan tentang keadaan reka bentuk persimpangan di Malaysia. Kajian ini bermula dengan penentuan kawasan kajian, pengumpulan data kemalangan jalan raya, sebelah pengumpulan data untuk parameter yang telah dikenal pasti, analisis taburan kekerapan dan akhir sekali menganalisis hubungan antara jumlah kemalangan dan parameter menggunakan perisian SPSS. Dua daripada persimpangan berlampu isyarat yang mempunyai kapasiti telah dikenal pasti iaitu persimpangan Tanjung Lumpur-Kuantan dan persimpangan Indera Mahkota-Kuantan. Merujuk kepada penyelidikan sebelumnya, buku dan artikel, 10 senarai faktor persekitaran yang mempunyai kemungkinan tinggi untuk menjadi punca kemalangan di dipilih sebagai parameter dalam kajian ini. Oleh itu, kajian ini mendapati bahawa lebar laluan pejalan kaki mempunyai hubungan yang paling tinggi dengan jumlah kemalangan yang berlaku di persimpangan berlampu isyarat. Lebar laluan pejalan kaki di kawasan kajian dibina tidak berdasarkan garis panduan yang telah ditetapkan oleh pihak berkuasa. Namun, terdapat juga banyak cara yang boleh mencegah kemalangan daripada berlaku di kawasan tersebut. Berdasarkan pendedahan kajian ini, ia dapat meningkatkan kesedaran para pengguna jalan raya terhadap bahaya persekitaran tepi jalan dan dapat sentiasa mengambil langkah berjaga-jaga. Pihak berkuasa juga dapat jadikan kajian ini sebagai rujukan untuk membuat penambahbaikan keadaan persekitaran persimpangan jalan raya yang berlampu isyarat.

CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

Road safety is very important fundamentals in road engineering. One of the main things that need to be prioritized in road safety is the environment of the road in order to prevent road public hazard or crash. As recorded in the World Health Organization (WHO) report in 2013, around 1.24 million of life has been lost due to road crash. After 5 years, by gathering information from 180 countries WHO indicates that in 2015, the total number of road traffic deaths is expected to reach 1.25 million per year. It seems that the statistics of crashes that occurred throughout the world have been increasing by 1 % per year. These numbers of death are something that needs to be concerned for the road safety in the whole world.

According to Abdul Manan (2012), Malaysia has the highest road fatality risk per 100 000 population among the ASEAN countries. In the past 5 years, there are more than 6 000 fatal cases and over 250 00 injuries are recorded all over Malaysia. Based on research source from the Royal Malaysian Police (PDRM), fatality data due to underreporting severe injuries is up to 600% and minor injuries is up to 1400%.

There are many factors that could be the cause of fatal accidents such as the driver's attitude itself, vehicle's condition, weather's condition and the surrounding road environment (Pasetto, 2011). Driver's attitudes such as drink and drive or red light running contribute to increase of percentage in fatality. Sometimes, vehicle's condition also could be the reason why accidents happened such as brake defect or tyre defect which happen because drivers do not check before the journey. Other than that, the road side environments that are not maintained properly also give rise to crash percentage cases (Wang, 2002).

Road safety does not involve the drivers alone but also the relationship with the road environment and the vehicles. Depending on how the road environment been designed and structured, the vehicle that being driven by human is influenced, for example in most cases is the speed (Pasetto, 2011). Drivers tend to speed up whenever they are sure that the path they are taking can be considered safe visually but in the end, they involve in crash because the road condition does not appeared clear as it seems from far distance.

There are few factors of road environment that can be listed out where one of them is the objects within and nearby the roads can be obstacles for the vehicle's path (Edquist, 2009). The objects include signage, trees, median, divider, traffic light, lanes and others. Some of the problems such as dangerous road geometric design, inadequate capacity in roads, incompatible and unsafe pavement, problematic slope surface in road building and long vertical slopes can be very dangerous to road users (Esmaeeli, 2010). These problems may influence the vehicle's speed where the vehicle lose its balance and then lead to crash. There are several areas that had high chance of crash risk in the urban area including the roundabout, straight road, signalized intersections and unsignalized intersections (Royal Malaysian Police, 2011).

In a study by Polus in 2005, at roundabout, there are less right angle and left turn head-on collision crash happened as the geometric aesthetics of the road help lowered the vehicle's speed while passing through this area. This might be because round about design for turning is strategic compared with at the intersections. A source by Statistical Report Road Accident, Royal Malaysian Police in 2003 stated that 215 fatalities

happened at intersection compared with 23 in roundabout. This shows that the higher risk of crash happened at intersections area.

Traffic signals are often implemented to provide for efficient movement and to improve traffic safety. Nevertheless, severe crashes still occur at signalized intersections (Polders et al, 2015). On account of those statements, signalized intersections areas are still at risk. Rear-end accidents are the most common accident type at signalized intersections since the diversity of actions taken increases due to signal change (Xuedong et al, 2005). Thereby, observations and mitigations measures need to be done at those area to find out what factors could be the spark of the problem.

In urban area especially at signalized intersection, the road environment situation affected the road fatality by its traffic composition (Edquist, 2009). In situation where the existing road has no specific lanes for each composition according to sizes and types of vehicle probably could contribute to high crash. This is because the design of the road is not suitable to be applied at the intersections. The critical road environment conditions could play a significant role in rear-end accidents and they may contain all kinds of non-driver related factors such as lighting conditions, the roadway surface conditions, highway characteristics, traffic volume, the weather conditions, and so on (Xuedong et al, 2005).

A case study at the particular signalized intersection is to be conducted to identify the road environment factors that lead to road crash. As what have been stated about the road safety situations in Malaysia, it is very important to know which factors that contributes to road crash at the signalized intersections. Kuantan is considered as urban area with the population of 1.50 million reported by Department Of Statistics Malaysia in 2010. Kuantan town have many signalized intersections that could have high chance of vehicle crash thus, it has been chosen as the study area of this research. The map of Kuantan town in overall can be viewed in Figure 1.0 as shown.