ATTITUDES AFFECTING SPEEDING BEHAVIOUR WITH SPECIAL REFERENCE TO ATTITUDES OF MALAYSIAN CAR DRIVERS

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ABSTRACT

The increasing number of road crashes and fatalities on Malaysian roads is a worrying phenomenon and the main cause of this has been attributed to the speeding behaviour of drivers. As such, this study aims to investigate the possible driver factors, specifically, their attitude, which could affect the speeding behaviour of drivers on Malaysian roads. This study uses a mixed method research design. The quantitative data were collected via a face-to-face survey of 503 participants in Malaysia. Data were then analysed via Statistical Package for Social Sciences (SPSS) version 25. The outcome of the quantitative approach was further supported by the qualitative approach where interviews were conducted via a focus group discussion. Data were thematically classified. The findings revealed that the drivers' attitude is capable of affecting the drivers' speeding behaviour when driving on Malaysian roads. The survey results also highlighted that drivers have a higher tendency to speed on Expressways as compared to Federal roads. This outcome was strongly supported by the focus group discussion data. Three hypotheses formulated for this study were also supported, whereby male drivers, speed violation records and crash experiences were found to have a higher tendency to speed. Additionally, this study also showed that drivers can be classified into four driver typologies - law abiding, cautious, pragmatic and risk-taking. This study offers three contributions to the driver-behaviour research. Firstly, this study serves as an insight into understanding the drivers' attitude in relation to their speeding behaviour when using the Expressways and Federal roads. Hence, attitude becomes the basis of behaviour even when different road types are involved. Secondly, by taking the drivers' typologies into consideration, this study offers the authority a possibility into undertaking the safety approaches employed by other countries, such as the Concept of Safe Speed Limit and Safe System Approach, as a way to improve drivers' behaviours on the road. Finally, this study is the next step for sustainable road safety implementation. It is hoped that this study

will serve as a guide to improve drivers' speeding behaviour and to reduce speed-related

road crashes and fatalities on Malaysian roads.

ABSTRAK

Peningkatan jumlah kemalangan jalan raya dan kemalangan jiwa di Malaysia adalah fenomena yang membimbangkan dan punca utamanya boleh dikaitkan dengan tingkah laku pemandu yang memandu laju. Oleh yang demikian, kajian ini bertujuan untuk menyiasat faktor pemandu, terutamanya sikap pemandu yang menyumbang kepada berlakunya perkara ini. Kajian ini menggunakan pendekatan penyelidikan kaedah campuran. Data kuantitatif telah dikumpul dari soalan kaji selidik secara bersemuka melalui 503 orang pemandu di Malaysia. Data ini kemudian telah dianalisis menggunakan Pakej Statistik untuk Sains Sosial versi 25. Keputusan daripada kaedah kuantitatif telah disokong oleh kaedah kualitatif, iaitu temubual melalui kaedah perbincangan kumpulan. Data telah diklasifikan mengikut tema. Penemuan ini mendedahkan bahawa sikap pemandu mampu mempengaruhi kelakuan memandu laju di atas jalan raya di Malaysia. Dapatan daripada soalan kaji selidik juga menerangkan bahawa pemandu mempunyai kecenderungan yang lebih tinggi untuk memandu laju di Lebuhraya berbanding di Jalan Persekutuan. Dapatan ini telah disokong kuat oleh kaedah perbincangan kumpulan. Tiga hipotesis yang dibentuk daripada kajian ini juga dapat disokong, iaitu lelaki, pemandu yang mempunyai rekod saman kelajuan dan penglibatan dalam kemalangan jalan raya adalah lebih cenderung untuk memandu laju. Di samping itu, kajian ini mendapati bahawa terdapat empat kategori pemandu iaitu mematuhi undang-undang, berhati-hati, pragmatik dan mengambil risiko. Kajian ini memberikan tiga sumbangan kepada kajian tingkah laku pemandu. Pertama, kajian ini diperluaskan untuk memahami sikap pemandu yang memandu laju di Lebuhraya dan Jalan Persekutuan. Oleh itu, sikap pemandu menjadi asas kepada tingkah laku pemandu walaupun kajian ini dijalankan pada jalan yang berbeza. Kedua, dengan mengambilkira hasil penemuan kajian iaitu kategori pemandu, pihak berkuasa dapat mengambil contoh pendekatan keselamatan dari negara-negara lain

seperti *Concept of Safe Speed Limit* dan *Safe System Approach* untuk memperbaiki sikap pemandu di atas jalan raya. Ketiga, kajian ini menjadi langkah pelaksanaan keselamatan jalan raya yang lebih mampan. Oleh itu, kajian ini diharapkan dapat menjadi panduan dalam memperbaiki tingkah laku pemandu dan mengurangkan kes kemalangan dan kematian yang disebabkan oleh kesalahan memandu laju di atas jalan raya di Malaysia.

KATA KUNCI

Attitude, ABC Model of Attitude, Habit, Speeding Behaviour, Theory of Planned Behaviour, Road Safety

ACKNOWLEDGEMENTS

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LIST OF SYMBOLS AND ABBREVIATIONS

BOT   :   Build-operate-transfer

FHWA   :   Federal Highway Safety Administration

MHA   :   Malaysia Highway Authority

MIROS   :   Malaysian Institute of Road Safety Research

NSE   :   North South Expressway

PMB   :   Projek Lebuhraya Usahasama Malaysia Berhad

PLUS   :   Projek Lebuhraya Usahasama Berhad

RPM   :   Royal Police Malaysia

RTD   :   Road Transport Department

ROSPA   :   The Royal Society for the Prevention of Accidents

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CHAPTER 1: INTRODUCTION

1.1 Background

Every year, over 1.25 million of road accidents are reported worldwide. Sixty percent (60%) of these road accidents happen in Asia with over 70% of them being reported from ASEAN countries. This issue has become one of the pertinent matters being discussed in the global context. Realising the need to decrease casualties and calamities caused by road accidents, the United Nations then declared the Decade of Action for Road Safety, which was to take effect from 2011 to 2020. The goal of this agenda was to reduce the number of casualties and calamities caused by road accidents around the world. During the United Nations Summit on Sustainable Development on September 2015, a new agenda called the Sustainable Development Agenda was introduced. Some of the excerpts from the agenda reiterated that the number of global deaths and injuries caused by road traffic accidents should be reduced partially by the year 2020 (The ASEAN Secretariat, 2016).
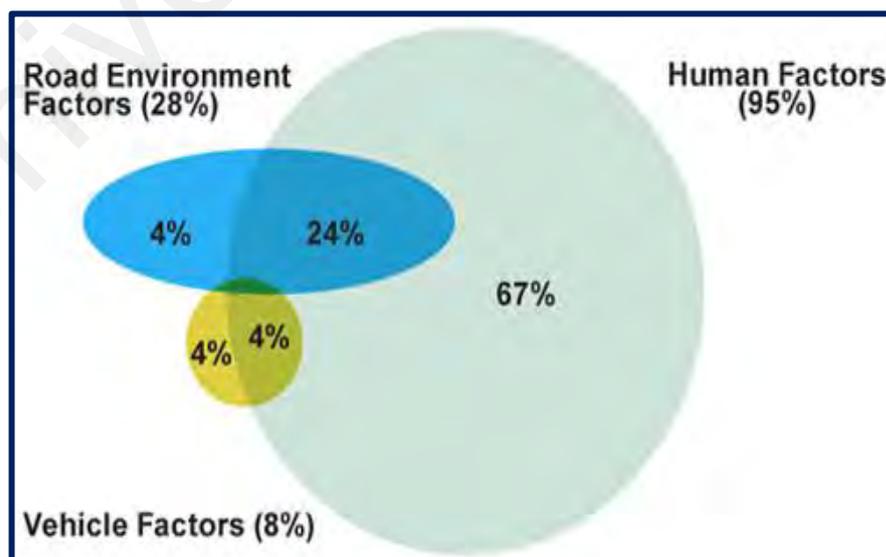
Figure 1.1: Contributing Factors to Traffic Crash Worldwide (Trentacoste, 1997).

In many of the road accident cases, fatalities can be attributed to human factors (95%), road environment factors (28%) and vehicle factors (8%) (Federal Highway Administration, 1997). The human factor can be further attributed to human beings and their attitudes of driving, their age, their health conditions and their behavioural problems (Stephens et al., 2017; Moataz & Bromfield, 2017; Mohd & Lilis, 2015, (Knight, Iverson and Harris, 2012; Leandro, 2012; Fildes, Rumbold & Leening, 1991). On the other hand, a number of factors contributed to fatal accidents such as distracted driving, driving under the influence of alcohol, non-use of helmets or seatbelts, non-use of child restraints and speeding (World Health Organisation, 2017). However, speeding has been acknowledged to be one of major factors amongst other human factors that contribute fatal accidents. Speed not only makes a large contribution to all injuries but also the most important contributor to fatalities. (Farmer et al. (1999), Dee and Sela (2003) and Clarke et al. (2010). Speeding has also been acknowledged as the main contributory factor of RTA in developing country includes Malaysia (WHO, 2004; Ciosca & Ivascu, 2017; Akmal Abdelfatah, 2016; Malaysian Digest, 2017).

Most countries in the world suffer from one of these traffic offences while some countries may be experiencing all of these offences. However, travelling above the posted speed limit or travelling within the speed limit may be inappropriate for certain prevailing road conditions and this serves as the most significant contributor for road accidents and fatalities worldwide (Peden et al., 2004). Looking into this phenomenon, The Canadian Press (June 27, 2017) reported that speeding is the number one cause of road fatalities on Ontario roads. Meanwhile, the three predominant factors in traffic deaths among Americans have been cited to be the non-use of seat belts, alcohol influence and speeding (The New York Times, February 15, 2017). Speeding behaviour has become the main issue discussed in road safety because the number of casualties related to speeding behaviour is on the rise over the years. This issue has gained greater attention among

researchers and experts of all fields who strive to seek and work out solutions to ease the problem. Nevertheless, this issue has also raised concerns for traffic psychologists who aim to study, assess and evaluate the road users' behaviours.

In the local context, Malaysia has recorded an average of 7,152 fatalities derived from road accidents which have resulted in a fatality rate of 23 persons per 100,000 population each year (Fauziah, 2017). Report (Tamarai, 2016) also shows that 80.6% of the fatalities can be attributed to human error in which speeding behaviour contributed to 32.8% of the fatalities (Malaysian Road Safety Council, 2001 which recently became known as the Malaysian Institute of Road Safety Research, MIROS). In a study conducted by Kareem (2003), it was emphasised that speeding had become one of the causes of road accidents occurring in Malaysia, besides other traffic offences such as reckless driving, lack of proper protection, bad personal habits, social and behavioural misconduct and inconsiderate driving of larger vehicles. Another significant outcome provided by reports (Teo & Gan, 2016) state that speeding has contributed to one-third of all the fatal crashes recorded in Malaysia for nine consecutive years, beginning from 2002 and stretching to 2011. Recent findings (Haziq, 2017) also stated that speeding contributes to a significant majority of the traffic offences and the causes of road accidents in Malaysia.

In the Road Safety Plan of Malaysia (2014), motorcyclists, motorists and pedestrians have been ranked as the most vulnerable victims of road accidents in Malaysia. Similarly, motorcycles, cars, lorries and vans have been ranked as the most susceptible vehicles to be affected in any road accident in Malaysia (Ministry of Transport, 2014). Thus far, road engineers, government bodies and related agencies have tried to develop a proper mechanism which can address the problem of speeding among drivers. For instance, proper signages are placed on the roads to serve as warning signs or stop signs. Other mechanisms include enforcement bodies putting up legal speed limits

on the roadways so as to ensure road users' safety. The objective of introducing speed limits on roadways is to alleviate the risk of accidents and travel time, to guide drivers towards safe travel speed limits and to create a stable traffic flow which is deemed to improve the overall road safety conditions in Malaysia (Public Works Department, 2016). Nevertheless, drivers tend to ignore and underestimate the speed limits, thus they become engaged with speeding. Undoubtedly, speeding is a perilous and hazardous practice; it increases the risk of accidents and fatalities and it is stressful to other motorists on the road. For this reason, implementing a regulatory intervention is essential because doing so will help to identify the risk-afflicted drivers from their speeding habits thereby allowing the authorities to admonish the drivers on their speed choices and to warn them about the effect of speeding on crash probabilities and severities (Public Works Department, 2016).

Speeding increases crash probability and severity because speeding intensifies the kinetic energy of vehicles. Speeding also amplifies drivers' response time and braking distance, thereby making it a risk in emergency events. Kinetic energy exists whenever an object is moving and the same goes for a vehicle that is moving, it too has its own kinetic energy. The faster the vehicle is travelling, the more the kinetic energy is produced. As the vehicle's speed increases, the reaction time, reaction distance and braking distance also increases. Reaction time refers to the duration of time spent by a driver to see and realise the hazard before making any reaction to the hazard. Reaction distance refers to the distance travelled by the driver during the reaction time. Meanwhile, braking distance refers to the distance needed to stop before the vehicle hits the target.

For this reason, a table of speed and survival chance of pedestrians being hit by a vehicle was established by Ashton and Mackey (1979). From their point of view, a car that is travelling at 32km/h could have an impact of 5% fatally injuring pedestrians.

Meanwhile, a car that is travelling at 64km/h would incur an impact of 85% fatally injuring pedestrians. Speeding behaviour is nevertheless, a serious issue since it is life-threatening for motorists, motorcyclists and pedestrians. The result of this anti-social behaviour is the emergence of road menace with speeding behaviours, thereby turning it into one of the leading causes of road accidents (Kareem, 2003). The worst scenario in road safety could happen if speeding is predicted to become a leading cause of death by the year 2030, especially if nobody takes any action in the road safety aspect (World Health Organization, 2017).

Besides causing hurt to several parties during the road accident, speeding also has a detrimental effect on the stability of a country. For example, a country can suffer from economic deprivation as a result of its population adhering to the speeding behaviour. This is because the victims who suffer from the speeding behaviour may end up with injuries ranging from minor injuries, severe injuries to disability or even deaths. These occurrences have an economic burden on the government as they involve hospital treatments, health care services, emergency services and workplace productivity costs. Indirectly, the government needs to bear the related costs incurred when road users suffer from minor or severe injuries which include the provision of medical facilities such as medicine, ambulance and special equipment together with the employment of personnel for road accidents such as the police, emergency response teams and firefighters. The worst scenario occurs when the person is found dead. When this happens, the government needs to bear the insurance claims while the family involved needs to bear the funeral costs and other monetary expenditures, notwithstanding the emotional pain experienced by close family members.

Malaysian Institute of Road Safety Research (MIROS) report of the total costs of accidents, injuries and fatalities happening all over the world amounted to USD 500

million per year. This valuation exercise has been used to estimate each death and injury caused by road accidents throughout the whole of Peninsular Malaysia. The valuation for death is USD 370,000, severe injury is USD 37,000 and for slight injury, it is USD 3,700 (Mohd Yusof, Mohamad & Md Noor, 2011). Moreover, the impact of accidents, injuries and fatalities caused by speeding can adversely affect the psychological and sociological being of the victims as well as the families. The victims would be suffering either from temporary or permanent injuries and should this happen, these victims also need to depend on the families for daily care and assistance. Further, victims may be traumatised by the incidents, causing them to suffer from emotional imbalance which not only affect the victims but also the family members. All these repercussions cost money and create a heavy strain for all parties involved.

In a broad view, the impact of accidents, injuries and fatalities caused by speeding behaviour can also ruin the image and development of the country. In the context of Malaysia, outsiders may perceive Malaysia to be an unsafe country and this may cause outsiders to have a poor impression and a dreadful perception of our country in terms of reputation, safety and image. As an example, there was a case of a Polish woman who died in 2016 after she was hit by a stage bus while she was crossing the road in the federal state of Kuala Lumpur (Faisal, 2016). In another example, an accident in Johor Bharu in 2017 caused a Singaporean youth to die from severe injuries after he was hit by a speeding car (Yuen, 2017). These are but two of the fatalities involving foreigners caused by speeding behaviours. Indeed, we do not want the same things to happen to our family members, neighbours and even ourselves. Thus, it is the responsibility of every Malaysian citizen to ensure the safety of roads, the safety of people, safety speed and the safety of the vehicles they drive. Under these circumstances, it is crucial for researchers to examine, study and investigate the underlying factors and the underpinning circumstances causing speeding among Malaysian drivers.

1.2   Problem Statement

The concern is not merely on the speeding behaviour of motorists or drivers. In fact, this study is interested evaluate the concrete problems arising from speeding by looking at what factors cause people to change when they are behind the wheels. Malaysians are well-known for their courtesy, politeness and caring attitude towards one another. However, it seems that a courteous and polite person could transform to become a different person when he/she is behind the wheels driving. This phenomenon is not a laughing matter because thus far, it seems to be the norm on Malaysian roads causing fatal road accidents. According to the road accident statistics, the total number of accidents, casualties and deaths caused by road accidents in Malaysia is approximately 548,598 cases. Referring to this statistic, 6,284 are contributed to deaths, followed by 2,964 of serious injuries and 5,377 of minor injuries which contributed to total number of 14,625 of casualties on Malaysia roads. Meanwhile, the total motor vehicles involved in road accidents is approximately 837,695. Out of this number, 591,399 (70.5%) is reported among car drivers (Bukit Aman Traffic Investigation and Enforcement Department, 2018). Current road offences seem to include various factors such as speeding, aggressiveness, inconsiderate driving behaviours, running off red lights, road bullying, lack of use of indicators and driving on emergency lanes (Andres, 2017). In a study conducted by the University of Michigan, the report listed Malaysia as the top 25 most dangerous countries for road users (Dina, 2014). Likewise, Malaysia has also been listed in the 17th most dangerous country for drivers, among 193 countries, as revealed by the WHO's data in 2008 (Dina, 2014). All these imply that Malaysia already carries a poor reputation in terms of road safety, and this certainly needs to be addressed urgently.

The question that is hanging in the minds of most Malaysians is what are the actual causes of this problem? Malaysians do want to know why these problems occur despite the many approaches and interventions conducted by the government and

authorities. Malaysians also want to know how such a problem should be solved and who should be responsible for this problem? In this regard, it is noteworthy to mention that the individual factor which serves as a significant cause of accident occurrences in Malaysia is human factor. The human factor contributing to road accident occurrences can be attributed to human beings and their bad attitudes of driving, their age, their health conditions and their behavioural problems (Selamat & Suriety, 2015). These human beings, thereby the drivers' and their bad driving attitudes, have been cited several times as the most significant contributor of road accidents and fatalities in Malaysia (Dina, 2014; Fauziah, 2017). Further to Dina (2014) and Fauziah's (2017) findings, recent research (Nora, 2017) looking at the cause of fatalities in Malaysia had also noted that some of these fatalities can be attributed to speeding and the breaking of other traffic laws. Clearly, the speeding behaviour also originated from drivers' bad attitudes (Nora, 2017). Based on these, the current study investigates the possible causes of speeding behaviour which are rooted in the drivers' attitude and possibly, other determinants, that could have influenced and affected the driver's speeding behaviour. The attitude concept is a broad concept that consists of the cognitive, affective and behavioural components (Allport, 1954). Therefore, this study evaluates the driver's cognitive (perception and belief), affective (emotion) and behavioural (tendency to act) components since it has been observed that the drivers' speed choice is mostly influenced by their opinion towards speeding and also their social attitudes (Jorgensen & Pedersen, 2005).

The drivers' attitude is distinctive on different roads when responding to the road types and road geometry. Hence, different kinds of attitude and behaviour are assumed by the drivers when they are on different road types. In other words, the drivers' attitude cannot be generalised due to the different road types and settings prevalent on Malaysian roads. In a study conducted by the National Highway Traffic Safety Administration (2011), which focus on drivers' attitude and behaviour on different road types, it was

found that drivers' attitude towards safe driving speed is different for multi-lane divided highways, two-lane highways and residential streets (Schroeder, Kostyniuk & Mack, 2013). Therefore, an attempt to investigate the drivers' attitude and behaviour on different road types in Malaysia is crucial as the outcome would be of great interest to the road authorities and other researchers. This outcome will be of value and benefit to others to comprehend the role of attitude on driving behaviour, particularly on speeding.

