

UNDERSTANDING OF SPEED BEHAVIOUR IN RELATION TO ROAD TRAFFIC ACCIDENT: A COMPARISON BETWEEN MALAYSIAN AND VIETNAMESE DRIVERS

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Abstract: Speed behaviour has always been associated with road traffic accident in Malaysia and Vietnam. The speed behaviour may vary from one moment to another depending on external factors or internal factors affecting the driver at that particular moment. Understanding the speed behaviour between Malaysian drivers & Vietnamese drivers are important to pin down the factors causing the road traffic accident in each respective country, with a countermeasures proposal to improve driver's speed behaviour in a long run. Following a set of questionnaire completed by 150 Malaysian and Vietnamese drivers respectively, a certain degree of similarity between Malaysian and Vietnamese driver's speed behaviour were observed. The results revealed similarity in primary factors affecting the driver's speed choice which are road design (tendency to speed on wide lane), circumstances of journey (time pressure to meet schedule or deadline), emotion (impatient and enjoying the feeling while speeding) and strong self-belief (confident in overtaking other vehicle safely and believing that speeding is normal). In conclusion, Malaysian and Vietnamese drivers have similar speed behaviour, with countermeasures to improve the speed behaviour are proposed and discussed.

Keywords: Countermeasures, road traffic accident, road design, road infrastructure, speeding behaviour, traffic calming.

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1.0 Introduction

1.1 Background of Malaysia and Vietnam

Malaysia and Vietnam are categorised under Southeast Asian countries. Malaysia is an upper-middle income country with a population of approximately 30,851,718 people. In contrast, Vietnam is a lower middle-income country with a population of approximately 94,683,377 people (World Bank, 2016). The difference between Malaysia and Vietnam economy growth indirectly affect the road infrastructures and road design.

Road infrastructure can be defined as the structures which form part of roadway, pathway or shoulder which this constitutes of constructions and materials to build roadway, pathway or shoulder (Victorian Road Management Act, 2004). This means the road infrastructures and designs for Malaysia and Vietnam are relatively different. The road infrastructures for Malaysia and Vietnam are relatively different in terms of structures that forming the roadway and materials from which the roadway is made This can be seen in the road design in Malaysia and Vietnam highways, whereby Malaysia highways are characterised by two and three-lane roads with asphalt pavement and guardrails. The allowable speed limit for Malaysia highways is 110 km/h, except for the gradient road and accident-prone areas. Meanwhile, the road design in Vietnam highways are characterised by two-lane road with guardrails and asphalt pavement at certain areas. The allowable speed limit for Vietnam highways is 60 km/h. Thus, the road infrastructure and design can affect the driver's speed choices which subsequently contribute towards road traffic accident.

1.2 Road Traffic Accident in Malaysia and Vietnam

As reported by World Health Organization (WHO), 1.25 million people die worldwide annually due to road traffic accidents (WHO, 2016). This can be understood that road traffic accident is a global problem. Malaysia and Vietnam have suffered from road accidents and fatalities over the past five years (Ngo, Rao, Hoa, Hoy, Trang & Hill, 2012; MIROS, 2015). This can be said the leading causes of death in Malaysia and Vietnam are caused by road accident. It is reported also people who are kill in road traffic accident in Vietnam is 30 times higher than those who are killed in pandemic diseases (Darshan, 2016; VnExpress, 2016).

As far as Malaysia is concern, human factors have become the largest contributors to road traffic accidents in Malaysia (Malaysia Institute of Road Safety Research, 2015), while speeding behaviour has contributed 60% to the causal of road traffic accidents and deaths in Malaysia (Ahmad, Siti, Fauziana & Abdul, 2012). In contrast, the condition of road traffic accidents in Vietnam is deteriorating with speeding as the major contributor of road accident and death in Vietnam (Huyen, 2009).

1.3 *The Influence of External and Internal Factors towards Driver's Speed Behaviour*

Several external and internal factors can be associated with driver's speed behaviour in Malaysia and Vietnam. The external factors are related to (1) road design (2) environment (3) time pressure and (4) vehicle occupancy. On the other hand, the internal factors are factors that relate with human ranging from (1) personality trait (2) belief and (3) emotion.

