DETERMINING THE EFFECTS OF DIFFERENT POSTED SPEED LIMITS ON HIGHWAY

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MASTER OF SCIENCE
UNIVERSITI PUTRA MALAYSIA
2004

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By

KAMARUDIN BIN AMBAK

Thesis Submitted in Partial Fulfilment of the Requirement for the Master of Science in Highway and Transportation Engineering
Faculty of Engineering
Universiti Putra Malaysia

November 2004

DEDICATION

I dedicate this to my beloved parents.....

Ambak Bin Muda

Ramlah Binti Salleh

Special to my cute daughter...

Humaira Binti Kamarudin

My beloved wife.....

Tuan Senik Binti Tuan Muda

Thanks for the support, encouragement, guidance, advice, patience and faith.

ABSTRACT

Vehicles are the important element in transportation system. It is being used for traveling on road to fulfill the demand of working, business, vacation, etc. About 1.4% of registered vehicles getting involved in road crashes in Malaysia. There were found about 4.9 deaths per 10,000 from registered vehicles in year 2002. Statistical reports road accident (PDRM) shows that the road accident by type of faults about 15% by speeding behavior. These statistic lead to the inevitable conclusion that the impact of road crashes due to speeding behaviour could be fatal and severed injuries.

Therefore, a study on the effects of different posted speed limits to determine the operating speed and compliance of speed limits was carried out. The sites were identified and selected that located on PLUS expressway stretch from Kuala Lumpur to Seremban. The section of locations were in Sg.Besi area with 80 km/h posted speed limit, Serdang area 90 km/h posted speed limits and Seremban with 110 km/h posted speed limits. There were 100 data collected in spot speed study was carried out for each vehicles classification namely motorcycle, car, taxi, light van and utility, medium lorry, heavy lorry and bus. The collection of data were taken from 10.00 a.m to 1.00 p.m within a month and covered for both southbound and northbound direction. The vehicles that traveling at or below posted or commercial speed limits was classified as complied with the speed limits, those who traveling above posted or commercial speed limits at all was classified as not complied with the speed limits. The data were analysed using statistical anaysis on univariate and bivariate analysis.

Results from univariate analysis on descriptive frequency showed that the 85th percentile speed of car, taxi and bus almost over with the speed limits compared with motorcycle, light van and utility, medium and heavy lorry. Also the percentage of non-compliance with speed limits for car, taxi and bus were higher than motorcycle, light van and utility, medium and heavy lorry. While, from bivariate analysis the results shows eight variables were significantly associated with compliance of speed limits. They were vehicle classification, travel direction, different posted speed limits, 110 km/h posted speed limits, 90 km/h posted speed limits, 80 km/h posted speed limits, car versus taxi and private vehicle versus commercial vehicle.

Therefore, road safety program should be focused on car at any posted speed limits, taxi at 90 km/h posted speed limits, bus at 110 km/h posted speed limits, direction of travelling toward CBD area and speed limits on 90 km/h. It is recommended that future engineering and non-engineering road safety programs in promoting the anti-speeding behavior through educating the public to travel with safe speed regarding with speed limit. Besides, there should be to carry out speed trapped and patrol operation on target group by the authority. Also, there is need some warn of a possible withdrawal the license permit upon any commercial vehicle those are frequently involved in violation of speed limit. Last but not least, by enforcing on commercial vehicles to install with special devices on speed pedal to restricted form speeding over speed limits.

ABSTRAK

Kenderaan adalah merupakan elemen yang penting dalam sistem pengangkutan. Ianya digunakan untuk perjalanan di jalan raya bagi memenuhi untuk tujuan pekerjaan, perniagaan, percutian dan lain-lain lagi. Lebih kurang 1.4% daripada kenderaan berdaftar telah terlibat dalam kemalangan jalan raya di Malaysia. Juga didapati bahawa sebanyak 4.9 kematian setiap 10,000 bagi kenderaan berdaftar dalam tahun 2002. Laporan perangkaan kemalangan jalan raya (PDRM) menunjukkan bahawa bagi kemalangan yang melibatkan jenis kesalahan, lebih kurang 15% adalah daripada kesalahan memandu laju. Ini menunjukkan kesan daripada kemalangan yang melibatkan kelakuan pemanduan yang laju boleh menyebabkan kematian dan kecederaan yang parah.