1.3   Gap of the Study

In the past decade, substantial studies have been conducted related to road safety and contributory factors related to accident such as drivers' speeding behaviour (Moataz & Bromfield, 2017; Stephens et al. 2017; Simsekoglu et al. 2012; Yang et al. 2013). However, until recently little work has been conducted to study the human factor related to drivers' speeding behaviour in Malaysia (Fauziah, 2017; Suhasni & Abdulkarim, 2016; The Sun Daily, 2015). In fact, little works have been discovered to study the elements of human factor which are attitude and behaviour. To the best of researcher's knowledge, only several studies are focussing on the attitude and behaviour towards speeding of Malaysian car drivers (Allyana et al. 2014; Noradrenalina et al. 2015; Suhasni & Abdulkarim, 2016). Thus, this represents a gap in the current knowledge.

Besides, most of the studies that investigating drivers' speeding behaviour employ quantitative method either through empirical investigation or survey (Bates et al, 2014; Moller & Haustein, 2014; Rolison et al. 2018; Yuen, 2017). Therefore, most of the studies could only investigate the engineering-based study as in the empirical evidence and the stated preference as in survey. Thus, this represents a gap in the current knowledge. The current study would investigate not just from the empirical evidence and survey, but it explores the topic more comprehensively by adopting thorough methods, which involves the quantitative and qualitative methods.

1.4 Research Goals and Objectives

The preceding discussion suggests a need to conduct further investigations into the speeding behaviour of drivers since the outcome is of great importance in the aspect of road safety. The primary goal of this study is to examine the factors of speeding behaviour by focussing on drivers' attitude and behaviour on different road types in Malaysia. In that regard, the research objectives underlying this study are:

1. To investigate the key factors that affect drivers' speeding behaviour.

2. To explore the attitude, components of attitude and their relationship with drivers' speeding behaviour.

3. To uncover the reasons and intentions of drivers' involvement in speeding behaviour.

4. To propose policy recommendation to improve driver speeding behaviour and reduce the speed related road crashes.

1.5 Research Questions

Based on these objectives, the research questions formulated for this study are as follows:

1. What are the key factors that affect the drivers' speeding behaviour?

2. How can attitude influence the drivers' speeding behaviour?

3. Which component of attitude is significant in affecting the drivers' speeding behaviour?

4. What are the reasons for the drivers' involvement in speeding behaviour?

5. How similar and distinct the drivers' intentions to speed and comply with the speed limit for both roadways?

6. What policy can be recommended to improve driver speeding behaviour?

1.6   Scope of research

As noted, this study aims to examine drivers' attitude and behaviour towards speeding in the context of Malaysian drivers. The location of this study was mentioned above, and they are confined to selected North-South Expressways and selected Federal roads within Peninsular Malaysia only. This study was carried out merely at the North-South Expressways and not the other Expressways such as Karak Expressways, East Coast Expressways, New Klang Valley Expressways, Besraya Expressways or New Pantai Expressways. This is because the North-South Expressways has linked many major cities in western Peninsular Malaysia and became the backbone of west coast Peninsular.

Before selecting the study locations, research collaborations and agreements were made between the researcher and PLUS Malaysia Berhad (the largest highway concessionaires in Malaysia) to study the drivers' attitude and behaviour towards speeding. Consequently, four locations along the North-South Expressways (NSE) were selected and six locations along the Federal roads were chosen. These locations were picked to represent the north, central and south regions within Peninsular Malaysia.

In addition, the participants selected for this study consists of passenger car drivers with the exclusion of motorcyclists, van, taxis, lorry and bus drivers. This study focused only on the four-wheeler vehicle drivers as most of the accidents in Malaysia tend to involve the four-wheeler vehicle drivers (Ministry of Transport, 2014). The exclusion of motorcyclists and bus drivers in this study took into consideration that motorcyclists and bus drivers practised a different kind of attitude and behaviour when compared to the four-wheeler vehicle drivers. The top causes of fatalities among motorcyclists are frequently due to head damage emerging from not wearing a helmet (Nur Sabahiah & Satoshi, 2011). Furthermore, the attitude and behaviour of bus drivers are different as their behaviour had been found to be influenced by psychosocial demands, working hours

and physical workload (Rohani & Buhari, 2013), hence they were also excluded from this study.

The empirical research locations mentioned in Chapter 2 will serve as evidence that the speeding behaviour have taken place along the North-South Expressways (NSE). This is to supplement the face-to-face survey that was conducted along the NSE. The data were collected under free-flow traffic condition during the day and under beautiful weather. This is to prevent any moderating effects caused by other factors such as weather, lighting and road surface condition from interfering with the research outcomes. It should be noted too that the apparatus involves in empirical research is merely for research purpose to show that speeding behaviour occur on the NSE. The research does not involve the police or authorities, nor it is meant for the enforcement purpose.

1.7   Significance of study

This study explores drivers' attitude towards speeding behaviour in the Malaysian context. It aims to provide evidence that can be used as further insight into understanding the factors that affect drivers' speeding behaviour. As noted, various factors that affect speeding behaviour include the vehicles themselves, the road condition, the driving environment, and trip characteristics, among others. Nonetheless, the most significant contributor to speeding behaviour is the human factor. Hence, this research aims to highlight the role of attitude and behaviour within the human factor so as to comprehend the issue more thoroughly. The results and findings generated from this study can benefit everyone and subsequently, they can be used to improve the road safety aspects of Malaysian roads. The results can also provide some shred of evidence and references about drivers' speeding behaviour, hence government bodies and the relevant authorities can further develop and design mechanisms and approaches which are aimed towards

improving drivers' attitude and behaviour, thereby contributing to the road safety aspect of Malaysia.

Consequently, any improvement made to the road safety aspect of the country can also enhance the economic development of the country and this can be accomplished in three ways. First, the government's spending on healthcare services such as hospital treatment can be alleviated and so the finances meant for this sector can be redistributed to meet other necessities, fulfil other economic projects and be utilised for other development purposes, all of which benefit the population as a whole. Besides that, any improvement made to the road safety aspect can attract foreign investors to invest in Malaysia since the country is now economically strong and stable as well as safe, resilient and sustainable. Third, this improvement can help to expand the tourism industry in Malaysia as tourists are more tempted to visit and stay in a country that is safe and secure.

Additionally, the outcome generated by this study will highlight which aspect of the human factor most substantially contribute to the drivers' speeding behaviour. Thus, by addressing this issue, other people from different walks of life can enhance their understanding, thereby becoming more conscious and aware of their roles and contribution towards the speeding behaviour. Through that consciousness and awareness, people can practise and apply the right attitude in driving whilst also engage in safe driving behaviours while behind the wheels and on the roads. This can help them to become more responsible drivers who demonstrate consideration and respect for others by applying defensive driving techniques.

The outcome generated from this study will possibly transform every single person to play their roles by ensuring that he/she adheres to the speed limit while driving. Previously, the government had implemented various approaches to reduce the number of speeding drivers on the roads, for example, *'Ops Bersepadu Hari Raya, Ops Bersepadu*

Tahun Baru Cina'. All of these were enforced and targeted at speeders and other traffic offenders especially during the festive seasons. The traffic enforcement was conducted mainly to ensure drivers' safety and to encourage drivers to apply safe driving instead of punishing them for speeding. Therefore, everyone needs to play his/her role and drive safely so as to ensure a safer mobility for all.

1.8 Organisation of the Thesis

This thesis is organised into seven chapters. Chapter 1 describes the background of the study whereby the researcher explained and clarified the current situation of road accidents and fatalities in Malaysia. The condition of various road accidents and fatalities in Malaysia were also highlighted and this is followed by the problem statement, the research goal and objectives, the research questions, the methodology, the research scope and the significance of the study.

Chapter 2 begins with the understanding of the concept and definition of speeding behaviour, the category of speeding and the speed limit, evidences of the speeding behaviour along the North South Expressways (NSE), theories related to the speeding behaviour and factors affecting drivers' speeding behaviour. These were discussed under the headings of socio-demographic, trip characteristics, vehicle factor, driving environment and driver factor.

Chapter 3 discusses the methods applied in the study. The mixed method research design is described in detail. It establishes the face-to-face survey employed for this study, followed by the focus group discussion.

Chapter 4 discusses the results obtained from the quantitative data collection process. The Social Statistical for Social Sciences (SPSS) was applied to analyse the survey results. Meanwhile, the Chapter 5 discussed the findings obtained from the qualitative data collection. The Nvivo software was utilised to analyse the focus group discussions. Chapter 6 dwells on the policy and implications. Chapter 7 discusses the conclusion which comprised the summary of key findings generated from this study and recommendations made for future works.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

This chapter provides a review of the literature that is related to speeding behaviour. It reviews the definition of the concept and keywords that are used in this study. It also discusses how the definition had evolved from past studies to recent times. Specifically, this chapter focusses on the category of speeding and the category of the speed limit. This chapter also provides evidences of the speeding behaviour which are extracted from previous studies, particularly from the research undertaken by PLUS Malaysia Berhad with the University of Malaya. Subsequent to this, this chapter also covers theories related to this study such as the Theory of Planned Behaviour and the ABC Model of Attitude. Finally, the chapter ends by looking at the factors affecting drivers' speeding behaviour.

2.2 Definitions and concepts

This section provides several definitions of concepts used in this study.

2.2.1 Speeding behaviour

Speeding behaviour is a prevalent issue within road accident reports. This factor has been constantly discussed in the transportation field throughout the world (Shinar, 2007; Nordfjarn, Jorgensen & Rundmo, 2011). As the word, speeding, is mentioned, it conjures images in one's mind - anyone can imagine it as the "act of driving fast than is allowed in a particular area" or "the act of driving a vehicle faster than is legally allowed" (Cambridge University Press, 2018). Based on this, it is logical to say that everyone has an experience of dealing with speeding, whether directly or indirectly. The direct experience is when the person him/herself drives the vehicle and exceeded the speed limit or was driving it at an unsuitable speed under the prevailing road conditions. The indirect

experience is activated when the person becomes the passenger in the vehicle driven by a driver whose speed is exceeding the speed limit or a driver who is driving at an unsuitable speed under prevailing road conditions.

A good practice of a driver is to comply with the speed limit that is assigned for the road, when driving a vehicle. However, this standard may not be complied by drivers for various reasons. This action of driving beyond the speed limit indicated can be considered as speeding as it logically is moving above the limit stated. Similarly, if the driver is driving at a speed which is unsuitable for prevailing road conditions such as driving at 100 km/h on a curved road and on a rainy day, it can be considered as speeding as the vehicle speed is inappropriate for the road conditions even though the limit stated is 100 km/h. The details of the speeding behaviour will be discussed in the subsequent sections. The discussion will comprise theories explicated for explaining speeding behaviour and the factors contributing to speeding behaviour in addition to the explanation of methods used by various studies to investigate the behaviour.

In the context of driving, the act of speeding refers to the act of exceeding the speed in driving conditions at any point in time (Giles, 2004). In other words, speeding refers to "tolerance mainly to account for the accuracy of vehicle speedometers, radar and speed cameras" (Johnston, 2004, p.258). Tolerance may differ according to jurisdictions, for instance, New South Wales adopts zero tolerance toward speeding while New Zealand adopts a 10 km/h tolerance (Ellison & Greaves, 2010). Similar to what has been pointed by Giles (2004), Malaysia adopts the definition of speeding as "exceeding the posted speed limit or driving to fast under prevailing conditions" (Public Works Department, 2016, p.1).

There are three ways of defining speeding as according to EKOS Research Associates Inc. (2005): technical, relative or absolute. A technical definition of speeding

refers to any amount when a driver exceeds the posted speed limit. For instance, driving at 101 km/h within a 100 km/h area. The relative speeding is referring to "driving too fast for the road conditions". The term relative is used as it is based on the circumstances and factors that affect the speeding behaviour, for instance, vehicle types, road conditions, weather conditions and the background of the drivers. In this context, the driver can exceed the speed limit driving at 130 km/h, but the driver manages to control the vehicle from a collision. Meanwhile, the absolute definition of speeding refers to the fixed amount of speed that exceeds the posted speed limit. For instance, if a driver drives at 120 km/h within a 100 km/h zone. The Queensland Government of Australia, however, defines speeding as driving which exceeds the speed limit or driving at a speed that is unsuitable, according to the weather, traffic and road conditions (Queensland Government, 2018). Therefore, the definition of speeding is no longer confined to driving above the speed limit; it also consists of the broader context and it may also depend on the road conditions, surroundings, weather conditions, the environment and the driver.

2.2.2   Categories of Speeding

Speeding can be categorised into several categories. The first category is excessive speeding. Excessive speeding is a widespread offence committed by many drivers. In this regard, many drivers travel faster than the speed limit and it exceeds by about 20 per cent of the speed limit indicate thus, about 10 km/h (European Commission, 2015). This is a dangerous behaviour because significant causes of road crashes and fatalities in Malaysia are observed to be caused by excessive speeding. This condition has caused 6,706 losses of lives based on 489,600 Malaysian road crashes identified in 2016 (The Star Online, 2016).

The second category of speeding is inappropriate high speed (IHS). Inappropriate high speed is described as "a speed at which a driver loses control of the driving task" (Fuller et al., 2008, p.12). The loss of control can happen when a driver loses his/her control over the direction as a result of a collision with objects or with other road users. Normally, the vehicle will be skidding or sliding when accidents happen. This means that a driver who is driving at high speed on a wet road had lost control of his/her vehicle and ultimately, the vehicle collided with an object such as a tree. Inappropriate high speed can also refer to an event where the driver is driving a vehicle at high speed but the vehicle was within control and so it resulted in no crash.

2.2.3 Category of Speed Limit

It is crucial to provide an explanation for the category of speed limits so as to be able to differentiate them. The first category of speed limit is called prevailing speed. This category of speed refers to the moving speed of majority of the traffic that chooses to travel. Normally, it is either at or below the 85th percentile of the speed (Maryland Department of Transportation State Highway Administration, 2010). The second category of speed is advisory speed which refers to "a speed below the speed limit that is recommended for a section of the highway" (Federal Highway Administration, 2009). An engineering study which takes into consideration the highway design, the operating characteristics and conditions was conducted before the advisory speed can be determined. The third category of speed limit is posted speed which refers to the maximum speed that is allowable for the driver to drive at the location, as displayed by the speed sign (Fitzpatrick et al., 1997). Posted speed was designed according to the 85th percentile speed where adequate speed samples can be guaranteed (Texas Department of Transportation, 2015). A fourth category of speed limit is called statutory speed which refers to the numerical speed limit that is designed for various road types such as rural

expressways, residential streets, arterial roads, national roads with the absence of posted speed limit. Passenger cars, buses and trucks with a gross weight of four tons or less should follow the speed limit of 65mph on freeways or expressways.

2.2.4 The Concept of Safe Speed Limit by the ASEAN countries

Moving on to the safe speed limit applied by the ASEAN countries such as Singapore, Thailand, Indonesia and Vietnam, it is necessary to understand what the concept of safe speed limit means. The only safe speed limit to travel on the road is 0km/h. If that is the case, there should be no moving vehicles on the roads. Thus, no mobility would occur. However, people need vehicles for mobility, thus people have to trade-off between safety and mobility. People need to accept a minimum level of road trauma for the privilege of mobility, hence, to ensure safer mobility, each driver needs to adhere and follow the national speed limit set by the government and enforcement agencies.

Table 2.1: Safe speed limit among ASEAN countries

Country	Category	Passenger cars/ inhabitants	Statistics of fatalities	Speed limit (km/h)
Malaysia	Middle-income	341 per 1000 (2011 est.)	6,674 in 2014	Expressway: 110 Federal: 90
Singapore	High-income	114 per 1000 (2014 est.)	155 in 2014	Urban area: 70
Thailand	Middle-income	74 per 1000 (2011 est.)	13,766 in 2010	Urban area: 80
Indonesia	Middle-income	47 per 1000 in (2014 est.)	28,297 in 2014	Urban area: 60
Vietnam	Middle-income	14 per 1000 (2011 est.)	8,671 in 2015	Urban area: 50

Referring to Table 6.2, the safe speed limit among the ASEAN countries is outlined to demonstrate the similarities and differences of each country's safe speed limit towards improving Malaysia's road safety conditions. The national speed limits for Malaysian Expressways, especially the North-South Expressways, are set to 110km/h, but it can be reduced to 90km/h on selected locations such as dangerous, mountainous, crosswinds and

urban areas with high traffic capacity. Meanwhile, the national speed limits for Federal and State roads are set to 90km/h and this can be reduced to 80km/h during festive seasons and 60km/h in town areas.

Nonetheless, the speed limit for heavy vehicles is slightly different, with light vehicles given the allowable speed limit of 80-90km/h for Expressways and 70-80km/h for Federal and State roads. Those who fail to adhere and follow the speed limit can be fined up to RM 300 and they also receive demerit points under the new rule of the KEJARA system (Kesalahan Jalan Raya - traffic offences). The new rule states that if the driver drives between 1 to 25km/h over the speed limit, he/she can be fined RM80 with six demerit points. Subsequently, if the driver exceeds 26 to 40km/h, he/she can be fined RM150 with eight demerit points and anything exceeding 40km/h can be fined RM300 with ten demerit points.

When compared, Singapore has the highest income category compared to the other ASEAN countries. The number of passenger car per inhabitants is 114 over 1000 which is second highest to Malaysia. The fatalities recorded for Singapore is the lowest compared to other ASEAN countries with 155, while the safe speed limit applied is 70km/h in the urban areas. In contrast, Thailand has 74 passenger cars per inhabitants with 13,766 fatalities case, which is the second highest among the ASEAN countries for fatalities. The speed limit applied is 80km/h in the urban areas, slightly below that of Malaysia. In comparison, Indonesia and Vietnam have the lowest passenger cars per inhabitants with 47 and 14 passenger cars, respectively. Indonesia has the highest fatalities case with 28,297 compared to Vietnam with 8,671 cases although Indonesia has the lower speed limit, 60km/h when compared to Vietnam, 50km/h in the urban areas.

Based on the comparison, it can be summarised that even though Indonesia and Vietnam had the lowest car ownership and applied the lowest speed limit for urban areas,

there were still many cases of road traffic injuries and fatalities reported. This can be related to the high burden road traffic injuries and fatalities experienced by the low-and middle-income countries. Their fatalities contribute to 90% of the world's road traffic deaths (Staton et al., 2016). Malaysia is ranked below Singapore, but it has a slight improvement when compared to Thailand for road traffic injuries and fatalities cases. This is despite the fact that Thailand has lower car ownerships. In this regard, Malaysia could emulate Singapore's approaches in the road safety practices so as to be able to reduce the road traffic injuries and fatalities in this country. Such approaches applied by Singapore include restricting the number of cars on its roads (Shane, 2017), deploying fixed speed camera, mobile speed cameras, police speed laser camera and average speed camera (Shah, 2017). Thus far, these have been proven to be effective in improve drivers' speeding behaviour which also resulted in a reduction in the number of road traffic injuries and fatalities.

2.2.5 Safe System Approach

In addition to the safe speed limit drawn by the ASEAN countries, the Safe System approach seems to be popular as it is being undertaken by several countries around the world. The Safe System approach is believed to be effective in addressing the road safety issues especially pertaining to drivers' speeding behaviour. The description of the Safe System approach is outlined in the Table 2.2 below.