The first external factor that influences driver's speed behaviour is the road designs and environment. Road design refers to road width, number of lanes, shoulder width, presence of parked cars on the edge and the presence of vertical elements on the roadside (Edquist, Brown & Lenne, 2009, p.6). The influence of road width and number of lanes may increase the tendency of driver to speed. In normal condition, majority of driver tend to speed on roads with wide and multiple lanes as they perceive that there is sufficient space to overtake other vehicles when required. They also feel that they have time to react if anything occurs on the road (Elliot, Mccoll & Kennedy, 2003). These have subsequently increased the likelihood of drivers to speed and involve in road accidents if they perceive that wider road width and higher lane numbers as opportunity to speed.

Additionally, the second external factor is environment. Environment factors are consisting of weather, road sign, road marking, light and road geometry that can influence driver's speed behaviour (Edquist, et al., 2009). It is well understood that low visibility can reduce the travel speed as the drivers unable to estimate the leading vehicle distance as well as the hazards appear on the roads. U.S Department of Transportation (2009) reported that low visibility significantly reduces travel speed and roadway capacity by up to 12%. Correspondingly to the visibility, the dry weather can affect driver's speed behaviour as dry and daylight conditions increase the mean volumes and traffic variations (Golob and Recker, 2003). Besides that, posted speed limit at the locations can influence driver's speed behaviour in a sense that it increases driver's alertness to the design speed limit and surroundings. The speed limit is set in response to the geometry and conditions of the road. Therefore, the drivers are required to adhere to the speed limit and decrease the speed limit accordingly when there is a road sign to lower speed limit. The effects of lowering the speed limit has been investigated in several countries include Belgium, Finland, France, Germany and United Kingdom. The investigation revealed that by lowering the speed limit, it lowers the average speed and subsequently reduces the crash risks and crash severity (Archer, Fotheringham, Symmons & Corben, 2008).

Then, the third external factor that can influence driver's speed behaviour is the circumstances of journey. Generally, heavy vehicles drivers are under time pressure as they need to meet scheduled deadlines (Townsend & Galbraith, 2011). As such, the

driver often drives faster than the posted speed limit which could potentially attract road traffic accident. The work context can put the drivers under time pressure, which this can be a risk factor for accidents. Other than that, running late for appointment, traffic congestion, delays and attending emergencies are among the occurrences that possibly increase the time pressure among drivers. These occurrences have driven drivers not to perceive speeding as an important risk factor but punctuality as more desirable (Adam-Guppy and Guppy, 1995).

Furthermore, occupancy of vehicle affects drivers' speed behaviour. The vehicle occupancy may affect the driver directly when they are visible and present in the car. This is related to the influence of peer passenger in influencing drivers' speeding behaviour especially to young drivers (Gheorghiu, Delhomme, Felonneau, 2015; Moller & Haustein, 2013). Similarly, the driver can be indirectly affected with the presence of other road users in the general traffic environment (Hagland & Aberg, 2000).

Apart from the external factors, internal factors can influence driver's speed behaviour. This involves driver's demographic backgrounds particularly age and gender. Age and gender are strong predictors in influencing driver's speed choice. Past studies have proven that young drivers have higher tendency to exceed the speed limit than the experienced and older drivers. Young drivers contributed three to four times more crashes than any other older or experienced drivers (Clarke, Ward & Truman, 2005). Besides that, male drivers tend to engage in riskier driving behaviour as compared to female drivers since male drivers have the tendency to drive faster and violate the speed limit than the female drivers (Lancaster & Ward, 2002).

