

**RELATIONSHIP BETWEEN ROADSIDE FEATURES AND ROAD TRAFFIC
ACCIDENTS ALONG KM 3 – KM 27 OF JALAN KUANTAN - GAMBANG**

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ABSTRACT

Road traffic accident cases are increasing year by year. There are many factors which can lead to road traffic accidents such as vehicle speed, weather conditions, poor road conditions, and poor vehicle conditions. There are many studies that have been carried out to study the causes and effects of the road traffic accidents. However, only limited research has been done on the relationship between the roadside development and the number of traffic accident cases happened. Hence, this research on the relationship between the roadside features and the road traffic accidents along KM 3 until KM 27 of Jalan Kuantan – Gambang has been carried out. This research has been done in order to identify the existing critical distance of roadside features along KM 3 until KM 27 of Jalan Kuantan – Gambang and to study the relationship between the roadside features and the number of traffic accident cases. This research has been done by gathering the traffic accident data from the Polis Diraja Malaysia (PDRM). Then the data was tabulated and gathered as well as arranged into order by using Microsoft Excel. Next, the tabulated data was inserted into SPSS software in order to analyse them. The data was analysed by using the descriptive analysis and the bivariate correlation. The step has been done to get the relationship between the dependent variables and the independent variables. The dependent variables are the roadside features and the independent variables are the number of traffic accident cases happened along Jalan Kuantan – Gambang. This research has proven that there is a strong relationship between the critical distance of the roadside features with the increasing number of road traffic accidents. This research could produce a better findings if there are many other aspects that could be measure such as the road surface conditions and the types of road which is rural or urban.

ABSTRAK

Kadar kemalangan jalan raya yang dilaporkan semakin meningkat dari tahun ke tahun. Terdapat pelbagai factor yang menyumbang ke arah kemalangan jalan raya seperti tahap kelajuan kenderaan, cuaca, keadaan jalan, and keadaan kenderaan. Terdapat pelbagai kajian yang telah dijalankan untuk mengkaji punca dan kesan kemalangan jalan raya. Walau bagaimanapun, terdapat hanya sedikit kajian yang telah dijalankan melibatkan hubungan antara pembangunan di tepi jalan raya dengan kadar kemalangan jalan raya yang berlaku. Oleh itu, kajian ini telah dijalankan untuk mengkaji hubungan di antara pembangunan di tepi jalan raya dengan kadar kemalangan jalan raya di sepanjang KM 3 sehingga KM 27 di Jalan Kuantan – Gambang. Kajian ini dilakukan untuk menentukan jarak kritikal pembangunan di tepi jalan dengan kadar kemalangan jalan raya di sepanjang KM 3 sehingga KM 27 di Jalan Kuantan – Gambang dan juga untuk mengkaji hubungan antara pembanguna di tepi jalan dengan kadar kemalangan jalan raya. Kajian ini dilakukan dengan mengumpul data kemalangan jalan raya dari Polis Diraja Malaysia (PDRM). Kemudian, data itu dikumpulkan di dalam jadual dan disusun dengan menggunakan Microsoft Excel. Selepas itu, data itu dimasukkan ke dalam perisian SPSS bagi tujuan analisa. Data itu dianalisis menggunakan analisa deskriptif and juga hubungan bivariate. Langkah ini dilakukan bertujuan untuk mendapatkan hubungan antara pembolehubah bersandar dengan pembolehubah tidak bersandar. Pembolehubah bersandar ialah pembangunan di tepi jalan dan pembolehubah tidak bersandar ialah jumlah kemalangan jalan raya yang berlaku sepanjang Jalan Kuantan – Gambang. Kajian ini telah membuktikan bahawa wujudnya hubungan yang kuat antara jarak kritikal pembangunan tepi jalan dengan kadar kemalangan jalan raya. Kajian ini boleh menghasilkan hasil kajian yang lebih baik

sekiranya lebih banyak faktor yang diambil kira seperti keadaan permukaan jalan dan jenis jalan di kawasan Bandar atau luar Bandar.