Table 2.2: Safe System Approaches across Countries

Location	Approach	Key elements	Principles
Western Australia	Zero Road Safety Strategy	To ensure the speed limit and travel speeds can reflect the safety of the road infrastructure.	The government initiates the action by educating the road users, performing speed enforcement and establishing speed limits based on the road conditions and limitations of road user
South Australia	Safe System Approach	Priority is given to management of excessive speed	They treat speeding as unsafe behaviour and manage it under the element of 'Safer People'

Location	Approach	Key elements	Principles
Austria	Safe System Approach	Human behaviour, infrastructure, vehicles and Transport Policy Legal Framework are the key elements	a) Engaging support from political decision-makers b) Ongoing measure of effectiveness c) Broad support by the public, decision-makers and professionals at all levels
Denmark	Safe System Approach	Speeding is one of the important elements to improve besides alcohol, cycling and junctions	a) Road safety starts with you b) Private and public sector efforts c) Local road safety efforts must be strengthened d) New knowledge on road safety
Finland	Vision Zero	Speed control as one of the key elements in road safety strategy	
Sweden	Vision Zero concept	a) Focus on dangerous roads b) Safer traffic in built-up elements Responsibilities of road users d) Quality assurance in transport work e) Making better use of Swedish technology f) Responsibilities of road transport system designers g) Public responses to traffic violations h) The role of voluntary organisations i) Alternative forms of financing for new roads	a) Human life and health are paramount b) Life and health should not be allowed to be traded off against the benefits of the road transport system c) Vision Zero is an ethical approach to safety and mobility d) Accidents must be prevented from leading to fatalities and serious injuries e) Everyone shares responsibility for making traffic safer
The Netherland	Safe System approach	Speeding as one of the key elements in the approach	a) Functionality of Roads; b) Homogeneity of mass and/or speed and direction c) Predictability of road course and road user behaviour by a recognisable road design

The Safe System approach has been adopted by several European countries such as Australia, Austria, Denmark, Finland, Sweden and the Netherlands. The idea of the Safe System approach was initiated by the Netherlands which promoted, 'Sustainable Safety' back in 1992 and today it is renowned as a world leader on road safety. The Netherlands had used it on human error prevention, ensuring that crash forces do not exceed human

tolerance and that there is a non-existence of severe injuries or deaths. This was noted in their most current strategy, 'Advancing Sustainable Safety' which covers the period of 2005 to 2020. The Netherlands had employed quantitative scores to evaluate the extent of the characteristics of the road design that resembled the 'Safe System' requirements. This method is known as the Sustainable Safety Indicator or DV meter. In addition, Sweden also adopted the 'Vision Zero' concept which indicates the systematic, proactive 'Safe System Approach' to road safety. This approach covers the period of 2007 to 2020. At this moment, Sweden also maintains 'Vison Zero' as its main theme. Presently, Sweden and the Netherlands have become renowned for their 'Vison Zero' and the 'Sustainable Safety' approaches (Chen & Meuleners, 2011). They have been noted to be the best road safety records in the world. Many other countries around the world have also taken to adopting them.

The Safe System approach of Australia has outlined a framework that emphasises on four essential elements which are; 'Safe Road Users', 'Safe Roads and Roadsides', 'Safe Speeds', and 'Safe Vehicles'. This framework guides the development of the 2011-2020 National Road Safety Strategy in Australia which aims to build a road transport system that endures human error and minimises casualties following road crashes. Within the critical elements of Safe Speeds in Western Australia towards Zero Road Safety Strategy, Australia finds it vital to ensure that the speed limit and travel speeds reflect the safety of the road infrastructure. To accomplish this, the government has initiated the action of educating the road users, performing speed enforcements and establishing speed limits, based on road conditions and the limitations of road users. In other regions of Australia such as South Australia, priority is given to the management of excessive speed. To execute this action, the South Australian government has treated speeding as an unsafe behaviour and this is managed under the element of 'Safer People' (Chen & Meuleners, 2011).

Other European countries like Austria has also taken to emphasising human behaviour as one of the critical elements to achieve the 'Safe System' approach. The government has set up a road safety strategy which aims to reduce the road fatalities by 50%, come 2020. In order to ensure the implementation, it has to ensure a number of goals such as support from political decision-makers, providing an ongoing measure of effectiveness to evaluate the program and ensuring a broad support from all parties which include the public, decision-makers and professionals (Chen & Meuleners, 2011). Further to that, countries like Denmark has also taken to emphasising speeding as one of the crucial elements to be improved, besides alcohol and cycling, in the 'Safe System' approach. The first principle and key element outlined by Denmark highlights the role played by everyone within the road safety strategy. This means that all the stakeholders should play their part by giving full commitment to the road safety efforts carried out by the government. Secondly, the private and public sector also need to play their role by preparing special enterprise plans for road safety. Through this way, the private and public sectors can encourage and alert their employees and suppliers into reducing the number of road accidents on the Denmark roads. Thirdly, the local road safety efforts must be strengthened. The local authorities and local road safety committees are encouraged to adopt the vision and to use it as a guideline when preparing road safety action plans (Chen & Meuleners, 2011). Lastly, new knowledge on road safety should be cumulated and this can be achieved by conducting research which focusses on the accumulation of road safety knowledge and road user behaviour.

In comparison, Finland has prioritised speed control as one of the key elements in its road safety strategy. However, the principles on the implementation have not been disclosed. Moving on to Sweden's 'Safe System' approach, it appears to have initiated the Vision Zero concept. Within this concept, none should be killed or seriously injured within the transport system (Elvik & Amundsen, 2000). By this, it means that proper

planning, designing and building roads and infrastructures are needed to increase safety (The New Straits Times, November 26, 2017). Thus, human vulnerability and errors should be tolerated, and the road design should be able to support this goal. In fact, Sweden takes the stance that the whole society should be held responsible for road crashes instead of putting the blame on authorities. Among the key elements noted in the Vision Zero concept that can be emulated by the Malaysian government are the practices of the government and authorities. They concentrated on the most dangerous stretches of the roads, emphasised on the responsibilities of road users, enforced quality assurance in transport work, encouraged full utilisation of the technology and facilitated public responses to traffic violation. Besides that, people should be encouraged to understand that human life and health are paramount, so none should be killed or seriously injured as a result of road accidents. Life and health should not be traded off with mobility and everyone shares the responsibility of making the road a safer place for travelling.

The Netherland's adoption of the 'Safe System' approach through its 'Advancing Sustainable Safety' strategy is further noted. Among the key elements that the Netherlands is focussing on, is speeding. The Netherlands emphasised on the functionality of roads, homogeneity of mass and/or speed and direction and the predictability of road course and road user behaviour. This is accomplished through a recognisable road design.

To sum up, the 'Safe System' approach initiated by the various countries is a well-developed strategy which improves road safety issues. It can be noted that several countries such as Australia (Western Australia and South Australia), Denmark, Finland and the Netherland have emphasised on speeding and human behaviour as the key elements to achieve in the 'Safe System' approach. Even though Sweden has not outlined speeding as one of its key elements in its Vision Zero concept, Sweden has highlighted

the other concerns of road safety such as supervision of the dangerous stretches of road, the responsibilities of road users, making full use of technology and facilitating public responses to traffic violations.

These concerns are vital in building a comprehensive framework of road safety. Nevertheless, support from all participants such as policy makers, enforcement agencies and the public are crucial. Besides that, engagement with the community is equally important for the aim of conveying a clear strategy and message to the public so as to enable a better understanding of the approach and strategy used by the government and authorities. In this regard, the Malaysian government and authorities need to study the necessary areas proposed, especially matters related to speed management, stakeholders, public and community support, thereby the necessary steps.

2.2.6 Policy related to speeding behaviour

It is also important to understand the policy that governs the driver behaviour especially speeding behaviour. In this case, the Road Transport Act 1987, Section 40 govern the driver's speeding behaviour. This act outlines that exceeding speed limit is an offence in Malaysia. Under section 40 (1) states that if any person drives a motor vehicle at a speed exceeding any speed limit imposed for such motor vehicle under the powers conferred by this Act, he shall be guilty of an offence and shall on conviction be liable to a fine not exceeding RM1,000. Meanwhile, under Section 40 (2) the court shall, unless for any special reasons it thinks fit to order otherwise, order particulars of any finding of guilt under this section to be endorsed on any driving licence held by the person convicted. Under Section 40 (3) a first or second conviction for an offence under this section shall not render the offender liable to be disqualified from holding or obtaining a driving licence for a longer period than in the first conviction, one month or, in the case of a second conviction, six months.

The first clause of this Act clarifies that those who are convicted for speeding can be fined up to RM1000. However, the second clause suggests that the court is responsible to command otherwise if the person is found guilty. The clause is also applied to the repeat offenders whereby the offender can be barred from driving for one month in the first conviction and six months for second conviction.

2.2.7 Evidences of speeding behaviour[1]

This section provides evidences of speeding behaviour which have taken place on four stretches of the North-South Expressways within Peninsular Malaysia. The evidences were based on research undertaken by the two organisations, the University of Malaya and PLUS Malaysia Berhad, based on MOUs, to analyse the actual scenario of speeding occurrences on selected locations which are C6 KM42.5 Nilai, C3 KM 431.5 Rawang, N5 KM 232 Kuala Kangsar and N5 KM 256.1 Menora. The Figure 2.1, Figure 2.2, Figure 2.3 and Figure 2.4 describe the four road stretches. Meanwhile, the speed analysis results provided in Table 2.1, Table 2.2, Table 2.3 and Table 2.4 below outline the mean speed, the minimum and maximum speed and the 85th percentile speed for the four road stretches.

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[1] This part is a report from research collaboration between University Malaya and PLUS Malaysia Berhad (Expressways concessionaire) from October 2015- October 2016 on the project "Understanding and Quantifying Driver Behaviour Related to Speeding and Close-Following using Empirical Simulation Technique (EST)".

Figure 2.1: Data collection at site C6, KM 42.5 Nilai

Figure 2.2: Data collection at site C3, KM 431.5 Rawang

Figure 2.3: Data collection at site N5, KM 232 Kuala Kangsar

Figure 2.4: Data collection at site N5, KM 256.1 Menora

The speed analysis results below describe the information about mean speed, the minimum and maximum speed and the 85th percentile speed for the four road stretches.

Table 2.3: Speed analysis table for C6 KM42 Nilai

Statistics	Speed limit (km/h)
Mean	102.46
Standard Deviation	23.43
Minimum speed	9.90
Maximum speed	192.20
85th percentile speed	126.10

The table 2.3 shows the speed distribution for all vehicles ($N = 5{,}123$) at C6 KM42.5 Nilai. Here, the mean speed of all vehicles was 102.46 km/h with a standard deviation of 23.43 km/h. The 85th percentile speed was recorded at 126.10 km/h with the highest recorded speed being 192.20 km/h. The highest speed limit showed that majority of the drivers exceeded the posted speed limit of the location, that is 110km/h, by more than 80km/h (192.20 km/h less 110 km/h). This road section has three lanes with straight road alignments which facilitated the drivers in speeding. The drivers were comfortable and confident of driving fast on a wider and straight road, as evidenced. The said road stretch, potentially, has a high number of speeding behaviours.

Table 2.4: Speed analysis table at Site C3 KM 431.5 Rawang

Statistics	Speed limit (km/h)
Mean	106.15
Standard Deviation	21.86
Minimum speed	45.30
Maximum speed	189.30
85th percentile speed	130.30

Table 2.4 above shows the speed distribution for all vehicles ($N= 6{,}986$) at site C3 KM431.2 Rawang. The mean speed of all the vehicles was 106.15 km/h with a standard deviation of 21.86 km/h. Here, majority of the drivers were speeding as the 85th percentile speed for this site, C3 KM 431.2 Rawang, was 130.30 km/h. The highest recorded speed was 189.30 km/h. A plausible factor that could have influenced drivers in speeding is the probability that these drivers were driving based on work trips since the

nearby environment was made up of industrial areas. This particular location site is considered dangerous as it had been observed to potentially consisting of high-risk road traffic accidents. The location is a straight section that approaches a bend northward.

Table 2.5: : Speed analysis table at Site N5 KM232 Kuala Kangsar

Statistics	Speed limit (km/h)
Mean	90.80
Standard Deviation	22.92
Minimum speed	8.10
Maximum speed	192.80
85th percentile speed	112.10

The speed distribution for all vehicles ($N=$ 5,978) at the location site of N5 KM232 Kuala Kangsar is shown in Table 2.3 above. The mean speed of all the vehicles was 90.80 km/h with a standard deviation of 22.92 km/h. The 85th percentile speed recorded for this site was 112.10 km/h which is slightly lower than the other location sites. This outcome is probably brought on by the structure of the narrower two-lane road as well as the elevation along the road section. Despite this, drivers were still exceeding the speed limit of 110 km/h with the highest recorded speed being 192.80 km/h.

Table 2.6: Speed analysis table at Site N5 KM256.1 Menora

Statistics	Speed limit (km/h)
Mean	88.61
Standard Deviation	17.63
Minimum speed	8.10
Maximum speed	163.70
85th percentile speed	105.60

The speed distribution for all vehicles ($N=$ 7,146) at location N5 KM256.1 Menora is presented in Table 2.4 above. The mean speed of all the vehicles was 88.61 km/h with a standard deviation of 17.63 km/h. The 85th percentile speed recorded for this site was 105.60 km/h, which is slightly below the posted speed limit of 110 km/h. This

phenomenon is probably because the two bends of the narrower two-lane road section prevented the drivers from speeding. Despite this, there were still cases of speeding which recorded the maximum driving speed as 163.70 km/h.

All these evidences presented in these four roads stretches of the North-South Expressway revealed that majority of the drivers exceeded the safe speed limit which was 110 km/h. The highest 85th percentile of speed recorded at KM 431.5 Rawang was 130.30 km/h followed by C6 KM 42.5 Nilai with a speed of 126.10 km/h. The other two sites that reported having slightly lower 85th percentile speed recorded speeds of 112km/h at N5 KM 232 Kuala Kangsar and 105.60km/h at N5 KM 256.1 Menora. This revealed that the two sites were at high risk of getting road traffic accidents. Indeed, the high-risk sites were KM 431.5 Rawang and KM 42.5 Nilai as the 85th percentile of speed was higher when compared to other sites. Most of these locations had recorded high maximum speed limits with the highest speed recorded at N5 KM 232 Kuala Kangsar and C6 KM 42.5 Nilai comprising 192.80 km/h and 192.20 km/h respectively. The other sites like the C3 KM 431.5 Rawang recorded a speed of 189.30 km/h and the N5 KM 256.1 Menora recorded a speed of 163.70 km/h.

The results discovered the actual driver speeding behaviour that existed along four locations of the North-South Expressways. The highest 85th percentile speed was recorded along two locations which are KM 431.5 Rawang and KM 42.5 Nilai. Hence, there is a need to implement traffic calming measures in order to reduce the speeding behaviour and minimise the number of speed related road crashes. One of the traffic calming measures that can implement on the location is transverse rumble strips. An audible warning is generated when the vehicle's tyres passing over the transverse rumble strip. It is revealed that the implementation of traverse rumble strips results in a small reduction between 1.6 to 6.4km/h in vehicle speeds (Thompson et al., 2006). Besides that, the

placement of transverse rumble strip is equally important and effective on the road where drivers have been traveling at high speed on long periods (Fordjour, 2016).

2.3   Theories related to speeding behavior

In studying road safeties, there is need to discuss the theories and the models related to driver behaviour. This section elaborates on the three most widely used theories applied in traffic psychology, namely: The Theory of Planned Behaviour, the Theory of Reasoned Action and the ABC Model of Attitude. These theories are crucial and need to be included in this research because they highlight the essential components involved in speeding behaviour. They also unravel the relationship that exists in the drivers' attitude which influences the drivers' behaviour. In addition, it also deals with the additional component of intention-behaviour, which has not been mentioned before.

2.3.1   The Theory of Planned Behaviour (TPB)

This study employs the Theory of Planned Behaviour (TPB) to explain the role attitude plays in determining the drivers' behaviour. This theory was introduced by Ichek Ajzen in 1991. The TPB is an extension of the Theory of Reasoned Action (TRA) which assumes and limits the behaviour of people with incomplete volitional control. The TRA was introduced by Ajzen and Fishbein in 1980. In the TRA, an intention to engage in a certain behaviour is considered the best predictor of whether or not a person actually engages in that behaviour. Intention in turn are predicted by attitudes and subjective norms. Meanwhile in the TPB, Ajzen (1991) explained that intention is the core predictor of behaviour. The other core components that are involved in the TPB include attitude towards the behaviour, subjective norm and perceived behavioural control, all of which, affect the individual's intention towards the behaviour.

The drivers' belief determines the drivers' attitude towards the behaviour, based on the consequence of the behaviour. If the drivers' consciousness of the consequences

of the behaviour is intact and if the drivers' have direct experiences dealing with the consequences of speeding, then these drivers would tend to have a hostile attitude towards speeding. However, if the drivers were unconscious about the consequences of speeding and they have not dealt directly with the consequences of speeding, then these drivers are likely to have a favourable attitude towards speeding. The drivers' subjective norms are determined by their beliefs about the normative expectations of the essential other towards the behaviour. By this, it is meant that the feedback gathered from the significant others, either as approval or disapproval of the behaviour, determines how the drivers behave.

Subsequently, perceived behavioural control relies on the belief about the presence of factors that facilitate or deter the performance of the behaviour. The behaviour is acted based on the drivers' perception; they are either able or not able to control the behaviour. This component can affect the drivers' intention to perform or not to perform the behaviour. These conditions, the favourable attitude towards speeding, together with the existence of passengers, encourage the drivers to perform the behaviour. Moreover, the perception of ease in committing the behaviour further encourages the drivers' intention to speed. Within this theory, perceived behavioural control can affect the behaviour directly as the drivers have partial control over the decision. The drivers are realistic in the judgment of behaviour difficulty where the perceived behavioural control can be a component that can be used to predict the behaviour since it serves as a substitute for actual control (Ajzen, 1991). The illustration of the TPB is described in Figure 2.5 below:
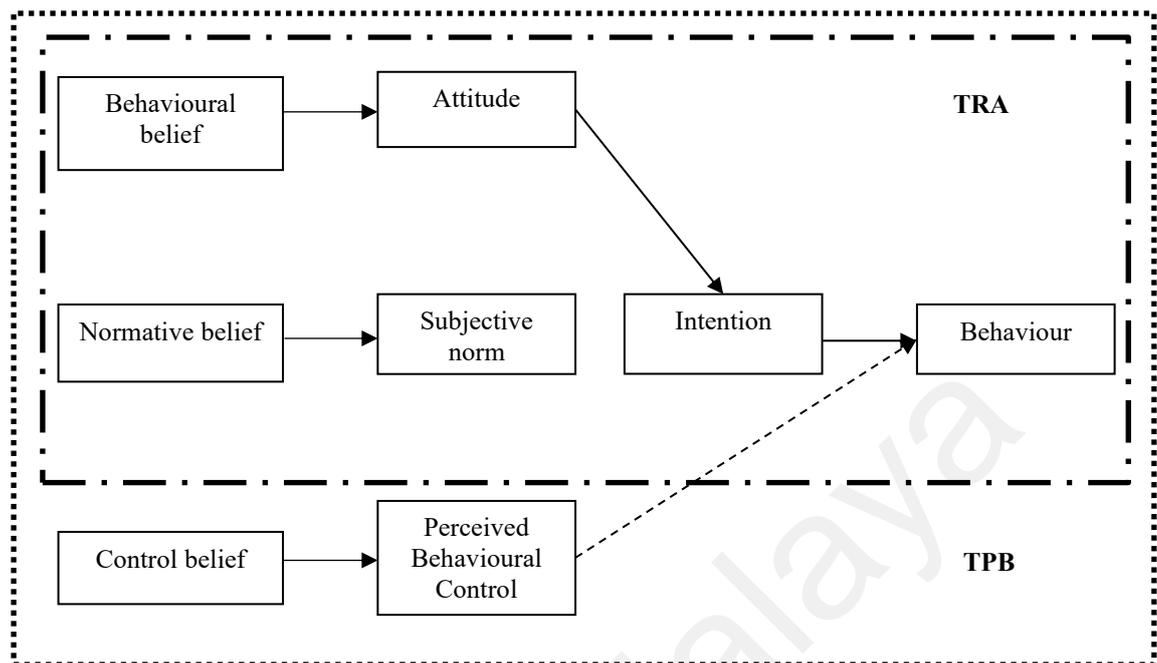
Figure 2.5: Theory of Planned Behaviour (Ajzen, 1991).

The TPB helps to predict the drivers' speeding behaviour (Forward, 2009). It also explains the pedestrians and drivers' intention to violate traffic rules (Hill & Holland, 2007). Many researchers (Stead, Tagg, MacKintosh, & Eadie, 2005) use the TPB in mass media campaigns as a method to reduce speeding. Research regarding driving behaviours has ascertained that drivers' behaviour are intentional and also influenced by their perception. Hence, behavioural intention determines the drivers' motivational factor; it explains how drivers are willing to try and put an effort into performing the behaviour (Ajzen, 1991). This theory also assumes that belief is the underlying component of behavioural attitude, subjective norm and perceived behavioural control, all of which are connected to intention.

To further understand the concept of attitude, the elements of affective and evaluative attitude need to be considered. Elliot and Thomson (2010) described the concept of affective attitude as the feelings experienced by the drivers when they exceed

the speed limit. It can be either positive or negative feelings. Besides that, the evaluative attitude refers to the consequences the drivers face subsequently, after they had exceeded the speed limit. If the drivers evaluate the occurrence as favourable, then the drivers may continue the behaviour in the future. However, if the drivers evaluate the behaviour to be unfavourable, then the drivers may discontinue the behaviour. Indirectly, this shows that affective and evaluative components of attitude can influence the speeding behaviour of drivers. Thus, it can be one of the predictors on drivers' speeding behaviour.