Besides that, drivers may experience different emotions towards the traffic, the environment as well as the other road users during a road journey. Most of the time, drivers may experience anger due to restless and impatience towards the traffic conditions. These drivers usually endanger themselves and other drivers intentionally with their behaviour by speeding and manoeuvring without turning on the signals (Deffenbacher et al., 2003). On the same note, personality traits such as sensation seeking, impulsiveness, excitement and thrill have also been identified as major factors in risk-taking behaviour. There is positive relationship between sensation-seeking with risky driving behavior which this consequently contribute to the increase of road traffic accident (Rimmo and Aberg's in (Amirfakhraie, Taghinejad & Sadeghifar, 2013).

This can be understood that the magnitude in which the external and internal factors influence the driver's speed behaviour is depending on the environment, vehicle occupancy, time pressure, driver's demographic background, emotion and personality which this can affect the driver's speeding behaviour on the road.

2.0 Method

2.1 Respondents and Settings

There were 211 Malaysian respondents and 150 Vietnamese respondents recruited in this cross-sectional survey. Two research assistants were assigned to recruit the Malaysian respondents while three research assistants were assigned to recruit the Vietnamese respondents. The compulsory rules for the respondents to participate in this study are 18 years old above and having a valid driving license. The respondents from Malaysia were selected randomly at rest areas of selected highways representing the north, central and southern regions of Malaysia. These locations were chosen based on the accident data from Royal Malaysia Police and Malaysia Institute of Road Safety Research (MIROS). Meanwhile, the respondents from Vietnam were selected at rest areas of Route National Highway No.1. This location was selected to represent the accident-prone locations in Ho Chi Minh City as advised by Vietnam City Council. Thus, a total number of 150 Vietnamese drivers were eligible and recruited for this survey. Hence, 150 respondents were then sampled among Malaysian drivers to ensure balance number of respondents in this survey.

2.2 Procedures and Measures

This survey employed self-administered questionnaire and informed consent was asked from the respondents prior to the survey. Subsequently, the researchers explained carefully and thoroughly the aims of the research and informed that their responses would be anonymous. The researchers read out the questionnaires clearly and record the responses given by the respondents. The respondents may interfere at any point of time if they do not understand with the questionnaire. This questionnaire was measured using 4-items of Likert Scales answer ranging from 1- Strongly Disagree, 2- Disagree, 3- Agree and 4- Strongly Agree. This questionnaire employed 4-items Likert Scale to avoid undecided responses among respondents. There were four sections covered; start with vehicle use characteristics, driving experiences, speeding behaviour statement and end with demographic backgrounds questions. This accumulated to 34 questions altogether. After the questionnaire was submitted, a small gift was provided for participation.

2.3 Vehicle Use Characteristics

There were three questions related to vehicle use characteristics. The respondents need to indicate their vehicle type, the vehicle use type and purpose for their trip.

2.4 *Driving Experience*

For this section, six questions related to driving experience were asked. The questions are about length of driving experience, fine history, involvement in accident, self-reported speed, average travel distance and average travel time for the trip.

2.5 *Speeding Behaviour*

This section covers on speeding behaviour statement which respondents need to indicate which factors have influenced their speeding behaviour. The statements use a 4-point Likert scale ranging from 1 (strongly disagree) to 4 (strongly agree).

2.6 *Demographic Background*

Finally, the last section covers on demographic background. The respondents need to disclose their background in term of age, race, marital status, education level, profession and household income.

3.0 **Results and Discussion**

3.1 *Demographic Background*

The demographic background for Malaysian and Vietnamese respondents are reported in Table 1. As depicted in Table 1, 21.8% of Malaysian drivers are categorized under age group of 39 to 45 years old and 20.9% from young driver's age of 18 to 24 years old. Meanwhile, equal proportion of 20.0% from four age groups can be seen among Vietnamese respondents; 18 to 24 years old, 25 to 31 years old, 32 to 38 years old and 39 to 45 years old. The percentages for older drivers, represent the age of 46-59 years old on the road among Malaysian and Vietnamese respondents are relatively the same, to show the mobility among older drivers are occasional compared to those below 46 years old drivers. This can also be translated to high speeding cases involving young and middle-aged drivers as compared to older drivers. Meanwhile, the smallest percentage of age composition is found from 60 years above respondents. This can be seen among Malaysian and Vietnamese respondents with 2.4% and 0.7% separately.