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LIST OF ABBREVIATIONS

WHO	World Health Organization
KSI	Killed or Seriously Injured
UN	United Nations
PDRM	Royal Malaysian Police / Polis Diraja Malaysia
JKR	Public Work Department / Jabatan Kerja Raya
MPK	Kuantan Municipal Council / Majlis Perbandaran Kuantan
MIROS	Malaysian Institute of Road Safety Research
WSDOT	Washington State Department of Transportation
SPSS	Statistical Package for Social Sciences
LPT	East Coast Expressway / Lebuhraya Pantai Timur
KUKTEM	Kolej Universiti Kejuruteraan dan Teknologi Malaysia
UMP	University Malaysia Pahang

CHAPTER 1

INTRODUCTION

1.1 Introduction

Road traffic safety has been considered as one of the most important social responsibilities to be taken care of by the Malaysian Government and this situation had already last for such a long time (Mohd Nizam Mustafa, 2005). The main purpose of road traffic safety is to reduce or minimize the effects from vehicle accidents such as death, injuries, and property damage. Every year, more than one million of people from all over the world were killed because of road accidents with more than 3000 thousand people died each day, and many of them were injured. Road traffic safety has become one of the big issues nowadays since road traffic accidents give more harm compared to other transportation systems (David A. Sleet and Christine M. Branche, 2004).

The latest statistics from all over the world shows that almost one quarter of road traffic accidents happened because of vehicle skidding off from the road. Therefore, roadside safety must be improved and an appropriate action must be taken very seriously. Based on the data obtained, about 9000 out of 44000 vehicle accidents that happened were caused by roadside safety which is the roadside fixed objects. Every year, vehicles involving with roadside accidents are among all cases reported and the number of cases are increasing year by year (Jinsun Lee and Fred L. Mannering, 1999).

Accidents that happened due to roadside development involves almost one-third of all highway fatality cases reported. Most of all the crashes involve the vehicle leaving the roadway and hits the fixed objects along the roadside such as the trees and guardrails. Vehicles also skid off from the road due to drivers' own fault such as driving over speed and lack of attention while driving. Many efforts had been done in order to educate the drivers but it is not effective. Another way that can be done is by removing the roadside objects or avoid from putting them along the road in areas which is very easy for vehicles to skid off the road (Auto and Road User Journal, US Roads, 1998).

Accidents happened due to roadside development are quite difficult to be controlled since there are too many factors that influence the accidents to happen. Some of the factors are weather conditions, road conditions, right-of-way constraints, and the drivers' behavior themselves. Many studies had been done on road traffic accidents but only a few of them involves roadside accidents. This situation has created less awareness among the vehicle drivers.

1.2 Background of Study

1.2.1 Introduction

Road traffic accidents have been one of the biggest problems in the world involving the public health and prevention problems. This problem has become more complex since the victims of the road traffic accidents are fit and healthy prior to the crash that they involved. Based on the data by World Health Organization (WHO), there are over a million of people were killed due to road accidents every year and the cases are increasing every year. To measure the data, the standard measurement used are fatalities and Killed or Seriously Injured (KSI), usually per billion passenger kilometers (WHO, 2004).

Due to rapid human growth population, the number of vehicles using Kuantan – Gambang road has increased year by year. The number of traffic flows has also increased which causes traffic congestion. The increasing number of traffic flows will also increased the number of road traffic accidents. The interventions usually take in many aspects. Some factors that contributes to road accidents are related to the drivers' carelessness themselves such as driving error, illness, or vehicle problems. The interventions might seek the right way to reduce these factors and reduce the effects of the accidents happened.