The TPB has been found to be the most appropriate theory in elaborating the drivers' speeding behaviour. Several studies (Forward, 2009b; Parker, Manstead, Stradling, & Reason, 1992; Warner & Aberg, 2006) have demonstrated the applicability of the TPB in understanding drivers' speeding behaviour. In their study, Parker et al. (1992) found that the TPB variables can predict 47.2% of variance in the intention to speed. In the study conducted by Forward (2009), it was found that the TPB variables can predict 47% of the variance in the intention to speed on urban roads. However, a study conducted by Cestac, Paran and Delhomme (2011) observed that the TPB variables can predict only 28% of the variance in the intention to speed on a 90km/h speed limit road.

Other studies, such as the one conducted by McEachan et al. (2011), discovered that the TPB accounted for 44% of the variance in the intention and 19% of the behavioural variance, across 237 prospective empirical tests. The TPB postulates that intentions can be the most possible determinant of behaviour. This claim is based on attitude, subjective norm and perceived behavioural control. Previous researchers (Chorlton et al., 2012; Armitage & Conner, 2001; Webb & Sheeran, 2006) also found that speeding intentions in drivers and motorcyclists can be predicted by the TPB components. In an analysis of around 185 studies, it was found that the correlation of intention-behaviour was 0.47 (Armitage & Conner, 2001). In the analysis of 47 experimental

studies, it was revealed that a significant impact on subsequent behaviour can be predicted when intentions are manipulated (Webb & Sheeran, 2006). Furthermore, there are correlations between intentions and speeding in real driving with $r = 0.41$ and in a simulator with $r = 0.48$ (Conner et al., 2007). Additionally, findings (Cetac, Paran & Delhomme, 2011; Letirand & Delhomme, 2005) also noted that different scholars had different findings because their studies were conducted in different contexts such as speeding on urban roads of speed limit comprising 50km/h and 70km/h and speeding on rural roads that have a speed limit of 70km/h and 90km/h respectively (Warner & Aberg, 2006) and speeding on national roads with a speed limit of 90km/h.

The role of habit in predicting drivers' speeding behaviour should also be discussed. Habits can be defined as the frequent repetition of a behaviour. Previous researchers (De Pelsmacker & Janssens, 2007; Lheureux & Auzoult, 2016) mentioned that habit strength was regarded as an isolated basis for speeding intentions. This impliesthat no causal relationship exists between habit strength and speeding intentions. However, isolating habit strength from the study of speeding behaviour could cause difficulties in understanding the influence of habit on speeding behaviour. As such, various past researches (De Pelsmacker & Janssens, 2007; Elliot, Armitage & Baughan, 2003) have incorporated habit strength into their research designs. For instance, habit formulation was added to the TPB for investigating speeding behaviour among the Belgian population. Alternatively, Forward (2009) used the past behaviour to assess the habit strength and its association with speeding and overtaking. The results drawn from these studies postulate that past behaviour and habit strength have a significant residual effect on current and future intentions and behaviour.

2.3.2   The ABC Model of Attitude

The ABC Model of Attitude provided in Figure 2.6 is cited for this study so as to understand the components of attitude in influencing drivers' speeding behaviour. The ABC model is one of the attitude models that is frequently cited by most attitude-behaviour studies (Eagly & Chaiken, 1998; Van den Berg et al., 2006). In this model, the ABC is represented by the affective, behavioural and cognitive. The affective refers to the drivers' emotions towards an attitude object. The behavioural denotes the individual's tendency towards an attitude object while the cognitive refers to the belief an individual has towards an attitude object. The interrelation between affective and cognitive is moved towards behavioural attitude which later predicts the attitude which is then translated into the attitude object.

The translation of these three components, namely the affective, behavioural and cognitive, can be viewed as favourable or unfavourable attitude towards attitude object. The three components of attitude may or may not be consistent with each other. Each component of the attitude encompassing cognitive, affective and behavioural components, is distinct in nature (Krech, Crutchfield & Ballachey, 1962; McGuire, 1985). This happens because a person might have positive cognitive and affective responses but negative behavioural response towards the object. The positive cognitive and affective responses contribute to the person's positive attitude towards behaviour; this is referred as the consistency of attitude and behaviour.
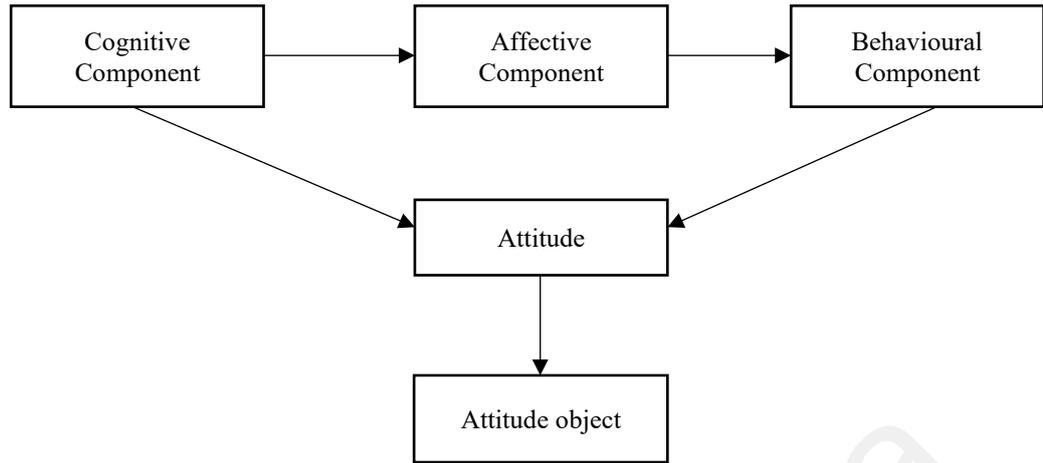
Figure 2.6: Components of Attitude (Breckler, 1984)

Although the cognitive, affective and behavioural components of attitude are distinct, it does not mean that the components are independent of each other (Breckler, 1984).

2.4 Factors Affecting Drivers' Speeding Behaviour

Speeding behaviour has become the most influential factor that leads to road traffic accidents. It is also one of the common causes of road deaths worldwide (WHO, 2017) including Malaysia (Fauziah, 2017). Drivers who are frequently involved in speeding behaviour stated that speeding provides assurance and 'benefits' to themselves, either directly or indirectly (Hatfield & Job, 2006). The indirect benefit prevails when the drivers are in a hurry to get to an appointment. The direct benefit is observed in a situation to impress others or to race with other drivers. Presumably, society has regarded speeding as a socially acceptable behaviour; they also perceive speeding to be normal as it is not a criminal act. This is in contrast to drunk driving and dangerous driving which are seen as severe crimes (DETR, 2000). Consequently, this has created more challenges for this issue out. There are various factors that contribute to drivers' speeding behaviour. These factors consist of their socio-demographic characteristics, trip characteristics, vehicle characteristics, driving environment and driver factors. All these factors have a great potential to influence drivers' speeding behaviour.

2.4.1 Socio-demographic characteristics

The socio-demographic factor ranges from age, gender, driving experience, education background, profession to household income.

a)   Age

Many studies in the past raised the concern about young drivers who are involved in speeding behaviour (EKOS Research Associates Inc., 2005; Moataz & Bromfield, 2017; Rowe et al., 2016; Schroeder et al., 2013). Young people (the term youths is used interchangeably in this study), according to the National Youth Development Policy (1997) are defined as those individuals aged from 18 to 25 years old hence, they are also young drivers. Young drivers are considered to be vulnerable victims who are prone to getting involved in road traffic accident and fatalities. A report made by the World Health Organisation (2013) found that young drivers contribute to a significant number of road crashes worldwide. These young drivers performed various traffic violations such as drunk-driving, non-use of the seatbelts, abruptly changing lanes, texting while driving and speeding. From these traffic violations, speeding is one of the offences found to be performed mostly and seriously by young drivers (Cestac et al., 2011; Williams et al., 2006). Young male drivers, especially, show lower compliance level towards traffic laws and more prone to practise speeding as compared to female and older drivers (Cordellieri et al., 2016). Previous researches (National Highway Traffic Safety Administration, 2008; Masten et al., 2004) state that speeding among young drivers is over-represented, possibly due to their lack of experience and driving skills.

To become a good driver, one needs to learn and practice good driving behaviours since driving is an acquired skill which is developed over time and experience. In this manner, the lack of experience and driving skills could be one of the reasons that can explain why young drivers or beginner drivers are frequently involved in car crashes (Bates et al., 2014; Masten, 2004; National Highway Traffic Safety Administration, 2008,

WHO, 2013). Such a phenomenon contributes to three or four times of the number of road crashes than any older or experienced drivers (Clarke, Ward & Truman, 2010). In addition, young drivers tend to perform reckless driving behaviours by violating traffic rules such as exceeding the posted speed limits on highways and federal roads. Therefore, more than anyone else, the young drivers are those who need to be equipped with better driving manners.

This explains why most road accidents involve younger drivers and why most of these cases are related to alcohol use, driver distraction and high speeds (Hartos, Nissen & Simons-Morton, 2001). These psychological and social characteristics displayed by the young drivers can clarify the phenomenon as to why young drivers are attached and associated with car crashes. Examples of young drivers' characteristics include aggressive behaviour, problems with attention, alcohol use and positive attitude to offensive behaviour (Oxley et al., 2014; Vassallo et al., 2007). Young drivers also prefer to take risks. Their behaviour is inclined towards risk-taking as they tend to over-estimate their driving abilities while on the road (Organisation for Economic Development and Cooperation, 2006).

On the contrary, older drivers were less likely to be involved in crashes even though they may be travelling at high speeds (European Commission, 2015; McGwin & Brown,1999). It was also noted that older drivers were less likely to receive speeding fines as compared to younger drivers who are within the age range of between 21 to 40 years old (Stradling, 2000). It was also found that the tendency to speed decreases with increasing age (Shinar et al., 2001). Interestingly, research conducted by National Highway Traffic Safety Administration (2012) discovered that older drivers' crash involvement in the United States were associated with high speed, two-lane roadways and multi-lane roads with speed limits of 40-45mph.

b)   Gender

The investigation of gender as one of the predictors in the socio-demographic characteristics for drivers' speeding behaviour showed that males were more likely to speed than females (Adli, 2003; Curry et al., 2012; Rolison et al., 2018). However, in one of the studies, Ore (1998) showed that females were more likely to be involved in violations than males. Others (Monash Accident University Research Centre, 2009) showed gender to be significant only for certain speed limits (Fleiter & Watson, 2006) or for specific age groups. Some scholars (Fildes et al., 1991) revealed that gender was not a significant factor at all. These reports show that gender is not yet a stable variable of accidents.

In most of the occurrences, males were shown to be performing more excessive speeding compared to females. Also, in most of these occurrences, males were influenced by peer pressure (Moller & Haustein, 2014). Most of the cases involving risky driving behaviours were associated with males (Adli, 2003; Bachoo, Bhagwanjee and Govander, 2013; Curry et al., 2012; Rolison et al., 2018). In fact, most literature (Furnham & Saipe, 1993; Parker et al., 1992; Shinar et al., 2001; Stradling, 2000) associate males with speeding. The notorious notion about the gender-oriented attitude toward driving behaviour usually relates that males practise aggressive driving behaviours while females displayed less competent driving behaviours (Banakar and Nasrolahi, 2012). Male drivers were also shown to be engaging in riskier driving behaviours as compared to female drivers since male drivers tend to drive faster and violate the speed limits than the female drivers (Lancaster & Ward, 2002; Stradling, 2000). Higher accident risks were reported among the male drivers. The male drivers were also more prone towards disregarding the speed limit and traffic rules. In contrast, female drivers were more capable of observing the speed limit thus they had lowered their accident risks (Shinar et al., 2001).

Evidence also found that more male drivers were penalised for speeding when compared to female drivers (Lawpoolsri et al., 2007). Females in the 20s age group observed the speed limit consistently; those in the age range of 21 to 29 years old also maintained the velocity. In contrast, male drivers only maintained the velocity when they reached their 30s. Stradling (2000) further commented that males were slightly behind the females in observing the speed limit consistently.

c) Education level

The violation of speed limit is also associated with education level. In a study conducted by Dobson et al. (1999), it was found that women with tertiary education had higher scores for violations, speeding, lapses and errors than women with other education levels. Shinar et al., (2001) further commented that people who had higher education levels could have better judgements about the merits and risks of speeding hence they refrained from committing the offence. The connection between speeding and crashes is now a familiar phenomenon but it is accompanied by conflicting arguments and data.

d) Employment

Another factor found to be linked to speeding behaviour is employment type. It appears that business travellers were more likely to be involved in speeding when compared to other employment types (Fildes et al.,1991). The possibility of business travellers being associated with speeding behaviours could be due to the nature of their job which comprises high demand workloads such as meeting clients and attending discussions and shifting from one place to another, thereby making them more susceptible to be consumed by the 'hurry' syndrome.

Furthermore, those who were involved with night works, shift works or working prolonged hours were also more likely to contribute to the road traffic accidents as a result of their risky driving behaviour (Akerstedt & Wright, 2009). This can be understood by

looking into the lifestyles of those who worked at night and were involved in shift works. They tend to have a higher tendency of being involved in risky driving behaviours including speeding. Similarly, professional employments such as doctors also have a high tendency to be involved in speeding. Consequently, this increases their chances of getting involved in road traffic accidents (Yuen, 2017).

e) Income

Individual income may be another factor that influences drivers' speeding behaviour. In a study looking at the Danish people, Grimm and Treibich (2014) found that higher driving speeds was associated with higher-income people. The study showed that higher-income people have no problem in receiving speed-related fines. They however, admitted that by complying with speed limits, expenditures due to fines and accidents could have been avoided. Nevertheless, they were willing to break the rules as a compensation for time which could be utilised for more gainful activities such as gaining more money (Grimm & Treibich, 2014). Richer people also perceived that expensive cars are symbols of prestige. By holding that notion in their minds, they thus believe that they 'own the roads' and hence involved in speeding behaviour (Banakar & Nasrolahi, 2012).

f) Marital status

Past studies (Atombo et al., 2017; Mitra-Sarkar & Andreas, 2009; Whitlock et al. 2004) have regarded the influence of marital status on drivers' speeding behaviour. Marital status was found to be one of the important aspects of social standing (Whitlock et al. 2004). In a study conducted by Mitra-Sarkar and Andreas (2009), it was reported that divorced people have a higher tendency to be involved in road accidents but in the study conducted by West (1996), it was revealed that single people, in contrast to married and divorced people, had the highest tendency to take more risks while driving (West,

1996). Moreover, as reported by observational studies, single people seem to contribute to more fatal related accident (Berkson, 1962). It was further added that married person had the lowest death rates in motor vehicle accidents with males having 61.4 death rates per 100,000 per annum and females having 19.8 death rates per 100,000 per annum as compared to single, widowed and divorced persons. This implies that marital status of drivers can affect their behaviour to speed or not speed.

2.4.2   Trip characteristics

In a sample of 5,000 drivers who were found to have committed speeding, results indicated that those who drove for high annual mileages in large cars were usually performed by young drivers who were travelling alone whether to work or from work. Similarly, speeding was noticed to be more prone among drives travelling for work. More precisely, business travellers were more prone towards speeding behaviour as compared to those who were travelling for domestic purposes (Fildes et al., 1991). Correspondingly, Broughton et al. (2003) clarified that travelling for work, driving bigger cars which were not privately owned, and high driving exposure are the reasons for speeding.

It was also observed that both male and female drivers who drove for higher annual mileage were reported to drive at higher speeds because they considered themselves to drive at speed band one, which represents the fast speed (Transport Research Laboratory, 1999). Furthermore, trip purposes had been identified to be one of the common factors involved in speeding (Fleiter & Watson, 2006). It seems that those who owned private cars were significantly reported to have greater mileage; they were also found to profoundly practise more risky driving behaviours (Scott-Parker et al. 2011). For further clarifications, it must also be noted that situational factors besides human factors, also contribute to speeding behaviours.

Situational factors refer to circumstances such as running late, keeping up with the flow of traffic, the purpose of the trip, and the opportunity to speed (Stradling et al., 2000). Those who committed speeding were normally those caught to be under time pressure, and these are the people who would perceive that being on time is more important than the risks associated with speeding (Bogdan et al., 2014; Rendon-Velez et al., 2016). Likewise, time urgency, thrill-seeking and competitiveness have outweighed the perceived risks of speeding (Monash University, 1998).

2.4.3 Vehicle factor

Various past studies (Monash University Accident Research Centre, 2009) have shown that vehicles that were equipped with technological advancement produced better performance on the road and this can also affect the drivers' speeding behaviour. Vehicle performances of cars are developing all the time hence the type of vehicles driven can also affect the drivers' speed choice, whether directly or indirectly. Technological advancement in terms of the engine power of cars had increased considerably over the years. This attribute of the vehicle offers greater accelerations and higher speeds (SWOV Institute for Road Safety Research Netherland, 2012). This implies that the ability of the vehicle to run very fast can also influence the speeding behaviour of drivers (Monash University Accident Research Centre, 2009).

In addition, increased in-vehicle safety devices can also influence drivers to feel protected and this factor may influence them to opt for risky driving behaviours (Atombo, Wu, Zhong, Zhang, 2016). Recent technologies have equipped cars with airbrake system, auto braking system, the navigation system, rollover protection, speed alert and electronic stability control. These technologies can assist drivers in so many ways such as in avoiding a crash by reducing the car risk from skidding during sudden emergency manoeuvre, avoiding speed-related traffic crashes, reducing speed to prevent rollover, and real-time traffic information systems to divert drivers from traffic congestions and to

ensure a hassle-free journey. All of these features present in a vehicle may also influence drivers' speeding behaviour.

Vehicle age is another reason affecting drivers' speeding behaviour. Normally, drivers who own vehicles of less than five years old tend to speed more than those whose vehicles are more than five years old (Fildes et al.,1991; Williams et al., 2006). This is because, the vehicle's age indirectly represents the vehicle's condition in terms of newness and engine capability. Besides that, an increased risk of fatalities of 5% for every 5 years was associated with recent model year vehicles (Bedard et al., 2002). In that regard, drivers with vehicles less than five years old were more confident to speed and to engage in risky driving behaviours like speeding.

Apart from that, it appears that drivers who were involved with speeding include those who were using company vehicles instead of their private vehicles. Research revealed that drivers using company vehicles were more likely to engage in speeding as compared to those used private vehicles (Transport Research Laboratory, 1999). Those who drove at the speed of 80mph were more accountable for 62% of the commercial vehicles as compared to 32% among the private vehicle drivers. Following these studies (Company Car, 2016; Institute of Transport Economics, 2005; Transport Research Laboratory, 1999;), various reasons were given by the drivers to justify why they exceeded the speed limit when using the company car.

The most prominent reason for speeding by Company Car (2016), 31% claimed was because they were following the traffic flow, 19% claimed that the driving conditions were very favourable, 15% were of the opinion that 70mph was too slow and 8% of them believed that the technology of the cars could control higher speeds efficiently. The drivers using company cars and were on business should know that the risks associated with exceeding the speed limit far outweigh the time saved. Hence, the respective

business companies should identify the high-risk drivers and emphasise on better driving behaviours (Fleet News, 2016).

2.4.4 Driving environment

Driving environment can also contribute to the factors influencing drivers' speeding behaviour. It is explained by Monash University Accident Research Centre (2009) that the weather, road signs, road markings, lightings and road geometries can influence driver's speeding behaviour. One of the important features in road geometries is road width. It is understood that the road width can provide mixed effects to the drivers as the drivers perceive the road as wider, they tend to increase the speed. Hence, the crash risk also increases. On the contrary, narrowing lanes has become one of the alternatives for drivers to reduce speed as narrow lane can increase perceived risk (Monash University Accident Research Centre, 2009). Besides that, driving on the narrow lane has encouraged drivers to become more cautious and vigilant to avoid dangers (Summala, 1996). Moreover, no crashes and injuries were reported on urban and suburban roadways as a result of narrow lane width (Rista et al., 2018). However, narrowing lane is not always encouraged as one of the speed control countermeasures as it increases the head-on risk and run-off road crashes (Road Safety Bureau and Federal Office of Road Safety, 1993).

It is well-accepted that low visibility can reduce travel speed since drivers are unable to estimate the leading vehicle distance as well as the hazards which appear on the roads. The US Department of Transportation (2009) had reported that low visibility significantly reduces travel speed and roadway capacity by up to 12%. Corresponding to visibility is the weather condition. Dry weather can affect driver's speed behaviour since dry weathers and daylight conditions increase the mean volume and traffic variations (Theofilatos & Yannis, 2014).