In term of driving experiences, majority of Malaysian respondents have broad driving experiences with 56.9% hold more than 10 years of experiences while only 30.0% of Vietnamese drivers hold more than 10 years of experiences. Those who acquired 4 to 10 years of experiences among Vietnamese respondents is reported with 33.3% while for Malaysian respondents is at 29.4%. This explained that Malaysian respondents are having more experiences compared to Vietnamese respondents, thus this clarifies that

Malaysian respondents have better driving capability as compared to Vietnamese respondents.

Aside to that, majority of Malaysian and Vietnamese respondents have never been involved in accident with 54.5% and 64.0% respectively. However, those who had been involved in accident for 1 to 4 times are accountable for 44.5% and 29.3% among Malaysian and Vietnamese respondents. This can be understood percentages of accident among Vietnamese respondents are slightly lower than Malaysian, although Malaysian are having wider driving experience than the Vietnamese. The reasons are possibly because Malaysian is over-confidence with their driving experience and capability, which result to higher involvement in accident. Besides that, the posted speed limit at Vietnam highway is comparatively lower, simply to reflect the road condition, road geometry and road surface in Vietnam.

Similarly, majority of Malaysian and Vietnamese respondents have never been fined for speeding with 51.7% and 56.0% respectively. However, those who had been fined for speeding were accumulated up to 48% among Malaysian and 45% among Vietnamese. These describe Vietnamese respondents have lower percentage of speeding fine as compared to Malaysian respondents possibly because majority of Vietnamese drivers adhered to posted speed limit and the traffic laws as those who caught speeding can be fined up to VND 3,000,000, which this can be converted up to RM 600.00 together with revoking of driving license for 30 days (Traffic Fines, 2017). Meanwhile those who were apprehended for speeding in Malaysia can be fined RM 150 under Automated Enforcement System (AES) and driving licence would be suspended under Automated Awareness Safety System (AWAS). This can be understood punishment for speeding offence in Vietnam is much stern compared to Malaysia.

3.2 *Factors Affecting Speeding Behaviour among Drivers*

Respondents have been asked questions pertaining to factors affecting their speed behaviour as shown in Table 2. As depicted in Table 2, nearly majority of Malaysian and majority of Vietnamese respondents weighted their agreement towards time pressure, represented by the statement “meeting schedule deadline” (45.9% and 76.0% respectively) and “urgency to reach the intended place” (40.7% and 72.0% respectively). This means, majority of Malaysian and Vietnamese respondents speed whenever they are under time pressure. This possibly because they view that speeding is not a risk factor and much more likely to consider punctuality as desirable.

Similarly, majority of Malaysian and Vietnamese respondents admit that they speed on wide lane such as highways or multiple lane on federal roads. This accounted to 45.0% and 77.3% respectively. This can be said, road design especially the road width and road surface can influence drivers to engage in speeding behaviour. The road width and

surface can possibly attract drivers to speed as drivers perceive enough time to react if anything occurrences occur on the road.

Besides that, majority of Malaysian and Vietnamese respondents put an agreement towards belief factor, "I believe I can overtake other cars safely" with 51.2% and 57.3% respectively. This somehow show high confidence levels among Malaysian and Vietnamese respondents while overtaking and speeding.

Table 1: Demographic characteristics between Malaysian and Vietnamese respondents

<i>Variables</i>	<i>Malaysian (N=150) Percentage (%)</i>	<i>Vietnamese (N=150) Percentage (%)</i>
Age		
18-24 years old	20.9	20.0
25-31 years old	19.4	20.0
32-38 years old	19.4	20.0
39-45 years old	21.8	20.0
46-52 years old	9.0	13.3
53-59 years old	7.1	6.0
60 years and above	2.4	0.7
Driving experience		
Less than 1 year	-	9.3
1-3 years	13.7	27.3
4-10 years	29.4	33.3
10 years and above	56.9	30.0
Involvement in accident		
Never	54.5	64.0
1-4 times	44.5	29.3
5-10 times	0.5	1.4
More than 10 times	0.5	5.3
Speeding fine		
Never	51.7	56.0
1-4 times	36.5	22.7
5-10 times	7.6	4.7
More than 10 times	4.3	16.7

Table 2: The Influence of External and Internal Factors for Speed Behaviour.