A United Nations (UN) general assembly plenary session had addressed road safety and called on member states to stimulate a new level of commitment and an urgent response to improve road safety. The World Health Organizations (WHO) states that road accidents will move from the

ninth to the third most serious health problems faced by the world within the next ten years. In year 1999, the road accident rate in Malaysia was 6.2 deaths per 10000 vehicles and it dropped to 5.6 deaths per 10000 vehicles in year 2001. Unfortunately, the world-class standard requires below 3 deaths per 10000 vehicles. That is the reason why in the year 2001, the Malaysian Government has adopted the latest national road safety target which is only 4 deaths per 10000 vehicles (Radin Umar R.S, et al.,2004).

This study will be conducted along KM 3 until KM 27 of Jalan Kuantan – Gambang due to the increasing number of traffic accident cases along that road. This is because Jalan Kuantan – Gambang is the main road which connects Kuantan City to Gambang. The opening of the East Coast Expressway (LPT) which connects Kuantan to Kuala Lumpur has caused this road to become more busy. The relocation of the Kolej Universiti Kejuruteraan dan Teknologi Malaysia (KUKTEM) has contributes to the increasing number of human population along KM 3 until KM 27 of Jalan Kuantan – Gambang which causes the road to become busier. This situation has contributes to the increasing number of traffic accident cases happened.

1.2.2 Road Accident Scenario

All roadside features and objects along the roadside are always considered as hazardous to all road users. The distance between the edge of the road and roadside objects are very important in road traffic accidents which involves roadside features. Many studies have been carried out which

focuses on road traffic accidents which involves vehicles and roadside features (S. H. Tung, et al., 2002).

There are many researches that have been done regarding the causes of traffic accidents. The improvements that have been done on the road geometric design can also deduct the number of road traffic accidents. Highway design such as the annual average daily traffic per lane, horizontal curvature, and vertical grade are associated with vehicle accidents. The lane and shoulder widths, median widths, and traffic volume are also associated with accidents (Jinsun Lee and Fred L. Mannering, 1999). The failure of maintaining and repairing defective shoulder widths will result in road accidents (US Roads, 1997).

Unfortunately, a very little attention had been given to the relationship between run-off roadway accident frequency and the roadside features and also all of the factors affecting it. About one-third of the fatalities involving road traffic accidents are associated with the vehicles running off the road (FHWA, 1998). This situation shows that more research need to be carried out to develop the most economical ways to minimize the run-off roadway accidents cases (Jinsun Lee and Fred Mannering, 1999).

In order to reduce the chance of accidents caused by roadside features, a relevant study must be conducted on the safety of road design decisions which includes the extent of the problems. A study on safety improvements priority, relationships of safety, and analysis of cost-effective must also be carried out. A better understanding on the characteristics of accidents, analyze the accidents potentials, and accommodating a continually changing vehicle fleet will improve the roadside safety. The selection of an

effective safety treatment and the use of new technologies will also give better improvement on roadside safety.

Roadside accidents usually involve particular roadside features such as the roadway guardrail systems and the advertisement boards. These objects usually give impacts on vehicles during accidents. The guardrail system is very important since it acts as a safety object to prevent the vehicles from roadside embankments and large roadside culverts. The reduction in road traffic accidents can be achieved by doing roadside improvements. This can be done by relocating the guardrails, the advertisement boards, and the traffic signage. However, the lack of roadside data has become a major problem in roadside safety research for many years hence making it very difficult to predict roadside accidents frequencies.

The traffic accidents scenario along KM 3 until KM 27 of Jalan Kuantan – Gambang has shown an increasing rate from year to year. This situation happens because of the increasing rate of human populations which makes the road becomes busier year by year. When the human population grows, the development along the road will be happened. This can be seen as there are many types of development along the road such as residential houses, shop lots, and school. When development occurs along the road, the needs of roadside features will be increased. Unfortunately, some of the roadside features are developed too closed with the road shoulder which will endanger the road users. This is one of the main reasons why the location has been chosen for the research study.