Oleh itu, satu kajian untuk menentukan kesan-kesan terhadap perbezaan had laju terpampan/terpamer telah dilakukan. Tapak kajian telah dikenalpasti dan dipilih yang terletak di lebuhraya PLUS di laluan dari Kuala Lumpur hingga ke Seremban. Seksyen yang dipilih adalah di kawasan Sg. Besi dengan had laju terpamer 80km/j, di kawasan Serdang dengan had laju terpamer 90km/j dan di kawasan Seremban dengan had laju terpamer 110km/j. Sebanyak 100 data telah dikumpul untuk kajian kelajuan setempat bagi setiap kelasifikasi kenderaan iaitu motorsikal, kereta, teksi, van dan utiliti, lorri sederhana dan berat. Pengumpulan data telah diambil dari jam 10.00 pagi hingga 1.00 petang selama tempoh sebulan dan meliputi dari kedua-dua arah selatan dan utara. Kenderaan yang didapati bergerak pada atau di bawah had laju dikelaskan sebagai

mematuhi had laju berkenaan. Sementara, kenderaan yang didapati bergerak melebihi had laju dikelaskan sebagai tidak mematuhi had laju tersebut. Data-data yang diperolehi telah dianalsis dengan analsis secara statistik melalui keadah analsis *univariate* dan *bivariate.*

Keputusan dari keadah analisis *univariate* melalui frekuensi diskritif menunjukkan kelajuan persentil ke-85 bagi kereta, teksi dan bas adalah melebihi had laju berbanding motorsikal, van dan utiliti dan lori sederhana dan berat. Juga peratusan tidak mematuhi had laju menunjukkan kereta, teksi dan bas adalah melebihi had laju berbanding motorsikal, van dan utiliti dan lori sederhana dan berat. Sementara, bagi keputusan kaedah *bivariate* pula menunjukkan sebanyak lapan pembolehubah adalah ketara berkaitan dengan pematuhan had laju. Pembolehubah tersebut adalah kelasifikasi kenderaan, arah perjalanan, perbezaan had laju terpamer, had laju terpamer 110km/j, had laju terpamer 90km/j, had laju terpamer 80km/j, kereta melawan teksi dan kenderaan persendirian melawan kenderaan perdadangan.

Oleh itu, program keselamatan jalan raya harus ditumpukan ke atas kereta pada mana-mana had laju terpamer, teksi pada had laju terpamer 90 km/j, bas pada had laju terpamer 110 km/j, arah perjalanan menuju bandar pusat perniagaan dan pada had laju 90 km/j. Maka dicadangkan program mempromosikan anti-memecut melalui pendekatan mendidik orang awam untuk memandu pada kelajuan yang selamat berpandukan had laju yang dibenarkan. Disamping itu, pihak berkuasa perlu melakukan aktiviti rondaan dan perangkap had laju terhadap kumpulan sasaran. Juga perlu diberikan amaran untuk menarik balik lesen permit bagi kenderaan perdadangan yang kerap kali melakukan

kesalahan memecut dengan melebihi had laju. Serta, dengan mengenakan tindakan kuatkuasa bagi kenderaan perdadangan memasang peralatan penahan pedal kelajuan daripada memecut melebihi had laju yang dibenarkan.