<i>Factors</i>	<i>Malaysian Percentages (%) (Strongly Agree & Agree)</i>	<i>Vietnamese Percentages (%) (Strongly Agree & Agree)</i>
<u>External factors</u>		
I tend to speed:		
	45.9	76.0
I tend to speed when I need to meet a deadline (meeting at 9am)		
	40.7	72.0
I tend to speed as I want to reach the place quickly		
	19.9	45.4
I tend to speed when other road users start speeding		
	8.5	24.7
I tend to speed because my friend encourages me to speed		
	13.2	27.3
I tend to speed when I hear a certain type of music		
	38.3	36.7
I tend to speed during the day compared to night		
	45.0	77.3
I tend to speed on wide lane (e.g: highways, multiple lanes on federal roads)		
	32.2	50.0
I tend to speed due to slow drivers		
<u>Internal factors</u>		
Speeding feeds my ego by giving me a sense of power and control	9.9	35.4
I feel excited and thrilled while speeding	22.7	33.3
I like the feeling of speeding	23.7	44.0
I feel more relaxed when speeding	17.5	41.3
I believe that I can overtake other cars safely	51.2	57.3
I believe that I am skilful enough to avoid accidents	43.1	36.7
I believe speeding is a normal driving behaviour	32.7	50.7

3.3 Preferred Driving Speed for Malaysian Respondents

In one of the section in the survey, the respondents need to report their self- driving speed at the locations. As depicted in Table 3, majority of the respondents are driving below and at the speed limit of 110km/h with 54.7%. However, those who violate the speed limit, representing by 10km/h to 20km/h above the speed limit (111-130km/h) are 25.3%. Meanwhile, drivers who exceed 10km/h and more above the speed limit (\geq 131km/h) are 20.0%. This also means the percentages of speed infringement among Malaysian respondents are accumulated to 45.3%. This shows that Malaysian respondents have high tendency to speed. Speeding cases normally involve the free-flow traffic condition and the consequences may vary from fuel consumption, emissions and traffic noise consequences. However, the effect of speed and crash severity is perilous and evidence clarified that the possibility of a serious injury or death is greater at high impact speed, in which this can be converted to a curvilinear relationship between injury and speed (Munden, 1967).

Table 3: Percentage of Preferred Driving Speeds for Malaysian respondents

<i>Self-Reported Speed</i>	<i>Malaysian (%)</i>
Below and at limit (≤ 110 km/h)	54.7
Exceed 1km/h-10km/h (111km/h-120km/h)	25.3
Exceed 10km/h and above (>120km/h)	20.0

3.4 Preferred Driving Speed for Vietnamese Respondents

The Vietnamese respondents also need to report their self- driving speed at the locations. As depicted in Table 4, majority of Vietnamese drivers adhere to the speed limit of 60km/h. Only few of the respondents are reported to violate the speed limit with 4.0%. This can be understood that majority of Vietnamese respondents are law-abiders even though the posted speed limit is relatively lower than posted speed limit in Malaysia.

Table 4: Percentage of Preferred Driving Speeds for Vietnamese Respondents

<i>Preferred Speed</i>	<i>Vietnamese</i>
Below and at limit (≤ 60 km/h)	96.0
More than 60km/h (>60km/h)	4.0

3.5 The Relationship between Gender Differences and Self- Reported Speed among Malaysian Respondents

Based on the Table 5, the relationship between gender differences and self-reported speed is tested using Mann-Whitney U test. This test is relevant in exploring the difference in self-reported speed between genders. From Mann-Whitney U result, it can be reported that the difference in score between male group ($n=117$) and female group ($n=33$) is statistically not significant as the p value for this test is bigger than 0.05. The result shows that Mann-Whitney U (1823.000) = -0.505, therefore the p value is 0.613, $p > 0.05$. This explains that there are no differences in self-reported speed among male and female respondents.