Furthermore, posted speed limits placed within specific locations can also influence driver's speed behaviour in the sense that it increases drivers' alertness to the designed speed limit and the surroundings. The speed limit set in response to the road geometry and road condition can, therefore enable drivers to adhere to the posted speed limit and to adjust their driving speed accordingly. The effect of lowering the speed limits have been investigated in several countries such as Belgium, Finland, France, Germany and United Kingdom. These investigations revealed that by lowering the speed limit, the condition also lowers the average speed and so subsequently, reduces the crash risks and crash severity (Monash University Accident Research Centre, 2008).

The act of driving is a tiring activity, hence drivers need some stimulus to ensure that they are conscious and alert while driving. As such, in-vehicle music could be a good stimulus for drivers since music can calm the feeling and mind. However, certain kinds of music like fast-music tempo may be distracting to the point of taking away the drivers' attention on the road. This can cause drivers to drive at high speeds and eventually be involved in a number of traffic violations (Brodsky, 2001). Furthermore, in-vehicle environment such as the occupancy of vehicles can also affect drivers' speed behaviour. Vehicle occupancy may affect the drivers directly when they are visible and present in the car. This is related to the influence of peer passenger in influencing drivers' speeding behavior, especially among young drivers (Gheorghiu, Delhomme, Felonneau, 2015; Moller & Haustein, 2014). Similarly, drivers can be indirectly affected by the presence of other road users in the general traffic environment especially when there are attempts to overtake and race between the drivers (Hagland & Aberg, 2000).

2.4.5   Driver factor

Previous research has identified the driver factor as the core influence in the majority of road accidents and fatalities (WHO, 2013). Those who contributed to the road

accidents and fatalities consisted of motorists, motorcyclists and pedestrians who can be classified as groups that were susceptible to road accidents (Ministry of Transport, 2014). Likewise, the traffic fatalities and hospital admissions in Australia were noted to be caused by motor vehicle injuries (Lam, 2002). This was also observed in the United Kingdom where it was reported that the contributory factor to road accidents was caused by driver errors in 73% of the accidents reported in 2014 (Department for Transport London, 2015). Human contribution towards road accidents and fatalities can be classified into various traffic offences and violations such as speeding, running of red light, abrupt changing lane and close-following.

In the Malaysian context, the Malaysian Institute of Road Safety Research (MIROS) revealed that driver error contributed to 80% of road traffic accidents in Malaysia (The Sun Daily, February 18, 2015). The pieces of evidence gathered from the accidents indicated that driver factors contributed significantly to road traffic accidents and fatalities in Malaysia and worldwide. Subsequently, the evidences gathered from the driver factors can be understood in terms of driving experience, previous motor vehicle accident and license duration. Most importantly, important variables within the driver factor is the driver's attitude and behaviour.

a) **Driving experience**

Driver factor has been recognised to be one of the most significant factors contributing to drivers' speeding behaviour (Fauziah, 2017). Within this factor, the drivers' driving experience and their previous motor vehicle accidents are also attributable to the behaviour. It has been noted that the lack of experience among young drivers could lead to speeding behaviour. This has been proven in a study which highlighted the three common mistakes frequently committed by the newly licensed drivers. This include being inattentive with other vehicles, unable to control vehicles and

exceeding the speed limit (Braitman et al., 2008). In a focus group study conducted by Knight, Iverson and Harris (2012) among 101 participants in Australia, it was found that exposure to different driving experiences may influence and alter the risk-taking behaviours of these drivers. Overall, novice drivers tend to be involved in crashes more frequently than experienced drivers.

b)   Previous motor vehicle accidents

It is noteworthy to mention that one of the plausible factors used to predict future motor vehicle accidents is previous motor vehicle accident experiences (MVAs) (Norris et al, 2000). This phenomenon has been explained by scholars (Norris et al., 2000; Fildes, Rumbold, & Leening, 1991) who noted that the probability of accident severity and occurrence is also dependable on previous motor vehicle accidents. It appears that those who had been involved in an accident in the last five years of their driving experience had been identified as excessive speeders (Fildes, Rumbold & Leening, 1991). It was further claimed that those who reported multiple accident involvement and severe injuries were also made up of people who were excessive speeders.

c)   License duration

Similarly, in a study looking at novice drivers in New Jersey, Massachusetts and Connecticut, the report disclosed that the age of licensure to drive a car is also a contributing factor to crash risks. It thus recommended that the minimum age of licensure should be at 17 (Allan, Ronald, & Paul, 1983). Additionally, Waller et al. (2001) found that the duration of the licence could be the cause for future crash. The scholars reiterated that as the duration of the licence increased, the driving experience also increased, and this contributes to a decrease in road crashes.

2.4.5.1 Drivers' attitude and behaviour

Within the driver factor, it can be understood that there are components made up of attitude and behaviour which can ease in explaining the complexity of driver factors. The discussion of these aspects encompassing attitude and behaviour can provide insight towards a better understanding of the issue of speeding behaviour.

To recognise how attitude influences behaviour, we need to rely on the person's personal characteristics. In 1930, this was attempted by Richard La Piere who travelled across the United States with a young Chinese couple. Among several visits to the restaurants, they had been refused services in hotels and restaurants only once. A few months later after the visits, La Piere sent letters to each of the visited establishments. Surprisingly, only one indicated that they would serve the couples with more than 90% stating that they would not. La Piere described the people's attitude as dramatically inconsistent with their actions.

However, several researchers (Wicker, 1969; Kraus, 1995) commented that there are methodological flaws in La Piere's observation whereby the people who answered the letter could be different from the participants in the restaurants visited. Furthermore, the presence of La Piere as an American academic is likely to increase instances of the Chinese couple being served as predicted by Hawthorne's effect which states that under observations, people tend to behave differently than when not under observations. A few years later in 1969, Alan Wicker commented that attitude was a relatively poor predictor of behaviour as attitude accounted for around 2% of variability in behaviour. A researcher (Kraus, 1995) also responded by improving their research methods. They claimed that greater attention could be devoted to looking at when attitude is likely to predict the behaviour. Three decades later, Steven Kraus (1995) found the average correlation, $r=$ 0.38, between opinions and actions. This result offered a much higher credibility than what others did in the past.

The reason for getting better results in the subsequent studies is because the researchers (Wicker, 1969; Kraus, 1995) employed better measures of attitude and behaviour as compared to La Piere's study which was unable to ensure whether the measurement of attitude and behaviour came from the same individuals. Nevertheless, modern researchers (Wicker, 1969; Kraus, 1995) have also applied better experimental paradigms for testing predictions in which the same constructs were examined within the same individual. Because of this, the aspects of attitude and behaviour are viewed to be two very crucial components because they are interrelated with one another. Attitude acted as the foundation for behaviour formation, and behaviour can be the foundation for attitude formation. This explains why the discussion of the attitude is inseparable from behaviour and vice versa.

The study of attitude and behaviour have been widely used throughout the world and in various countries to investigate traffic and transportation issues. Investigations have been conducted to examine the risky driving behaviour of drivers in Saudi Arabia (Suhasini & Abdulkarim, 2016), travellers' behaviour regarding the use of public transportation (Hoang-Tung & Kubota, 2015), attitudes and behaviours relevant to pedestrians or cyclists' safety (Hatfield & Prabhakharan, 2016), pedestrians' attitude and behaviour in Turkey (Nordfjarn & Şimşekoğlu, 2013), and also Norwegian drivers' attitude towards traffic safety (Iversen, & Rundmo, 2012). These studies have applied both components of attitude and behaviour in explaining and describing the social issues that exist.

Many past researches (Leandro, 2012; Moataz & Bromfield, 2017; Stephens et al., 2017) have indicated the consistency of attitude in predicting behaviour, especially on speeding. Bergmans and Shahid (2013) found that a behaviour change is possible among weak habit drivers. Meanwhile, the attitude change is made possible among strong habit drivers with the exposure on the persuasive mobile application among young drivers. It

appears that after being exposed to an anti-speeding message, behaviour change in speeding seemed more favourable especially when it is compared to drunk-driving (Cernecca & Glenden, 2003). However, there were also studies which described the misalignment of attitude and speeding behaviour (Fleiter & Watson, 2006). Therefore, it is crucial to understand the context when aiming to measure whether attitude influences behaviour.

In most speed related crashes and fatalities, the motorists were the most susceptible victims as they have contributed to the second highest casualties by road user types compared to the other road user types (Road Safety Department Malaysia, 2014). These occurrences are due to the rapid economic growth and motorisation in Malaysia. This can be seen in a report whereby 93% of Malaysian households possess at least one car. This is the third highest rate in the world (The Star, April 16, 2014). Therefore, the escalating number of speed-related road crashes recorded can be attributed to driving behaviour since prior studies have revealed the causal correlation between the likelihood of getting involved in crash and driving behaviours (Simsekoglu et al., 2012). Besides, past research on risk-taking behaviour and crash involvement has not always focused on social cognition, including attitude that explains drivers' behaviour (Ulleberg & Rundmo, 2003) as attitude can influence one's driving behaviour either directly or indirectly (Porter, 2011).

There are various motivations that influence drivers' attitude and behaviour for speeding. In a survey conducted, most of the reasons are time-related (i.e.: save time or getting to one's destination faster) (EKOS, 2005). Generally, heavy vehicles drivers are under time pressure as they need to meet scheduled deadlines (Townsend & Galbraith, 2011). 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 (AdamGuppy and Guppy, 1995).

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 (Yang et al., 2013).

2.4.5.2 Definition of Attitude

The central issue viewed from the psychological perspective is that of attitude. Attitude holds a strong psychological aspect within human beings. Attitude is the essential aspect that determines the individual's behaviour. An individual's attitude can be positively or negatively linked to the behaviour, depending on how people evaluate the situations they are in and the condition of those situations. If an individual evaluates and judges the situation as favourable, then the attitude can be positively linked to the behaviour. However, if an individual evaluates and judges the situation to be unfavourable, then the attitude can be negatively linked to the behaviour. Therefore, the drivers' attitude on the road is very crucial as it determines the subsequent behaviour of the drivers.

The notion of attitude is defined by Krech and Crutchfield (1948) as "an enduring organisation of motivational, emotional, perceptual, and cognitive processes concerning some aspect of the individual's world" (p. 152). This definition can be considered as comprehensive as it covers the aspect of motivation, emotion, perception and cognition of the individual regarding the world. This definition also consists of the internal and external aspects of how an individual view the world.

Shaw and Wright (1967) also attempted to extend on the definition by elucidating a comparable definition, where attitude is defined as "a relatively enduring system of effective evaluative reactions based upon and reflecting the evaluative or beliefs which have been learned about the characteristics of a social object or class of social objects" (p.10).

These two definitions of attitude were subsequently further refined. Eagly and Chaiken (1993) considers attitude to be "a psychological tendency that is expressed by evaluating a particular entity with some degree of favour and disfavour" (p.1). Eagly and Chaiken considers the definition as an evaluation that a person makes with outcomes that are favourable or unfavourable. Following this definition, Vaughan and Hogg (1995) provided a more enriching definition, they considered attitude as "a relatively enduring organisation of beliefs, feelings and behavioural tendencies towards socially significant objects, groups, events or symbols" (p.150). The more recent definition of attitude proposed by Vaughan and Hogg (1995) is more comprehensive when contrasted with other definitions because this definition carries the components of belief, feeling and behavioural tendencies. Hence, this definition was engaged as a reference for the current study. The summary of the definitions provided by the scholars is tabulated in Table 2.5 below.

Table 2.7: Definitions of Attitude

Scholar (Year)	Definition of attitude
Krech and Crutchfield (1948)	"An enduring organization of motivational, emotional, perceptual, and cognitive processes with respect to some aspect of the individual's world" (p. 152).
Shaw and Wright (1967)	"A relatively enduring system of affective evaluative reactions based upon and reflecting the evaluative or beliefs which have been learned about the characteristics of a social object or class of social objects" (p.10).
Eagly and Chaiken (1993)	"Psychological tendency that is expressed by evaluating a particular entity with some degree of favour and disfavour" (p.1).
Vaughan & Hogg (1995)	"A relatively enduring organization of beliefs, feelings and behavioural tendencies towards socially significant objects, groups, events or symbols".

2.4.5.3 The Components of Attitude

It is a well-known fact that attitude is a latent variable that cannot be observed directly. Therefore, it must be inferred from the assessable responses that reflect the positive or negative evaluations of the attitude object (Ajzen (1989) in Pratkanis, Breckler & Greenwald, 1989). Attitude is a single component, but it measures a multicomponent model known as cognition, affection and behaviour (Allport, 1954; McGuire, 1985). The cognitive component of attitude denotes the beliefs, thoughts and attributes associated with the object. The affective component of attitude describes the feelings or emotions associated with the attitude object (Maio & Haddock, 2009). This explains the drivers' feelings and emotions during their driving events or occurrences. The conative component refers to the past experiences or past behaviour related to the attitude object (Bem, 1972). These three components of attitude can be further separated into verbal and

nonverbal responses, as explained by Rosenberg and Hovland (1960) in Ostrom (1969) in Table 2.6 below.

Table 2.8: Responses to Infer Attitude (Rosenberg & Hovland, 1960)

Response mode	Response category		
	Cognitive	Affect	Conation
Verbal	Expressions of beliefs about attitude object	Expressions of feelings towards attitude object	Expressions of behavioural intention
Nonverbal	Perceptual reactions to attitude object	Physiological reactions to attitude object	Overt behaviours with respect to attitude object

Based on the table 2.8 above, the evident difference between the verbal and nonverbal response mode depicts that the verbal mode includes more verbal expressions while the nonverbal mode focusses on reactions towards the attitude object. This can be used to explain that the cognitive response denotes the expressions of beliefs and the perceptual reactions to the attitude object. The affective response refers to the expression of feelings and physiological reactions to the attitude object while the conative response refers to the expression of behavioural intentions and overt behaviour to the attitude object.

Each of the three components of attitude (cognitive, affective and conative) is distinct (Krech, Crutchfield & Ballachey, 1962; McGuire, 1985). This is expressed when the individual has a positive cognitive and affective responses but negative conative response towards the attitude object. The positive cognitive and affective response contribute to the person's positive attitude towards speeding. Although the cognitive, affective and behavioural components of attitude are distinct, it does not mean that the components are independent of each other (Breckler, 1984). Although the three components may be defined independently and represent the first-order factors, they are,

however combined to form the second-order factor known as attitude (Pratkanis, Breckler, & Greenwald, 1989).

Each individual has different bases of attitude in which the attitude may be formed on the basis of emotion which is referred to as affective. It could be based on beliefs thus known as cognitive or on observation of the past behaviour, known as behavioural. Major distinctions have been made by previous researches (Allport, 1935; Eagly & Chaiken, 1993) regarding the sources of attitude. Hence, the "ABCs" of attitudes (affect, cognition and behaviour) are often referred to as the "tripartite" approach. This has been discussed in various research (Zanna & Rempel, 1988; Eagly & Chaiken, 1993) as the basis of attitude formation. Most of the theories related to attitude have also clearly defined the distinction between these three sources (Zanna & Rempel, 1988).

a.   The Affective Component

The Affective component of attitude focusses on emotions. There are three processes known as operant conditioning, classical conditioning and mere exposure from where attitude is derived. The operant conditioning is "a process by which the frequency of a response is increased following a positive outcome; likewise, it is decreased following a negative outcome" (Skinner, 1957). The classical conditioning is relatively similar with the operant conditioning which refers to a conditioned stimulus that is associated with the unconditioned stimuli to produce a conditioned response even when the conditioned stimuli is presented alone (Pavlov, 1902). More exposure suggests that a positive attitude towards an object can be produced by increasing familiarity of the attitude object (Zajonc, 1968). When a person is familiar with the attitude object, he/she is more likely to have positive evaluation of the object.

b.   The Behavioural Component

The behavioural attitude formation of the attitude component states that attitude can be formed through the process of self-perception, or through the observation of past behaviour (Fazio, 1989). This process acts when the internal cues are weak to lead the attitude. Hence, an outside observer is needed to lead the attitude and to guide the behaviour (Olson & Kendrick, 2008 in Crano & Prislin, 2008). In addition, the self-perception aspect of attitude can help to shape the attitude through "foot-in-the-door" phenomenon. This phenomenon hypothesises that a person may agree to a larger request when there is an initial agreement on the smaller ones (Freedman & Fraser, 1966). This phenomenon suggests that there is consistency between a request and the person who is willing to engage in a subsequent request. However, the consequence of self-perception towards construal of internal attitude gained from overt behaviour demonstrates an opposite effect when one already possesses an attitude (Deci, 1971).

c.   The Cognitive Component

The third attitude formation is cognitive. This is derived from the expectancy-value model introduced by Fishbein and Ajzen (1975). In this regard, the individual uses and applies the information which is associated with the object when making an evaluation. Each of the attitude object has expectancy and value attached to each of the perceived attributes.

A second model that can describe the cognitive formation of attitude is the Information Integration theory. This theory suggests that the attitude is an integration of the belief that the individual already held with the new information that is processed and interpreted (Anderson, 1981).

Another method of attitude formation based on cognition can be explained by the reception-yielding model proposed by Mcguire (1972). This model postulates that an individual receives information about the attributes of an attitude object. The person then decides whether to accept or to yield to the information in terms of what is implied from his/her attitude towards the object.

Finally, attitude is formed from cognition with the cognitive response model (Greenwald, 1968). The cognitive response model suggests that attitude can be formed through an active thought process.

2.4.5.4 Attitude Structure

Another essential discussion noted in attitude is attitude structure which emphasises on the organisation of the positive or negative evaluations within and among the cognitive, affective and behavioural components of attitude (Maio & Haddock, 2009). The typical assumption is that the positive beliefs, feelings and behaviour may hinder the negative evaluation of these attitude components. This reflects the one-dimensional perspective in which the positive or negative elements are at opposite ends of a single dimension or in between the location (Cacioppo, Gardner, & Berntson, 1997). For instance, if a person has positive thoughts, feelings and behaviour towards a car brand (Mercedes), he/she tends to show positive attitude components and is unlikely to show negative feelings, thoughts and behaviour towards this brand.

Unlike the two-dimensional perspective, the attitude structure suggests that a person can have many positive attitudes and many negative attitudes which result in attitudinal ambivalence. The attitudinal ambivalence only occurs in a two-dimensional perspective (Maio & Haddock, 2009) and there are various types of attitude ambivalence, ranging from potential ambivalence to felt ambivalence (Connor & Armitage, 2008). Potential ambivalence occurs when a person possesses both positive and negative

evaluations towards an attitude object. Investigation on this attitude (McGregor, Newby-Clark & Zanna, 2002) revealed that an individual may have many positive and negative beliefs (cognitive ambivalence), positive and negative feelings (affective ambivalence) or positive and negative behavioural experiences (behavioural ambivalence). This is called potential ambivalence as the person may or may not be consciously perceiving that he/she is having this state of attitude.

Likewise, felt ambivalence denotes the actual feelings that an individual experience when he/she overthinks about the attitude object. Normally, this attitude can be measured by asking the person to rate the level of feelings which are mixed, in conflict and indecisive (Wegener, Downing, Krosnick, & Petty, 1995). The problem with the potential and felt ambivalence is that it somehow measures different things as it shows a low correlation (Riketta & Ziegler, 2006). The prediction of attitude towards behaviour depends on ambivalence and non-ambivalence towards the issue, with the inherent ambivalence resolving the non-ambivalence (Clark, Wegener, & Fabrigar, 2008) while felt ambivalence has low probability for predicting behaviour (Conner & Armitage, 2009).

2.4.5.5 Attitude function

The functions of attitude were developed by Katz (1960) sixty years ago. of Smith et al. (1956) claimed that attitude serves three primary functions: object-appraisal, social adjustment and externalisation, as illustrated in Figure 2.7.