ACKNOWLEGDEMENT

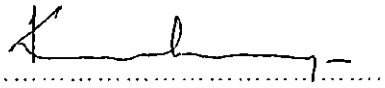
Praise and thanks to Allah for His blessings which has enabled me to come this far at this point of time. I wish to extend my deep gratitude to those who have contributed in a significant way towards this endeavour. I wish to express my sincere appreciation and gratitude to my honourable project supervisor Dr. Kulanthayan K.C Mani for his guidance, advice and constructive comment throughout the course of this study. My special thanks go to Mr. Azri Thamber (Highway Laboratory, UPM) for his co-operation in using the speed measure equipments.

I would like to thank Mr. Supian (IKRAM) who gave some valuable information data which was useful for this study. Special thanks is also extended to my best friend Mr. Zahid Zainal Abidin for his time in helping and accompanying me during the period of data collection. Last but not least, I am grateful with my fellow course mates, who gave their utmost help, co-operation and encouragement in completing this project successfully.

APPROVAL SHEET

This thesis attached hereto, entitled **"Determining the Effect of Different Posted Speed Limits"**, prepared and submitted by KAMARUDIN BIN AMBAK in partial fulfillment of the requirement for the Master Science in Highway and Transportation Engineering is hereby accepted;

Approved by,



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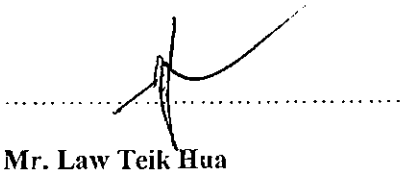
Date 15 NOVEMBER 2004



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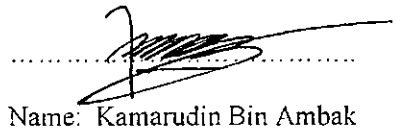
DECLARATION

I hereby declare that the thesis is based on my original work except for quotation and citation which have been duly acknowledged. I also declare that it has no been previously or concurrently submitted for any other degree at UPM or other institutions.



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LIST OF ABBREVATIONS

ASSTHO	American Association of State Highway Officials
CBD	Central Business District
FHWA	Federal Highway Washington Administration
ITE	Institute of Transportation Engineers
LPKP	Board of Commercial Vehicles License
JPJ	Department of Road Transport
PDRM	Royal Malaysian Police
PLUS	North South Expressway (PLUS)
REAM	Road Engineering Association of Malaysia
SPSS	Statistical Package for Social Science
TRB	Transportation Research Board
WSDOT	Washington State Department of Transportation

CHAPTER I

INTRODUCTION

This research describes a study on the effect of different posted speed limits on highways among vehicles classification within the context of the Malaysian environment. To make any mode of transport safer, it is vital to have a good understanding of how crashes and injuries occur. Then it may be possible to take effective remedial action to reduce the likelihood of crashes and minimise the severity of injuries to motorist during an accident.

This chapter begins with the background of the study which includes the number of registered vehicles in Malaysia and factors closely linked to demand among the vehicle classification to leading the establishment of the magnitude and seriousness of the road safety problems.

Background of the Study

Vehicles are important element in transportation system. It is being used for traveling on road to fulfill the demand of working, business, vacation, etc. Travel at safe and reasonable speeds on highways promotes the nation's productivity. Thus, total numbers of registered vehicles were 4,625,384 (year 1988) rose to 11,710,800 in year 2002 (Table 1.1). Within these 14 years the number of vehicles involved in accidents rose from 119,280 to 479,883 (Table 1.2).

Table 1.1: Type of Registered Vehicles

	Type of Vehicles					
Year	Car	Motorcycle	Van and Lorry	Bus	Taxi	Total
1988	1549068	2701147	326814	23346	25009	4625384
1989	1658567	2848717	349737	24828	26078	4907927
1990	1811141	3035330	38330	26803	28811	4940415
1991	1970934	3251289	411149	28229	31842	5693443
1992	2107005	3473643	442401	30013	34178	6087240
1993	2255420	3703838	466871	33358	36458	6495945
1994	2426546	3977047	495736	34771	40088	6974188
1995	2532396	3564756	430716	35224	27276	6590368
1996	2886536	3951931	512165	38965	59456	7449053
1997	3271304	4328117	572720	43444	51293	8266878
1998	3452852	4692183	599149	45643	54590	8844417
1999	3787047	5082473	642976	47674	55626	9615796
2000	4145982	5356604	655284	48662	56152	10262684
2001	4557992	5609651	689668	49771	56579	10963661
2002	5027173	5859195	714796	51251	58385	11710800