Table 5: Mann-Whitney U test between gender and self-reported among Malaysian respondents

		Ranks		
Gender		N	Mean Rank	Sum of Ranks
Self-reported speed (km/h)	Male	117	76.42	8941.00
	Female	33	72.24	2384.00
	Total	150		

Test Statistics ^a	
Self-reported speed (km/h)	
Mann-Whitney U	1823.000
Wilcoxon W	2384.000
Z	-.505
Asymp. Sig. (2-tailed)	.613

a. Grouping Variable: Gender

3.6 The Relationship between Gender Differences and Self- Reported Speed among Vietnamese Respondents

As depicted in Table 6, the relationship between gender differences and self-reported speed is tested using Mann-Whitney U test. From Man-Whitney U result, it can be reported that the difference in score between male group ($n=135$) and female group ($n=15$) is statistically significant as the p value for this test is smaller than 0.05. The result shows that Mann-Whitney U (700.000) = -2.084 , therefore the p value is 0.037, in which $p < 0.05$. This explains that there are differences in self-reported speed among male and female Vietnamese respondents. There are differences in the self-reported speed among male and female Vietnamese respondents as males usually have higher tendency to speed compared to female respondents.

Table 6: Mann-Whitney U test between gender and self-reported speed among Vietnamese respondents

		Ranks		
Gender		N	Mean Rank	Sum of Ranks
Self-reported speed (km/h)	Male	135	77.81	10504.35
	Female	15	54.67	820.05
	Total	150		

Test Statistics ^a	
Self-reported speed (km/h)	
Mann-Whitney U	700.000
Wilcoxon W	820.000
Z	-2.084
Asymp. Sig. (2-tailed)	.037

a. Grouping Variable: Gender

4.0 Conclusions

In conclusion, this comparative study provides an insight towards the factors that affect driver's speed behaviour between Malaysian and Vietnamese respondents. There were some similarities exist among the respondents on the primary factors that affect their speed behaviour such as road designs and time pressure. These factors can be categorised as external factors that determine respondents to speed. Besides that, other important factor that have affected driver's speed behaviour is self-belief. The strong self-belief has served as internal factors that determine driver's speed behaviour.

To improve driver's speed behaviour, several countermeasures to address the external and internal factors are proposed. The first countermeasure that addresses the external factor is through traffic calming measure. Traffic calming measure refers to the techniques of installing physical speed-reducing measures. Transverse rumble strips can be installed to warn the drivers about speed restrictions. An audible warning is provided to drivers by the noise generated from the vehicle tires passing over the rumble strip. The tactile warning is attained via the vibration that is induced by the rumble strips when the vehicle tires travel over the strip. It was proven that this technique was used as speed reduction as a surrogate for safety (Carlson & Miles, 2003).

Besides that, is another proposed countermeasure that could be undertaken for speed behaviour is through publicity and enforcement. The publicity helps to increase driver's expectations of being apprehended if they exceed the speed limit, while the high level of enforcement operation is needed to reprimand the speed limit offenders of the consequences from speeding. Both publicity and enforcement are crucial in increasing driver's awareness of the potential risks associated with speeding and expectation of being apprehended.

It is notable that the internal factor could also trigger driver's speeding behaviour. Public education campaigns as well as school education campaign are relevant to improve the internal factor. Public education campaigns are designed to target male and young drivers since these groups have higher tendency to speed in normal conditions. Besides that, road safety education should be introduced in Malaysian and Vietnam schools. Road safety education has been taught in New South Wales schools targeted the primary and secondary students in the learning area of Personal Development, Health and Physical Education (Road Safety, 2016).

To conclude, the responses provided by the drivers are confined to their revealed preferences that sometimes can be translated to actual behaviour and sometime may not be translated to actual behaviour. As such, future study is essential to conduct more in-depth investigation using empirical equipment and interviewing drivers that being apprehended to further understand the issue of speeding behaviour in Malaysia and Vietnam.

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