The object-appraisal refers to the ability of attitude to differentiate the positive and negative attributes in our social world. This suggests that people tend to do things that are beneficial to them; they avoid things that are not beneficial (Maio, Esses, Arnold & Oslon, 2004). The social adjustment practice suggests that attitude helps the individual to assimilate with the preferred person and to avoid the disliked person. The last function of

attitude is externalisation which refers to attitude that helps to protect the individual from internal conflicts.
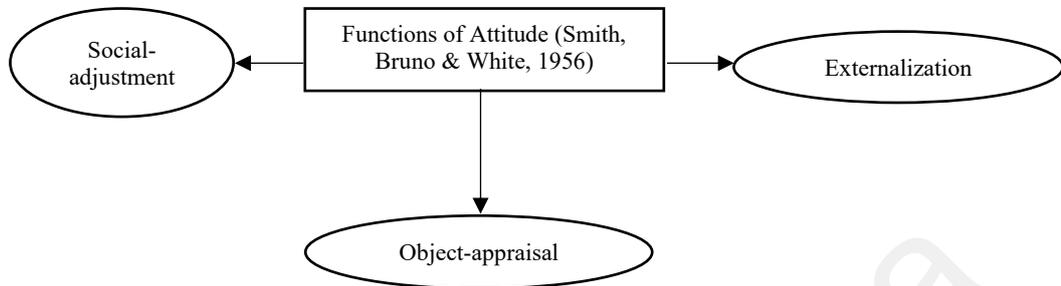
Figure 2.7: Functions of Attitude (Smith, Bruno & White, 1956)

Katz (1960) explained that attitude serves four main functions: instrumental, knowledge, ego-defensive and value-expressive, as illustrated in Figure 2.4. As others like him, Katz (1960) described the instrumental function as people developing favourable attitude towards things that meet their goals. This is done by achieving rewards and avoiding punishments. The elaboration provided by Katz (1960) is similar with Smith et al. (1956), where in an object-appraisal function people appreciate things that can maximise their profits and minimise their penalty. For example, people perceive car use to be an attractive means of transport due to its flexibility, availability, speed, reliability, safety, comfort, convenience and carrying capacity (Birgitta, 2007 in Tommy & Steg, 2007).
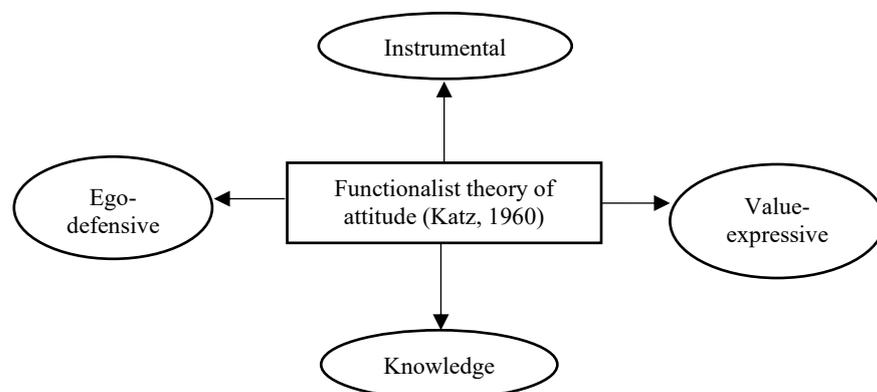
Figure 2.8: Functionalist theory of attitude (Katz, 1960)

Furthermore, where attitude serves as knowledge function, the attitude provides meaning for something, thereby developing a more structured environment and making sense of occurrences that happened around us. Similarly, knowledge function may also refer to the ability of attitude in organising the information about the attitude object (Maio & Haddock, 2009). Life is full of inexplicable events and occurrences, so knowledge function helps us to make sense of the world. The third function of attitude is value-expressive. Attitude serves to enable people to express their value where value is the mental process that recognises both the cognition and emotion such as concept and goals either positively or negatively. The last function of attitude is ego-defensive. Here, ego-defensive protects the self-image and self-esteem of the person. This is similar with the externalisation function described by Smith et al. (1956).

2.4.5.6 Measurement issue in attitude

Fundamentally, attitude and behaviour are two complicated issues. There are four multiple factors involved in attitude and behaviour. The five factors explained by Frymier & Nadler (2017) provide some understanding of the possible factors that can influence the attitude and behaviour of a person. The first factor that looks how attitude can influence behaviour is the measurement issue. Here, Ajzen and Fishbein (1977) identified four factors for measuring attitude and behaviour. They are: (a) the performance of the action, (b) the target of the action, (c) the context of the action and (d) time. To measure the magnitude of attitude which influences behaviour and to explore if attitude can be a good predictor of behaviour, all these factors need to be arranged accordingly. Thus, it can be said that the action, target, context and time must be appropriately matched. When this is achieved, then the attitude-behaviour relationship will be well predicted.

The action can be understood as a specific behaviour that is performed by a person. In this context, action refers to a specific behaviour, which is speeding performed by the driver. When the specific action has been recognised, the target of the action needs to be identified. The target of the speeding behaviour is the driver who is involved in the speeding behaviour, based on the various demographic factors such as age, gender, length of driving experience, experience with summoning and involvement with accident. While the action and target have been identified, the context of the action need to be familiarised. The context of speeding behaviour refers to the location and situation in which speeding behaviour is most likely to occur such as on Expressways during the daytime and when the driver is under time pressure. In this regard, all the four factors of measurement which can influence attitude behaviour relationship is described in Figure 2.9.
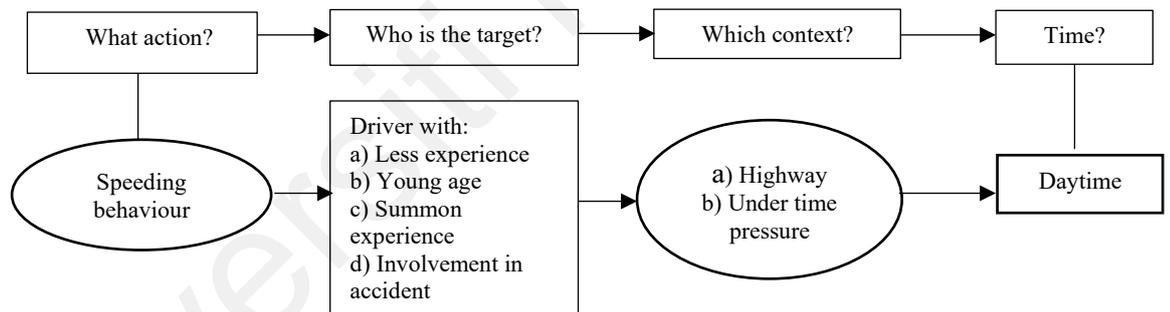
Figure 2.9: The four factors measurement for attitude-behaviour relationship

Second, the attitude formation factor can be a factor which influences attitude towards behaviour. The attitude formation factor refers to the way attitude is formed. Attitude can be formed either through direct or indirect experiences. In most of the occurrences, attitude formed through direct experience has a greater influence on behaviour. It is unlikely for indirect experience to cause attitude to influence behaviour. Notably, attitude formation can be traced to the behaviour itself (Dillard, 1993). This occurs when a person's attitude is formed through the behaviour, in which later, it influences the person's behaviour. The theory of Cognitive Dissonance and Self-

Perception Theory can help to explain how a person's behaviour can influence attitude and later shape future behaviour.

Third is attitude accessibility in influencing attitude towards behaviour. Topics that have always been discussed can easily be retrieved because they are easily accessible in the mind. In this context, when the media keeps discussing about the issue of speeding behaviour and why drivers are involved in speeding and why the attitude of the drivers towards speeding is as such, the consequences of speeding will thus form as an issue the mind of the drivers. This information can be easily retrieved when it is needed. The continual discussion of this issue can activate the drivers' attitudes; hence their attitude becomes accessible. This is known as attitude accessibility. A few essential criteria are necessary for attitude to become accessible and to influence the behaviour. Firstly, it must relate to a direct experience. A driver who has direct experience with speeding makes his/her attitude accessibility stronger than those who do not have direct experience with speeding. In this regard, the drivers' attitude on speeding becomes easily accessible and this can efficiently stimulate their future behaviour. Secondly, there must be relevance of the attitude to the behaviour. If the attitude does not play a relevant role in the behaviour, it is difficult for the attitude to influence the behaviour. Thirdly, there must be vested interest. The issue of speeding is the interest of everyone as it involves the public. Thus, the Road Transport Department and the Royal Malaysian Police can raise awareness and strengthen the enforcement procedures on speeding behaviour through social and print media. The media needs to broadcast the issue and they need to seek the opinion of the public on how the issue can be solved. The opinion of the public can be established as one of the benchmarks for solving the issue. The issue discussed then becomes relevant and an interest of the public. This can strengthen the attitude of drivers which influence their behaviour.

The situational factor is the final factor in determining the attitude influence towards behaviour. The situation can be divided into three classes: individuated situations, deindividuated situations and scripted situations (Abelson, 1982). In the individuated situations, the drivers focus on their internal states like attitude, belief and value. The drivers also take more responsibility for their action rather than the action of others. Thus, the attitude is generated by their willingness. This self-attitude can better predict the behaviour. The deindividuated situation has less anonymity and it is less focussed on internal states like the individual's attitude, feeling and value. This type of situation adopts a group perspective and it does not take responsibility for the individual's actions. In this context, the group attitude is stronger; it can influence behaviour more than the individual's attitude. Hence, drivers tend to depend on the group for the attitude, feeling, belief and value. This implies that the driver is more likely to engage in the group's behaviour without considering his/her own thoughts and feelings about the behaviour. Finally, the scripted situation occurs when the drivers respond automatically without thinking about the situation. The drivers know the expected behaviour and does not need much time to think and behave. This shows that in the scripted situation, the attitude is less guided by the individual but instead by the social norms, habits or previously thought out patterns. It can be said that there is a weak correlation between attitude and behaviour in the scripted situation as the drivers pay less attention to their own attitude and behaviour but behave automatically based on the situation. Therefore, the changing behaviour process is impractical in the scripted situation.

2.4.6   Summary of past literature on factors affecting speeding behaviour

In a nutshell, Table 2.9 summarises the factors affecting speeding behaviour from various literatures and findings. The factors are ranging from the demographic characteristics, trip characteristics, vehicle factor, driving environment and driver factor.

Table 2.9: Summary of Factors Affecting Speeding Behaviour

Demographic Characteristics	Authors (Year)
Age	WHO (2013); Cestac et al. (2013); Williams et al. (2006); Cordellieri et al. (2016); NHTSA (2008); Masten et al., (2004); Bates et al., (2014); Clarke, Ward & Truman, (2010); Hartos, Nissen & Simons-Morton, (2001); OECD (2006)
Gender	Adli (2003); Bachoo, Bhagwanjee & Govander (2013); Banakar and Nasrolahi (2012); Curry et al. (2012); Fleiter & Watson (2006); Furnham & Saipe (1993); Lancaster & Ward (2002); Monash Accident University Research Centre, (2009); Moller & Haustein, (2014); Ore (1998); Parker et al. (1992); Rolison et al., (2018); Shinar et al., (2001); Stradling (2000)
Education	Dobson et al. (1999); Shinar et al. (2001)
Employment	Akerstedt & Wright (2009); Fildes et al. (1991); Yuen (2017)
Income	Banakar & Nasrolahi (2012); Grimm and Treibich (2014)
Marital status	Atombo et al. (2017); Berkson (1962); Mitra-Sarkar & Andreas (2009); Whitlock et al. (2004); West (1996)
Trip Characteristics	**Authors (Year)**
Trip purpose	Broughton et al. (2003); Fildes et al. (1991); Fleiter & Watson (2006); Stradling et al. (2000); Transport Research Laboratory (1999)
Driving exposure	Broughton et al. (2003); Transport Research Laboratory, (1999); Scott-Parker et al. (2011);
Time pressure	AdamGuppy and Guppy (1995); Bogdan et al. (2014); EKOS (2005); Monash University (1998); Rendon-Velez et al. (2016); Stradling et al. (2000)
Vehicle Factor	**Authors (Year)**
Size of vehicle Vehicle age	Broughton et al. (2003); Bedard et al. (2002); Fildes et al. (1991); Williams et al. (2006)
Type of vehicle registration (commercial registered)	Company Car (2016); Fleet News (2016); Institute of Transport Economics (2005); Transport Research Laboratory (1999)
Technological advancement	Atombo, Wu, Zhong, Zhang (2016); Monash University Accident Research Centre (2009); SWOV Institute for Road Safety Research Netherland (2012)
Driving Environment	**Authors (Year)**
Road geometry	Monash University Accident Research Centre (2009); Rista et al. (2018); Summala (1996)

Weather	Monash University Accident Research Centre (2008); Monash University Accident Research Centre (2009); The US Department of Transportation (2009); Theofilatos & Yannis (2014)
In-vehicle entertainment	Brodsky (2001)
Passenger and other road users	Gheorghiu, Delhomme, Felonneau (2015); Hagland & Aberg (2000); Moller & Haustein (2014)
Driver factor	**Authors (Year)**
Driver error Experience	The Sun Daily (February 18, 2015); BRaitman et al. (2008); Fauziah (2017); Knight et al. (2012)
Previous motor vehicle accident	Fildes et al. (1991); Norris et al. (2000)
Speeding fine	Lawpoolsri et al. (2007); Stradling (2000)
License duration	Allan et al. (1983); Waller et al. (2001)
Attitude and behaviour	Ajzen (1991); Bergmans and Shahid (2013); Cernecca & Glenden (2003); Deffenbacher et al. (2003); Iversen, & Rundmo (2012); Leandro (2012); Moataz & Bromfield (2017); Porter (2011); Stephens et al. (2017); Suhasini & Abdulkarim (2016); Simsekoglu et al. (2012); Ulleberg & Rundmo (2003); Yang et al. (2013)

The summary of factors affecting speeding behaviour is tabulated in the Table 2.7. Based on the table, it can be described that there are five factors that affect drivers' speeding behaviour namely demographic, trip characteristics, vehicle, environment and driver. Each of the factor has contributed to drivers' speeding behaviour. However, referring to the table, it can be seen that demographic factors have more influences on drivers' attitude and behaviour towards speeding. Nevertheless, the influence of attitude is more prevalent in affecting drivers' speeding behaviour.

2.5 Conclusion

This chapter has detailed the related studies about speeding behaviour from the definitions and concepts, theories and factors that affects speeding behaviour. Several definitions of speeding have been mentioned by which a working definition that is selected for this study is from Giles (2004) that mentioned speeding as exceeding the speed limit at any driving conditions and point of time. Two theories which involved the ABC Model of Attitude and the Theory of Planned Behaviour were considered for this study. This chapter also investigated factors which could affect speeding behaviour such

as socio-demographic characteristics, trip characteristics, vehicle factor, driving environment and driver factor. They were discussed in detail as noted by various studies (Moller & Hustein, 2014; Leandro, 2012; Bergmans & Shahid, 2013; Glendon & Cernecca, 2003; Chevalier et al., 2016; Lancaster & Ward, 2002; Staplin et al., 2012). However, the most identified factor which could affect speeding behaviour can be found from driver factor which explains by driver's attitude and behaviour. Based on these studies, this chapter also provided a number of perspectives to investigate attitude and its influence on speeding behaviour.

Studies on attitude and behaviour (Leandro, 2012; Moataz & Bromfield, 2017; Stephens et al., 2017) have been conducted vastly across countries and throughout the world. Based on these studies, the definition for attitude was discussed with details, highlighting how it is perceived by various researchers and how the notion was used to meet the needs and current trends of various contexts of studies, culture and social character. Thus, a working definition that is selected for this study is adapted from Vaughan and Hogg (1995) to include three components that are beliefs, feelings and behavioural tendencies towards objects, groups, events or symbols.

This chapter also provided a more in-depth and clearer understanding of attitude form three perspectives: beliefs, feelings and behavioural tendencies. Hence, this study is interested to investigate driver's attitude in relation to speeding behaviour. In doing so, a conceptual framework as illustrates in Figure 2.10 has been applied in the current study.
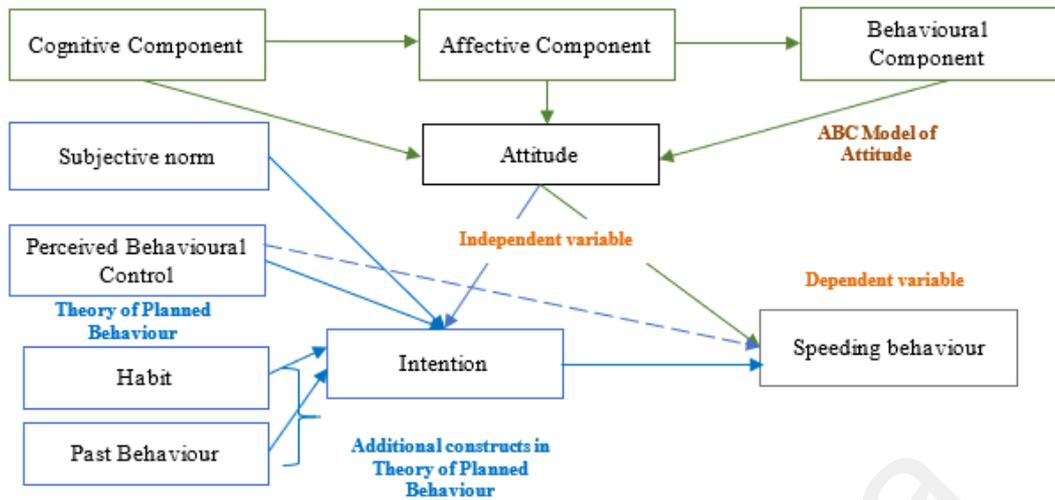
Figure 2.10: Conceptual framework of the research

Based on the conceptual framework outlined in the Figure 2.10, the ABC Model of Attitude is utilised in the quantitative study. The ABC Model of Attitude comprise of three components that are affective, behavioural and cognitive can support the quantitative study. Meanwhile, the Theory of Planned Behaviour that comprise of several constructs such as attitude, subjective norm, perceived behavioural control and intention is utilised in the qualitative study. Additionally, there are two constructs added known as habit and past behaviour to understand its relationship with intention and speeding behaviour. Both theories have been selected as they are able to explore driver's attitude towards speeding behaviour. The broad description of both theories and methodology are explained subsequently in Chapter 3.

CHAPTER 3: RESEARCH METHODOLOGY

3.1   Introduction

This chapter explains the methods and the research design employed. After considering the advantages and disadvantages of the various research designs, the mixed-method research design was adopted. To engage in the quantitative approach, a face-to-face survey was conducted. Respondents were recruited to response to the attitude survey (elaborated in sub-heading 3.2.7 and Appendix 1). On the other hand, the qualitative approach was accomplished through a focus group discussion activity (elaborated in sub heading 3.3.2). The two-pronged approach was applied to fulfil the triangulation perspective of the study. This is further explained in section 3.2.1. The remaining sub-chapters discuss the research design, data collection method followed by the validation of the method and analysis.

3.2   Research Design

3.2.1   Mixed method research

This study employed the mixed method research which involved two distinct phases, the quantitative followed by the qualitative approach (Creswell & Plano, 2011). Both these approaches are distinct, and the results generated can provide various types of knowledge (Brannen, 1992). The quantitative approach was conducted in this study to measure the effect of the independent variables on the dependent outcomes. This approach usually involves data that can be labelled and classified (Taylor, 2000). In the current study, the quantitative data was first collected and then analysed. This is subsequently followed by the qualitative data which were collected and analysed for the purpose of elaborating on the quantitative results obtained in the first phase.

The mixed-method research has its advantages and disadvantages. For instance, combining both methods within a research enables the data of one method to be further

verified by another method, thereby strengthening the results and findings. The quantitative research method has generated various findings which had precipitated different assumptions about the world hence, there is no uniform consequences. In contrast, the qualitative research method allows the research findings to be interpreted from different perspectives or research philosophies, hence it promotes different interpretations about the world. These critiques indirectly signify that some information is better to be analysed by one of these two approaches. The second concern involves the practicality of each research design. While quantitative approaches may be suitable for the sciences, it may not be suitable for the social sciences which deals with phenomenon or social happenings that cannot be capture by statistics. Although these two research methods acknowledge different philosophies, scholar (Creswell, 2014) has also contended that this should not inhibit researchers from integrating these two methods into their research. The third argument concerns the dialectical position where the two methods acknowledge differences between paradigms. This means that, the opposing values or ideas are equally important and recognised as it can bring diverse researcher teams and paradigmatic perspectives together (Johnson & Stefurak, 2013). According to some researchers (Howard & Borland, 2001), these differences should be deliberately utilised within and across disciplines, geared towards constructing new perspectives and meanings.