(Source: Royal Malaysian Police (PDRM), 2002)

Table 1.2: Type of Vehicles Involved In Road Accident

Type of Vehicles						
Year	Car	Motorcycle	Van and Lorry	Bus	Taxi	Total
1988	71852	23307	16063	5050	3008	119280
1989	69711	23974	14094	5351	7539	120669
1990	79642	27611	17503	5928	9406	140090
1991	86086	29237	20740	6446	11649	154158
1992	100305	39272	33272	7844	4729	185422
1993	112574	48511	48511	9317	5225	224138
1994	125972	58921	58921	10363	5747	259924
1995	138425	66508	66508	10236	5383	287060
1996	170671	73268	73268	10781	6429	334417
1997	201079	80100	80100	11620	6120	379019
1998	206070	77298	77298	10107	6245	377018
1999	227705	76032	76032	9721	6773	396263
2000	268881	79816	79816	9660	6620	444793
2001	300910	85761	85761	9275	6530	488237
2002	320719	86834	56883	9258	6189	479883

(Source: Royal Malaysian Police (PDRM), 2002)

Among type of vehicles involved in road accident were 43.6% motorcycle, 29.7% car, 10.6% lorry, 5.4% bus, 4.2% van and 6.5% others. Consequently, there were about 40.9% motorcycle, 26.6% car, 14.8% lorry, 7.6% bus, 3.4% van and 6.7% others death in the total road accident for the year 2002 (PDRM, 2002).

Problem Statement

Road accident is one of the major causes of death and injuries in Malaysia. Based on statistical data of PDRM, on average annual road fatality are about 6,000 people per year or 16.6 fatalities per day for the period between 1996 and 2002. Within this period, there were 1,753,468 road accident cases involving 44,152 fatalities and 342,771 injured including 80,558 severed. Speeding is categorised as one of the main faults of road accidents in the country. It contributes directly by 15% and indirectly through dangerous driving (7%) careless driving (37%). Thus speeding contributes from a minimum of 15% to a maximum 59% of all road accident in the country.

Objectives

The main objective of this study is to determine the effects of traveling speed of different posted speed limit on highway. The objectives of this study are as follows:

i) To determine the operating speed of different vehicles at different posted speed limit.

ii) To determine the speed compliance level of traveling vehicles.

iii) To identify the non-compliance level at different posted speed limits.

Hypotheses

The hypotheses of this study are to identify the contributing factors to compliance of speed limits. The hypotheses are as follows:

(i). There is no association between classification compliance of speed limits and vehicle.

(ii). There is no association between compliance of speed limits and direction of traveling.

(iii). There is no association between different posted speed limits and compliance of speed limits.

(iv). There is no association between 110 km/h Posted Speed Limits and compliance of speed limits.

(v). There is no association between 90 km/h Posted Speed Limits and compliance of speed limits.

(vi). There is no association between 80 km/h Posted Speed Limits and compliance of speed limits.

(vii). There is no association between car versus taxi and compliance of speed limits.

(viii). There is no association between private vehicles versus public vehicles and compliance of speed limits.

(ix). There is no association between private vehicles versus commercial vehicles and compliance of speed limits.

(x). There is no association between bus versus taxi and compliance of speed limits.

Scope of the Study

The study focuses on the effect of different posted speed limits among vehicles classification at 80 km/h, 90 km/h and 110 km/h posted speed limit on the North South (PLUS) expressway stretch from Kuala Lumpur to Seremban. The study aims to identify and determine the operating speed and the compliance of speed limits among the vehicles classification. The scope of the study were covered based on collection of spot speed data within the identified area.