1.3 Problem Statement

Only a small number of studies had been done which focusing on run-off roadway accidents due to roadside development even though most accidents that happened involve roadside development such as trees planted by Municipal Council and guardrails. Some roadside features have been developed too close with the road shoulder which is dangerous if vehicles skid off the road since it can cause accidents to happen. Hence, this research has been setup to study the rate of traffic accidents happened due to roadside development along Jalan Kuantan – Gambang and to find out the existing critical distance of the roadside features that have been developed along the road. This is because there are about 697 cases were reported by the Royal Malaysian Police (PDRM) involving roadside accidents which happened along KM 3 until KM 27 of Jalan Kuantan – Gambang from year 2006 to year 2009. At the end of this research, the most critical distance of the roadside features will be featured out and the relationship between the distance of the roadside features and the number of traffic accident rates will be established.

1.4 Objectives

There are two objectives that have been discussed and determined in order to realize the purpose of this study. The objectives are :

1. To identify the existing critical distance of roadside features along KM 3 until KM 27 of Jalan Kuantan – Gambang.
2. To study the relationship between the distance of roadside features and the number of traffic accidents along KM 3 until KM 27 from year 2006 until year 2009.

1.5 Scope of Study

In order to make sure that this study is done along the right path and in assuring that the objectives that have been proposed are met, there are several limitations that need to be applied :

- The scope of study will mostly covers on the roadside features such as guardrails, traffic signage, and advertisement boards.
- For this reason, the raw traffic accidents data which happened due to roadside development along KM 3 until KM 27 will be obtained from the Royal Malaysian Police (PDRM).
- The study area will be limited within 7 meters from the road shoulder.

1.6 Significant of Study

Nowadays, the numbers of road traffic accidents reported keep on increasing from year to year and among the road accident cases reported are run-off roadway accidents. Hence, this study was set up in order to investigate the relationship established between the distance of the roadside features and run-off roadway accident frequencies that happened along KM 3 until KM 27 of Jalan Kuantan – Gambang from year 2006 to year 2009.

The result obtained will be very important as it will be as indicator to show that the roadsides along KM 3 until KM 27 of Jalan Kuantan – Gambang were wrongly developed. This is because according to Uniform Building by Law, it is more appropriate to develop anything by the roadside within 30 meters of distance. The result obtained will be proposed to Public Work Department (JKR) and Kuantan Municipal Council (MPK) to prove that it is not safe to develop anything that is below than 30 meters range.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

Transportation system is a basic needs in human life. Humans used transport to travel from one place to another for many purposes. Transportation systems has fulfilled the basic needs in human life since it plays a very important role in the development of the human civilization. The relationship between the evolution of the human civilization and the needs of a better transportation system has increased rapidly. A better standard of living would usually requires a better quality of transportation system. The transportation system should provides safety and it should be comfortable. It also should be rapid, convenient, and economical, suitable with the human's living cost (Tom V. Mathew and K V Krishna Rao, 2007).

Malaysia has experienced a rapid growth in economic, population, and industrialization for the past 10 years. The population rate itself has increased from 19.5 to 25.6 million which represents an annual growth rate of 3 % per year. Together with the growth of human population, the number of paved roads has also increased from 60734 to 71814 kilometers all over Malaysia. With the increasing number of paved roads, the number of registered vehicles were increased too. For the year of 2004, the total number of registered vehicles had increased from 7210089 to 13878000 with the rate of 1.9 persons per vehicle (Radin Umar R. S, 2005).

Table 2.1: New Registered Vehicles in Malaysia for year 2007 (Commercial Vehicles)

No	Car Type	January	February	March	April	May
1	TOYOTA	650	671	880	711	748
2	NISSAN	820	531	665	687	634
3	DAIHATSU	404	311	383	411	445
4	MITSUBISHI	183	300	414	357	349
5	HICOM	266	243	265	314	354
6	ISUZU	185	222	238	220	242
7	HINO	143	122	119	194	243
8	FORD	101	189	117	102	151
9	MITSUBISHI FUSO	104	58	101	95	115
10	MAZDA	30	28	44	48	74
11	MERCEDES	11	9	28	118	23
12	PROTON	16	34	43	45	24
13	INOKOM	27	14	32	60	27
14	VOLVO	20	23	31	42	31
15	RENAULT	4	27	30	14	30