The combination of the quantitative and qualitative method could be referred to as the triangulation method. Triangulation has been used in the surveying arena to refer to a technique where two definite points are used to plot the location of a third point. This means that the combination of two or more theories, models and methods for the purpose of converging on a single concept is acceptable. In the current study, the triangulation method was used by integrating the quantitative and the qualitative approach so as to interpret one phenomenon. In this regard, the five steps of conceptual triangulation as

described by Foster (1997) were applied so as to arrive at the relevant results contained within each method, to examine the significance of each result, to develop the criteria for result inclusion in the conceptual model and finally, to develop the conceptual model.

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│     Conducting qualitative and quantitative data  │
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│      Finding the relevant results within each method │
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│        Examining the significance of each result  │
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│  Developing criteria for results inclusion in the conceptual model │
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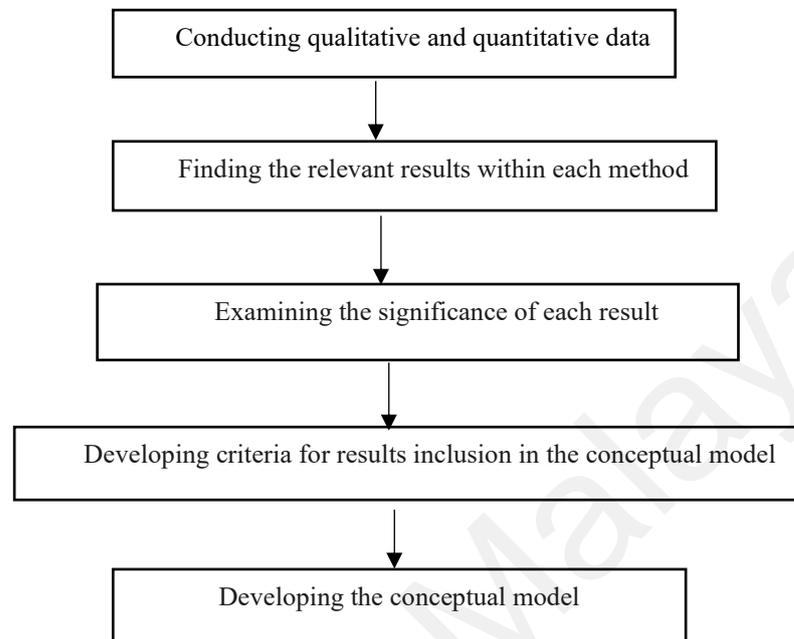
Figure 3.1: The triangulation concept (Foster, 1997)

Through triangulation, data can be verified, and the two research methods can generate analyses which support the research findings. In other words, the qualitative findings can support and explain the quantitative results. By using the triangulation approach, the results of each method would not stand alone but instead, be completed, complemented and confirmed by the other. In addition to this, triangulation permits the researcher the space to explain and describe a phenomenon holistically, wholly and comprehensively. Through triangulation, bias can also be minimised so as to enhance the validity of the results. This also means that the researcher can view the issue or phenomenon from different angles, thereby leading to better interpretations and insights for the issues explored. The quantitative data and their statistical results spawned by this study will be supported by the qualitative data extracted from the participants' views as both will be able to validate each other (Creswell, 2003). The overall flowchart of the current study is illustrated in Figure 3.2.
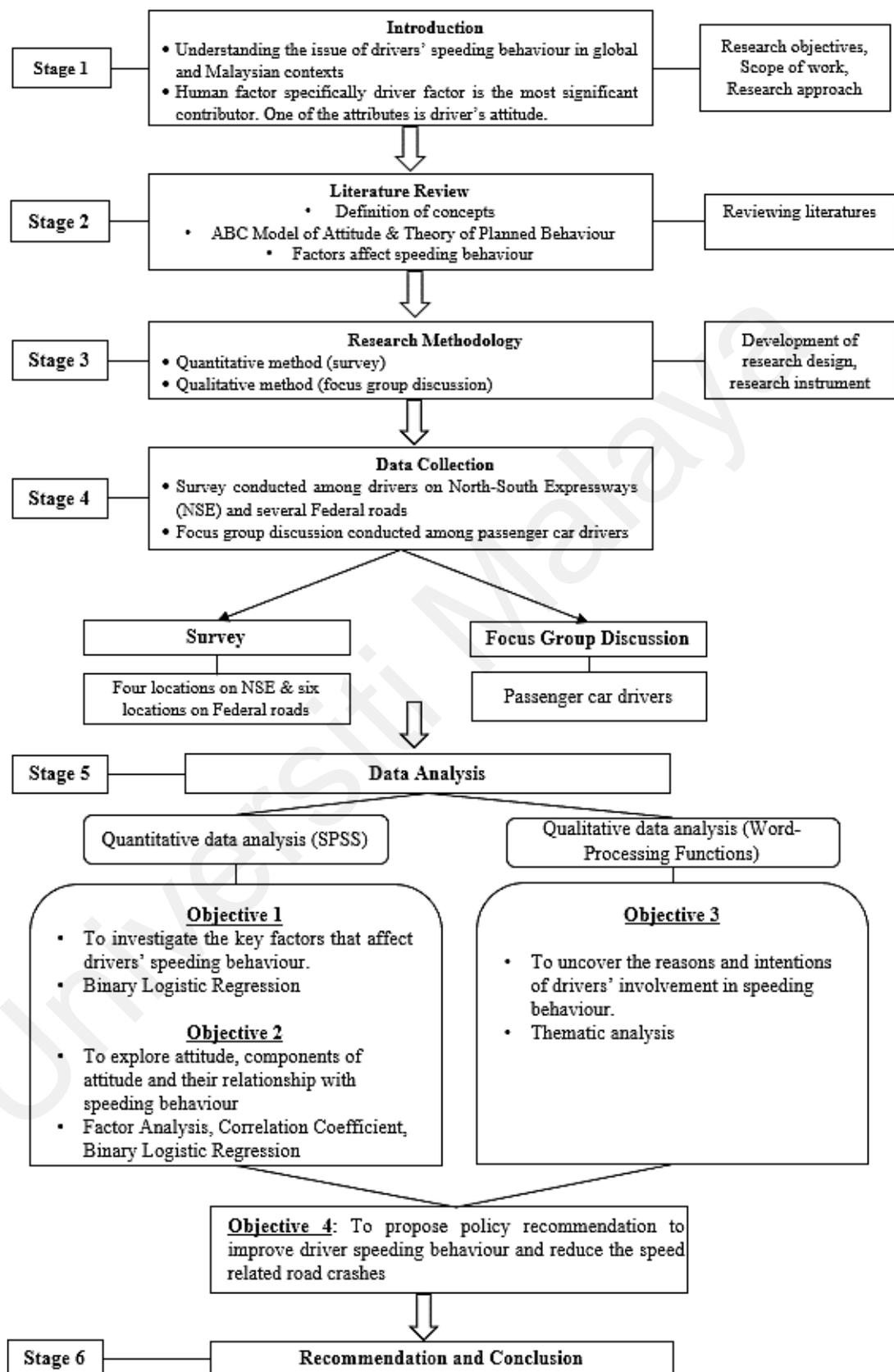
Figure 3.2: Flowchart of the mix-method study

3.2.2   The Quantitative Method: face-to-face survey

This study applied the survey approach, which is one type of quantitative research design, to collect data. A survey questionnaire is an instrument used for the purpose of gathering huge amounts of data which are then quantitatively analysed. These data tend to come from a specific sample that is recruited from a distinct population (Weisberg, Krosnick & Bowen, 1996) so as to be used for generalisation. The survey approach has been used in various social science disciplines such as psychology, accounting and education for the purpose of understanding various aspects of the human nature. For example, the survey approach can be used as a measure to understand how human beings behave under certain social settings and confines. In most circumstances, a survey is conducted on a group of people who are representative of a particular population. This method is more commonly applied by researchers in quantitative research method because it concerns the dispositional impact and contextual factors contained in human thoughts and human beings' social behaviour (Visser, Krosnick & Lavrakas, 2000). The survey approach can also be used to examine and investigate people's beliefs, opinions, attitudes, motivations and behaviour; it focusses on what people think and do (Mathiyazhagan & Nandan, 2010; Jones, Baxter & Khanduja, 2013).

The current research utilises the survey approach to explore the drivers' attitudes, beliefs, perceptions, motivation and speeding behaviour. The face to face survey was applied because it provides faster and higher responses as compared to mail and telephone surveys. Consequently, the current study was able to get instant responses and feedback on the questions. As such, there was no delay generated by the participants. This signifies that the face-to-face survey is much more efficient and effective in gathering participants' responses and feedback even though it was time-consuming and expensive.

3.2.3 Sampling method

In order to achieve the objectives of this study, the sampling method utilised in this study was based on convenience sampling which comprised car drivers recruited from four rest areas located along the North-South Expressways (Rest and Relax Tapah, Rest and Relax Rawang, Rest and Relax Ayer Keroh and Rest and Relax Pagoh) and six lay-bys of selected Federal roads (Jalan Tapah to Cameron Highland, Kuala Kangsar to Grik to Pengkalan Hulu, Kota Tinggi to Rompin, Johor Bharu to Ayer Hitam, Grik to Jeli and Lipis to Merapoh to Gua Musang). Convenience sampling refers to the samples who are conveniently available for accessing the information required. In most research, this is the best way of getting information quickly and efficiently (Sekaran, 2003).

There are some restrictions imposed on the current study. It excluded motorcyclists and bus drivers because the causes of fatalities among motorcyclists and bus drivers are relatively different from those using other vehicles. Nur Sabahiah and Santoshi (2011) observed that the top causes of fatalities among motorcycle riders were head damage caused by not wearing a helmet. Similarly, Rohani and Buhari (2013) noted that bus drivers also practised different driving behavioural styles which include their capability to cope with psychosocial demands, working hours and physical workloads. Thus, these different road users would manifest different kinds of attitude and behaviour, consequently, they were excluded. The participants of this study were recruited by using the intercept approach which occurred in the areas mentioned earlier (four rest areas and six lay-bys). The criteria of selection require that the participants were 18 years old and above; they hold a minimum a valid driving licence for a minimum of three months and they had driven a vehicle for a duration of at least ten hours per week.

There was no specific calculation in determining the sample size for convenience sampling. Hence, Saunders (2012) pointed out that samples apparently chosen for

convenience often meet purposive sample selection criteria that were relevant to the research aim. The total number of participants recruited were 503 (N=503), comprising 203 recruited from four rest areas (N=203) and 300 who were recruited from six lay-bys (N=300).

3.2.4 The road categories in Malaysia

Since the sampling of this research were participants from Expressways and Federal roads, only these two road categories will be discussed. The first of these, the Expressway, is characterised as a divided highway meant for through traffic which carries a full control of access for vehicles. It always has grade separations at all intersections. Such roads serve long trips and they provide a higher speed limit for vehicles to travel as well as comfort for travelling. These Expressways were designed to the highest standards and they were created for urban and rural areas thus they form the basic framework of the road transportation system in the urbanised area for through traffic (The Road Engineering Association of Malaysia, 2002). The Expressways built for rural areas refer to the interstate highways. Likewise, they are also the basic framework of the National road transportation for quick travelling.

The other road category is the Federal road which can be classified as a highway category. This type of road complements the expressway network and it also establishes the internal national network for average traffic volumes, unlike the Expressway which serves the highest traffic volume. This road usually connects the Federal Capital, State Capital, large urban centres and points of entry or exit to the country, whether directly or indirectly. It also serves long to average trip lengths, with a speed limit that is comparatively high to medium, with smooth traffic and partial access control. The difference between the Expressway and the Federal road is presented in Table 3.1 below.

Table 3.1: Characteristics of Expressway and Federal Roads (The Road Engineering Association of Malaysia, 2002)

Area	Road Cat.	Trip Length			Design Volume			Speed			Network
		Long	Med	Short	High	Med	Low	High	Med	Low	
Rural	Expressway	■			■			■			National network
	Highway	■				■			■		National network
Urban	Expressway	■			■				■		National network

Road classification is essential because this can help researches to clarify the various policies governing highways, particularly aspects of individual planning decisions on properties served by the road concerned. The classification can be further used to group the differences in speed designing, to classify the width of the carriageway and to exert control over pedestrians, intersection and frontage access. The most basic function of the road is transportation followed by two additional functions of mobility and accessibility. Roads in the rural area can be divided into five categories which are Expressway, Highway, Primary Road, Secondary Road and Minor Road. Meanwhile, roads in urban areas can be divided into four categories: Expressway, Arterial, Collector and Local Street (The Road Engineering Association of Malaysia, 2002).

3.2.5   Design standards for Expressway and Federal roads

Logically, the design of all roads needs to be standardised for three reasons: (1) the roads have its performance requirements, (2) the roads have to provide safe, reliable and consistent road facilities for traffic movement, and (3) the roads have to serve as a guide for less subjective decision on road designs. The design standard can be classified into six groups which are: R6, R5, R4, R3, R2 and R1 for rural areas and six groups for urban areas which are: U6, U5, U4, U3, U2 and U1. Only two road standards are being discussed in this study - Standard R6 /U6 and Standard R5 /U5 because this study only focusses on Expressways and Federal roads.

Expressways made for urban and rural areas can be represented by this standard - Standard R6/ U6, which offers the best geometric design standards. This standard usually has relatively high speed (more than 90kph) and serves long trips. The design of this road standard is called the divided carriageways. Its aim is to ensure drivers' comfort and safety along the roads. Besides that, full access control is guaranteed as the expressway was built by private companies that was supervised and administered by the Malaysia Highway Authority (MHA) (The Road Engineering Association of Malaysia, 2002).

The second road standard is known as the Standard R5/ U5 which is represented by The Highway, Primary Road and Arterial. This standard provides a high geometric standard with long to average trip lengths. The travelling speed for this road standard is relatively lower than the R6/ U6 standard as it only allows 80kph. Unlike the Standard R6/ U6 which is under full control, the Standard R5/ U5 is under partial access control, and the roads are sometimes being designed with divided carriageways (The Road Engineering Association of Malaysia, 2002). The authority that is responsible for planning, building and maintaining all Federal roads gazetted under the Federal Road Act 1959 is the Ministry of Works (MOW) (Ministry of Works, 2016). Although the Federal roads are divided into four categories: The Main Federal Road, FELDA Federal Roads, Institutional Federal Roads and Industrial Federal Roads, the survey conducted for this research is located on the Expressways and Federal Roads.

3.2.6   Survey locations for Expressway and Federal roads

This study selected the North-South Expressways (NSE) as the location of survey for the Expressway. The North-South Expressway is the longest controlled-access expressway in Malaysia, stretching from Bukit Kayu Hitam in Kedah to Johor Bharu in southern Peninsular Malaysia. This expressway is also known as PLUS Expressway as

it was named after the highway concessionaires, *Projek Lebuhraya Utara Selatan Berhad* (PLUS). It was a build-operate-transfer (BOT) operator company which was under the subsidiary of PLUS Malaysia Berhad (PMB). This expressway is represented by three regions. The northern region is represented by Tapah in Perak, the central region is represented by Rawang in Selangor, and the southern region is represented by Ayer Keroh in Malacca and Pagoh in Johor Bharu. The description of each survey location along the NSE is presented in Table 3.2 below.

Table 3.2: Description of Survey Location along the North South Expressway

Survey location	Region	State	Speed limit (km/h)	Gazette No. /Year
Rawang	Central	Selangor	110	P.U.(A) 436/ 1992
Tapah	Northern	Perak	110	P.U.(A) 436/ 1992
Ayer Keroh	Southern	Malacca	110	P.U.(A) 289/ 1991
Pagoh	Southern	Johor Bharu	110	P.U.(A) 289/ 1991

These four locations were based on the recommendations of PLUS Malaysia Berhad (PMB) because these areas were accident hotspot locations in 2015, at the time this study was conducted. Survey administrators administered the survey at the Rest and Relax (R&R) stopovers of the four locations identified earlier.

Meanwhile, the survey location of the Federal roads were those located on the main Federal roads such as Jalan Tapah-Cameron Highland and Kuala Kangsar-Grik-Pengkalan Hulu which represented the northern region, Kota Tinggi-Rompin and Johor Bharu-Ayer Hitam which represented the southern region, and Grik-Jeli and Lipis-Merapoh-Gua Musang which represented the east coast region. These six locations were identified based on the accident statistics provided by the Royal Malaysian Police and MIROS, as they too were accident hotspots for the Federal roads in 2015 when the study

was conducted. Survey administrators administered the survey at the lay-bys of the mentioned locations as presented in Table 3.3 below.

Table 3.3: Description of Survey Locations at Main Federal roads

Route No.	Description of route	Length of road (km)	Gazette No. /Year	State	Speed limit (km/h)	Gazette No. /Year
59	Jalan Tapah-Cameron Highland	44.96	P.U.(A) 322/ 2003	Perak	90	P.U.(A) 18/ 1989
76	Jalan Kuala Kangsar-Grik-Pengkalan Hulu	139.25	P.U.(A) 432/ 2010	Perak	90	P.U.(A) 18/ 1989
3	Kota Tinggi-Rompin	198.0	-	Johor Bharu & Pahang	90	P.U.(A) 18/ 1989
1	Johor Bharu-Ayer Hitam	86.1	-	Johor Bharu	90	P.U.(A) 18/ 1989
4	Grik-Jeli	30.45	P.U.(A) 401/ 1989	Kelantan	90	P.U.(A) 18/ 1989
8	Lipis-Merapoh-Gua Musang	100.0	-	Pahang & Kelantan	90	P.U.(A) 18/ 1989

3.2.7   Questionnaire development for survey

To understand the real scenario of the drivers' speeding behaviour in Malaysia, this study examined the effects of the independent variables (IV) towards the dependent variable (DV). The independent variables engaged in this study include the socio-demographic information of the participants such as their gender, age, race, marital status, education, occupation and income. Meanwhile, the vehicle characteristics engaged in this study comprised vehicle types and vehicle use types. The trip characteristics encompassed travel time, travel distance and trip purpose and the drivers' characteristics included their driving experiences and previous motor vehicle accident involvements. The dependent variable (DV) engaged for this study is self-reported speed whereby participants reported their maximum driving speed while driving on the Expressways and Federal roads. This variable was later rearranged into two levels - within the speed limit and above the speed limit.

A set of questionnaires was distributed to the participants. The questionnaire comprised four sections: Section A, Section B, Section C and Section D. Section A comprised questions related to vehicle use characteristics and trip characteristics. Section B contained questions which focussed on driving experiences, past experiences and self-reported speed (maximum driving speed). Section C carried questions which were related to attitude and speeding behaviour. This was adapted from the literature (e.g., Hatfield & Job 2006; Schroeder, Kostyniuk & Mack, 2013; Stradling, 2005) that discussed drivers' attitude and behaviour towards speeding. Section D comprised questions that were related to socio-demographic information. Each statement in Section C was ranked on a 4-point, unipolar Likert scale ranging from (1) Strongly Disagree, (2) Disagree, (3) Agree and (4) Strongly Agree with Cronbach's alpha obtained in this research = 0.90. The 4-point Likert scale carried the optimum number of alternatives which is between four and seven as suggested by Lozano et al. (2008). Alternatives fewer than four can affect the reliability and validity of the results.

The attitude and speeding behaviour questions mainly examined the components of attitude which encompass affective, behavioural and cognitive. These components can be derived from the ABC Model of Attitude. In total, there were 10 questions about affective component, 15 questions about behavioural component and six questions about cognitive component. The remaining six questions were associated with possible countermeasures which can be undertaken as solutions for speeding behaviour. All the questions were expected to explore the drivers' attitude and speeding behaviour. Questions indicating details of the attitude and speeding behaviour are described in the following paragraph. Finally, section D comprised questions related to socio-demographic characteristics.

a) *Affective component of attitude*

The affective component was measured by 10 questions using the 4-point Likert Scale (1- strongly disagree to 4- strongly agree). The statements include: "Speeding when I am in angry mood", "Speeding when I am moody", "Speeding feeds my ego by giving me a sense of power and control", "I feel excitement and thrill while speeding", "I like the feeling of speeding", "I feel more relaxed when speeding", "I feel that I am skillful enough to avoid accidents while speeding", "I feel that speeding is a normal driving behaviour", "I feel that I would not be caught speeding by the authorities" and "I fear the police, thus, I rely on technology to inform me of the police's presence".

b) *Behavioural component of attitude*

The behavioural component was measured by 15 questions which also used the 4-point Likert Scale (1- strongly disagree to 4- strongly agree). The statements are as follows: "I tend to speed when other road users start speeding", "I tend to speed because my friend encourages me to speed", "I tend to speed when I need to meet a deadline", "I tend to speed as a sense of urgency", "I tend to speed when there is no enforcement around", "I tend to speed when driving alone", " I tend to speed when listening to certain types of music", "I tend to speed when the weather is clear", "I tend to speed during the day as compared to night", "I tend to speed when driving a bigger vehicle", "I tend to speed because I feel safe in the vehicle", "I tend to speed when the speed limit is low", "I tend to speed on wide lanes", "I tend to speed when there is no warning sign at the location" and "I tend to speed due to slow drivers".

c)   *Cognitive component of attitude*

The cognitive component was measured by six questions which also used the 4-point Likert Scale (1- strongly disagree to 4- strongly agree). The statements are as follow: "Speeding has a direct link to accident", "I believe in my ability to overtake other vehicles safely", "I follow the speed limit at all times", "I follow the speed limit to avoid summons", "I follow the speed limit when I see accident warning signs at the location", and "I follow the speed limit when I enter a curved road".

d)   *Corrective Measures to Improve Driver Speeding Behaviour*

Finally, six questions were used to examine the corrective measures for the drivers' speeding behaviour by using the 4-point Likert Scale (1- strongly disagree to 4- strongly agree). The statements are as follow: "Increasing penalties for repeat offenders will help to reduce speeding offences", "Introducing road safety education since childhood will help to reduce speeding offences", "Installing the speed enforcement camera at accident hotpots will help to reduce speeding offences", "Installing alerting systems known as Intelligent Speed Adaptation (ISA) in cars will help to reduce speeding offences", "Media involvement will help to reduce speeding offences", and "Implementing speed limit can ensure road safety".