(source: <http://www.empta.com.my/>)

As we can see from the Table 2.1 above, it shows that the numbers of new registered commercial vehicles in Malaysia itself from January to May 2007. The number of the registered commercial vehicles are increasing very rapidly from month to month. Based on the table above, the highest registered commercial vehicles for January is Nissan and the lowest registered vehicles is Renault while in February and March the highest registered vehicle is Toyota and Mercedes shows the lowest registration number. In April, the highest vehicle registration still belongs to Toyota and the lowest is Renault while in May the highest is Toyota and the lowest is Mercedes. This situation has proven that Malaysian economic growth has increased very rapidly and the needs of better transportation system increased together with the economic growth and human civilization.

Table 2.2 : State Road Accident Comparison between 2004 to 2005

Year	2004	2005	Difference	%
Number of Accident Cases	326,814	328,268	1,454	0.4
Number of Fatal	6,223	6,188	-35	-0.6
Number of Fatal Accidents	5,675	5,604	-71	-1.3
Number of Accidents with Serious Injuries	7,450	7,573	123	1.6
Number of Serious Injuries	9,229	9,397	168	1.6
Number of Accidents with Injuries	33,143	25,928	-7,215	-27.8
Number of Injuries	38,631	31,429	-7,202	-18.6

(www. miros.gov.my)

The increasing number of human growth populations has contributed to the increasing number of road traffic accidents. Road traffic

accidents has been one of the highest cause of death throughout the years compared to other transportations systems. Besides that, it has become one of the main causes of death in Malaysia. This is because more people use road vehicles as their main transport to move from one place to another. This is the reason why road vehicles give more harm to human. Based on Table 2.2 as shown above, between the year of 2004 and 2005, the number of cases reported regarding road traffic accidents had increased with 5604 of them involving death or fatalities and 31429 cases involving injuries. The accident rate has increased from 363319 in the year 2007 to 373047 in the year 2008 (Royal Malaysian Police, 2002).

Table 2.3 : State Road Accident Comparison between 2007 to 2008 (January - December)

STATE	JAN-DEC	JAN-DEC	DIFFERENCE	%
PERLIS	1364	1417	53	3.9
KEDAH	16172	16520	348	2.2
P.PINANG	33881	34049	168	0.5
PERAK	29203	30539	1336	4.6
SELANGOR	99157	100380	1223	1.2
K.LUMPUR	49454	48671	-783	-1.6
N.SEMBILAN	16079	17362	1283	8.0
MELAKA	11720	12105	385	3.3
JOHOR	46584	48667	2083	4.5
PAHANG	13982	15629	1647	11.8
KELANTAN	8116	8840	724	8.9
TERENGGANU	8155	8792	637	7.8
SABAH	14256	14588	332	2.3
SARAWAK	15196	15488	292	1.9

(www.miros.gov.my)

Table 2.3 shows the comparison in the number of traffic accident cases reported between different states in Malaysia. Johor Bahru shows the highest difference in the number of traffic accident cases between 2007 and 2008 which is 2083 cases while Perlis shows the lowest with only 53 cases. In order to overcome this problem, a Cabinet Committee on Road Safety was established by the Prime Minister. The main target of this committee is to reduce the road traffic accidents for about 30% by the year 2000. Unfortunately, so far, this committee seems to be failed in reducing the number of road traffic accidents since the number of vehicle collisions are increasing year by year. The number of cases reported will be increasing more than usual during festive seasons.

2.2 What is Road Safety

Road safety is usually determined by the road users' opinions. The establishment whether the road is considered as safe or dangerous to be used is determine by the ones who are using the road. If the road users found that the road is dangerous to be used, an appropriate action must be done to make sure that the road is safe to be used. The government must work together with the engineers to overcome all the imperfections. This step is very important since even though the road is build according to the standard of requirements, the road might still be dangerous to its users (Frank Navin, 1999).