3.2.8   Procedure for conducting the survey

Ethical clearance was obtained from the University of Malaya Research Ethics Clearance for Non-Medical disciplines (Ref. No: UM. TNC 2/UMREC–162) (see Appendix A). The questionnaire was first piloted among 30 participants (*N*=30) and this was then amendment based on the feedback provided. The initial survey was conducted from 10 March 2015 to 7 April 2015 for Expressways and Federal roads. Once the

respective locations were identified (see above for explanation), the researcher examined the criteria for participant selection so as to ensure sample validity and consistency.

Subsequently, with the help of the survey administrators, the participants were certified to have fulfilled the criteria before the survey was administered. The interview began with the interviewers introducing themselves to the participants followed by an explanation about the study and all the processes involved in the interview (e.g., anonymity, privacy and confidentiality issues). The interviewer then read the questions and informed the participants that if they have any doubts about the questions, they could clarify at any point of time, without having to wait for the interviewer to complete the questions. While doing so, the participants need to hold the Q card as a method of answering the questions as the interviewer or survey administrator held the answer sheet and recorded the answers given by the participants. The survey ends when the participants have answered all the questions, and when no further questions or matters arise from the survey. The procedure of conducting the face-to-face survey is outlined in Figure 3.3.

```
                    ┌─────────────────────────────────────┐
                    │   Determine variables for study design   │
                    └─────────────────────────────────────┘
                                     │
                                     ▼
                    ┌─────────────────────────────────────┐
                    │  Assign study locations based on PLUS Malaysia Berhad's  │
                    │  recommendation (Expressways) and Royal Malaysia Police  │
                    │      statistics and MIROS (Federal roads)      │
                    └─────────────────────────────────────┘
                                     │
                                     ▼
                    ┌─────────────────────────────────────┐
                    │  Examine the criteria for participant selection: Hold valid  │
                    │  driving licence, 18 years old and above, driving more than 10  │
                    │       hours per week and drive a private car       │
                    └─────────────────────────────────────┘
                                     │
                                     ▼
   ┌─────────┐              ◇─────────────◇
   │  Ended  │◀──── NO ────│   Certify    │
   └─────────┘              │ participant  │
                            ◇─────────────◇
                                     │  YES
                                     ▼
                    ┌─────────────────────────┐
                    │    Conducting survey    │
                    └─────────────────────────┘
                                     │
                                     ▼
          ┌────────▶ ┌─────────────────────────────┐
          │          │  Interviewer read the questions  │
          │          └─────────────────────────────┘
          │                        │
          │                        ▼
          │                ◇─────────────◇
          └─── YES ───────│   Clarify    │──── NO ───▶
                           │  questions   │
                           ◇─────────────◇
                                     │
                                     ▼
                    ┌─────────────────────────────┐
                    │ Respondent holds Q card to answer │
                    └─────────────────────────────┘
                                     │
                                     ▼
                    ┌─────────────────────┐
                    │    End of survey    │
                    └─────────────────────┘
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Figure 3.3: Quantitative Data Collection (Face-to-Face Survey) Procedure

3.3   Qualitative Method: Focus Group Discussion

3.3.1   Overview of focus group discussion

The subsequent method involved the focus group discussion which is crucial for exploring, comprehending and discussing the issue thoroughly and comprehensively. The focus group discussion provides an avenue for drivers to express their thoughts and opinions as it involves an open discussion session. This offers the researcher valuable insights into reading their non-verbal gestures and the implicit meanings derived from their responses.

The discussion begins when the moderator starts posing questions to the participants. Any participant in the group discussion can start answering the question as soon as the moderator had completed the question. As a participant answers, the other participants can also give their opinions or comments on the issue. In this regard, the discussion would be ongoing, and it would generate various kinds of opinions and insights. The discussion is expected to generate new ideas and insights.

Since the focus group discussion would consume lesser time, it would also incur lesser efforts in logistics, venue, time arrangement and smaller costs as compared to in-depth interviews. By this, a focus group discussion is referred to as "a technique involving the use of in-depth group interviews whereby participants are selected because they are purposive although not necessarily representative of a sampling of a specific population, since the group is given a specific topic (Thomas et al. 1995). The focus group discussion also refers to an open discussion that is stimulated by a skilled moderator where participants are guided into answering the specific questions related to the study. A focus group discussion is generally composed of six to ten participants with various demographic backgrounds that helped to create a lively and dynamic discussion. This is

because forming a homogeneous group, somehow, restricts another participant's opinion. Thus, only a little information can be obtained.

The discussion is expected to be conducted in a spontaneous format to generate a maximum number of diverse ideas. Several researchers (Charmaz, 2006; Guest et al., 2016; Green & Thorgood, 2009; Ritchie, 2003) have observed that the number of sample size for a focus group discussion varied, with 15 serving as the smallest acceptable sample for all qualitative research (Guest et al., 2006), 20 people for interviews (Green & Thorgood, 2009), 25 participants for smaller projects (Charmaz, 2006) and a maximum number of 50 participants for a qualitative sample (Ritchie, 2003). These participants also need to be selected based on set of criteria that consider gender, age, driving experience length, educational and occupational backgrounds. The focus group discussion is expected to disclose information related to the issue being explored until saturation point. Thus, the researcher can plan and generate the questions derived from the theory, model or any reference, as a guideline.

3.3.2   Focus group discussion questions

This section discusses the questions used in the focus group discussion. The questions were created based on the Theory of Planned Behaviour by Ichek Ajzen (1991) with some additional questions being included, such as habit, demographic background, past experiences, recommendations and typology of a driver, as presented in Table 3.4. The additional questions were necessary for this study because they helped the study to understand the role of habit, demographic background and past experiences in influencing drivers' speeding behaviour.

Table 3.4: Focus Group Questions Based on the Theory of Planned Behaviour

Variables	Questions
Attitude towards the behaviour	• What do you think would be the advantages/disadvantages of speeding? • Do you think speeding is beneficial or harmful to you? • Are there any other possible things or aspects that may influence your speed choice? • Do you think emotional can influence you to speed?
Subjective Norm	• Would the people important to you approve of your speeding behaviour? Who would approve or disapprove? • When you think about speeding, are there any other individuals or groups who come to mind who may influence your speed choice?
Perceived Behavioural Control	• What factors may encourage or discourage your speed? • What will stop you from speeding? • What other things are there that may not have been discussed as influencing factors that could make you speed?
Habit	• How many times do you speed on Expressways and Federal roads. Let say in a scale of 10, how many times for Expressways and Federal roads?
Gender role	• Do you think gender has an influence towards speeding? • In certain situation, it can be seen that male or female drivers has higher tendency to speed. Why do you think it can happen?
Past experiences	• Can you recall when is the last time you speed? • Have you been fined for speeding in the past 12 months?
Intention	• In the future, do you think that you will break the speed limit? • In the future, do you think that you will comply to the speed limit?
Recommendation	• What do you think govt. or enforcement agencies can do to improve the speeding behaviour? • What you can do as a driver to improve the behaviour?
Driver typology	• How would you classify yourself as a driver? (i) Risk-taker (ii) Pragmatic speeder (iii) Ambivalent (iv) Cautious

Adapted from: Suhaila Abdul Hanan (2014).

The additional elements included in the focus group questions were the role of habit, gender and past experiences. The rationale for including habit is because this study is exploring the role of habit in influencing drivers' speeding behaviour. Past research (Kareem, 2003) has identified that bad personal habit is one of the reasons causing road accidents in Malaysia. Thus, the question created would be relevant for examining the propensity of speeding habit among Malaysian drivers on Expressways and Federal roads.

Subsequently, this study also examined the role of gender in influencing speeding behaviour. The objective is to uncover which gender had a higher tendency to perform speeding behaviour, as previous studies (Furnham & Saipe, 1993; Norris et al., 2000; Parker et al., 1992; Shinar et al, 2001; Stradling, 2000;) have shown that male drivers were more inclined than female drivers, to speed. Nonetheless, this claim may no longer sustain today's environment as technology and attitude have changed. Identifying gender distinction is important as this could highlight the differences or similarities in speeding behaviour. Moreover, at a later stage, after identifying whether there were gender differences in spending behaviour, the specific mechanism of improving drivers' speeding behaviour can be offered to local authorities who can then draw up the appropriate measures.

This study also examines the drivers' past speeding experiences because this too can affect the drivers' speeding behaviour. Their past experiences would be detected by getting the participants to recall their last experience of speeding and their experience for receiving speeding penalty in the past 12 months from the date of focus group discussion was conducted. These questions are relevant for examination as they can also influence the drivers' speeding behaviour. The researcher wanted to identify the drivers' frequency of speeding behaviour, whether they have performed the behaviour just recently or have performed it a long time ago, and whether they were aware of their own speeding behaviour. The question on 'receiving the speeding penalty in the past 12 months will help this study to determine the frequency of the drivers' being apprehended by authorities. This will enable the researcher to recognise the drivers' typology.

Subsequently, a question-related to intention was also posed to the participants. This kind of question is needed to understand the participants' intention to break the speed limit as well as to adhere to the traffic rule i.e., the speed limit. The purpose is to identify

whether these participants intend to follow or hesitate to follow, traffic rule (speed limit). The participants were also needed so that this study can propose and make suitable recommendations which can be used to reduce speeding behaviour. The final question will help this study to classify the participants into several categories or typologies of drivers. There are five categories or typologies of drivers namely, law-abider, cautious, ambivalent, pragmatic and risk-taker, as illustrated in Table 3.5 below.

Table 3.5: Description of Driver Typologies

Category	Description
Cautious	a) Least likely to indicate they personally speed. If they do, speed at lower average speed b) Unfavourable views of speeding c) Least likely to agree that driving over the speed limit is not dangerous for skilled drivers
Risk-taker	a) Most likely to speed b) Believe speed limit in highway is low c) Speeding is not dangerous for skilled driver d) Speeding for emotional reasons
Pragmatic	a) Frequently speeding but speeding not driven by emotional reasons b) Less support toward ideas reducing speed
Law-abider	a) Less likely to indicate they personally speed b) Strongly agreement with law enforcement c) Least likely to support the removal of speed limit on highways

Source: EKOS Research Associate Inc., (2005)

3.3.3 Designing and conducting the focus group discussion

The procedure of conducting focus group discussions is different from other qualitative research methods. It is distinct in various ways as in the number of participants, the procedure of conducting the interview and the preparation stage of the interview script. However, this does not mean that this method is difficult to conduct as many social sciences researchers (Suhaila, 2014; EKOS Research Associate Inc., 2005; Fleiter, Lennon & Watson, 2010) have employed this method to discover attitude and behaviour. There are three essential elements involved in the focus group discussion. The first element is the participants. The researcher needs to recruit participants carefully. Usually, between five to ten or between six to eight people are placed in a group. Second,

the environment of the focus group discussion needs to be comfortable, featured by a circular seating arrangement and an audio recorder. Third is that the moderator must be skilful in conducting the group discussion and must know how to probe and get the responses from the participants (Krueger, 2002).

The moderator needs to follow a set of guidelines like welcoming the respondents, briefing them about the topic, explaining the guidelines like Do's and Don'ts during the discussion and asking the participants open-ended questions. Besides that, the moderator must take note throughout the discussion so that the researcher does not overlook any necessary information that occurred during the discussion. It is essential to record the discussion either using video recording or audio recording. Video recording can be beneficial to record verbal and non-verbal responses like voice and facial expressions. However, it may make people feel uncomfortable as their identity can be recognised. Therefore, the use of audio recording is much more convenient and confidential compared to the video recording. However, the moderator must also take note of the non-verbal responses such as the participants' body languages, to interpret good results. The procedure of conducting focus group discussion is described in Figure 3.4 below.

Prior to the FGD

- Plan the focus group study
- Logistic arrangement
- Pilot study
- Respondent selection process
- Diverse context: urban areas such as community-based organization, local institution
- Determine the number of participants
- Ensure all the equipment are ready (audio tape, transcript)

During the FGD

- Fill up informed consent form and demographic information
- Brief the objectives of the research
- Conduct the discussion once the participants are ready
- Take note throughout the discussion
- Encourage active participation and probe for answers

After the FGD

- Make back up copy of audio tape
- Take note the themes, interpretation and ideas from the discussion
- Take note of the mistakes or what need to be improved for the next FGD

Figure 3.4: : Procedure of conducting focus group discussion

In this study, five groups comprising 30 participants (N=30) were formed. These participants were recruited through two methods. The first recruitment was through the advertisement where the recruitment of participants was circulated through various education institutional emails several times. The email indicated the participants' criteria, the purpose of the study, the time and venue of the session. Any participant interested in participating in the study can contact the researcher through the institution's email or personal mobile number. This method created Focus Group Numbers 1 and 3. Meanwhile, participants for Focus Group Numbers 2 and 5 were recruited through an advertisement posted on social media (Facebook). A post indicating the need to recruit participants also stated what the participant criteria would be, and other important matters related to the

study. Interested participants were expected to send a personal message to the researcher through Facebook Messenger. Finally, the researcher would conduct a filtration process to include only eligible participants per focus group.

The recruitment for Focus Group Number 4 was conducted through an electronic mailing sent to the affiliation administrator. At first, the researcher searched for various affiliations and then listed possible affiliations to be contacted and considered. The researcher contacted each of the affiliation to gather more information about the suitability and availability of its members to become participants. Following this, the researcher shortlisted one of the affiliations, based on its locality, availability and other criteria (e.g., age and race). Subsequently, the researcher sent an electronic mail to the affiliation's administrator and the affiliation was then informed about the details of the study. The affiliation administrator took around five days in finding the suitable participants. On the sixth day, the affiliation administrator contacted the researcher for the confirmation of time and venue. The focus group discussion was conducted the following weekend based on the participants' availability and convenience. Figure 3.5 illustrates one of the five sessions of focus group discussion.

Figure 3.5: Session of Focus Group Discussion

This study utilised different methods of recruitment so as to achieve a wide-range of participants with different backgrounds. This is because the recruitment through an institution mail could only gather participants comprising students and staff of the faculty, who are young and middle aged. The recruitment made through the social media platform (Facebook) could gather participants from generation Y or the Millennials (those born in early 1980s to early 1990s) and generation Z (those born in the mid-1990s to mid-2000) who are young as well as middle aged. This is also why the researcher contacted the affiliation administrator of the old folk's home to include the older participants' viewpoints and to gather their opinions and views pertaining to the study.

Table 3.6: Schedule for Conducting the Focus Group Discussion

Session	Date, Time	Composition of participants (Age and gender)
1	31st March 2017, 10.45 a.m.	N= 6 ($\geq$ 20's = 4, $\geq$ 40's = 2) (5 males, 1 female)
2	26th July 2017, 2.00 p.m.	N=5 ($\geq$20's = 4, $\geq$ 30's = 1) (2 males, 3 females)
3	9th September 2017, 11.30 a.m.	N=3 ($\geq$20's = 2, $\geq$70 =1) (2 males, 1 female)
4	18th October 2017, 10.00 a.m.	N=11 ($\geq$70) (4 males, 7 females)
5	24th February 2018, 11.00 a.m.	N= 5 ($\geq$ 20's) (3 males, 2 females)
Total		*N*= 30

Table 3.6 above provides the information of participants' composition which comprised of age and gender. The first session was held on 31 March 2017 at 10.45 a.m at the University of Malaya's meeting room. The first group was composed of six participants, with four participants being in their mid-20's and two participants being in

their mid-40's. This group also consisted of five males and one female. The second session was held on 26 July 2017 at 2.00 p.m at the library discussion room of International Islamic University Malaysia. Five participants attended the second session with majority of them being in their early 20's, two males and three females. The third session was held on 9 September 2017 at 11. 30a.m at discussion room of Faculty of Engineering, University of Malaya. The third group comprised three participants with two being males and females in their 20's and one being a male of 70 years old.

The fourth session was conducted on 18 October 2017 at 10.00 a.m at National Council of Senior Citizen Association (NASCOM) discussion room, located in Damansara Jaya, Selangor. There were 11 participants who participated in this group with all of them being senior citizens aged between 70 to 80 years old, with four being males and seven being females. The final session was conducted on 24 February 2018 at 11.00 a.m at the library discussion room of Library Complex, Pantai Dalam, Kuala Lumpur. There were five participants involved in this group with all of them being in their mid-20's with three being males and two being females. Therefore, altogether 30 participants participated in the five-sessions of focus group discussion.

3.4   Data Analysis

3.4.1   Quantitative Study: Survey

This section discusses how data were analysed. The completed questionnaires were analysed using the Software Package for Social Science (SPSS) version 25. All data were screened for quality, accuracy, and proper entry into the database by the researcher and other associate members, who are colleagues from the Engineering Faculty, University of Malaya. Quantitative data were analysed in the form of descriptive and inferential statistics because they helped to interpret or explain the surveys' results. The normality test was conducted prior to conducting other tests so as to identify the normality

of data. The skewness and kurtosis results obtained were between the value of -1.96 to +1.96. Hence, the data were deemed to be normally distributed. The rest of the analysis was done using the Parametric test.

The reliability and factor analysis were performed so as to determine the reliability of the instrument which will be analysed by using Cronbach alpha's reliability test. Previous literature stated that the standard acceptable value for this test is a value of above 0.70 (DeVon et al., 2007). The descriptive statistics for the attitude survey were presented in frequency value. This aims to illustrate the socio-demographic characteristics, trip characteristics and driver characteristics of the participants in the form of bar charts. Inferential statistics was employed to process the analysis of the variance (ANOVA), correlation test, binary logistic regression, factor analysis and cluster analysis. The ANOVA test was employed for more than two levels of independent variable with a dependent variable. The ANOVA test also applied the significant value of $p < 0.05$. Additionally, binary logistic regression tests were utilised to explore which independent variables would be significant with the dependent variable and also to predict the value of the dependent variable, based on independent variables. This test was employed for two levels of dependent variable that is ordinal category.

Additionally, factor analysis was employed to simplify the interrelated measures so as to uncover the patterns noted in a set of variables (Child, 2006). Similarly, factor analysis was referred to as the reducing dimensionality. This is based on the reduction of the measurable and observable variables to fewer latent variables which shared a common variance and were unobservable (Bartholomew, Knott, & Moustaki, 2011). The two main components in this analysis were Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA). The function of the EFA was to explore the dataset and to test the prediction of the complex patterns (Child, 2006). The EFA would also explore the number

of factors influencing the variables thereby indicating which variables can be grouped together (DeCoster, 1998). In contrast, the CFA would be useful for confirming the hypothesis which was presented through a path analysis diagram. This represents the variables and factors (Child, 2006). Both the EFA and CFA were applied in the current study. Cluster analysis was also employed in this study to identify the homogeneous groups based on the participants' set of answers. By placing the individuals into clusters, an insight demonstrating the individuals' shared and differing characteristics can be gained. This can also provide very meaningful advantages for the study (EKOS Research Associate, 2005).

3.4.2   Qualitative Study: Focus Group Discussion

3.4.2.1 Qualitative Data Analysis using Microsoft Word Processing Function

The qualitative data analysis using Microsoft Word Processing Function is illustrated through Figure 3.6.
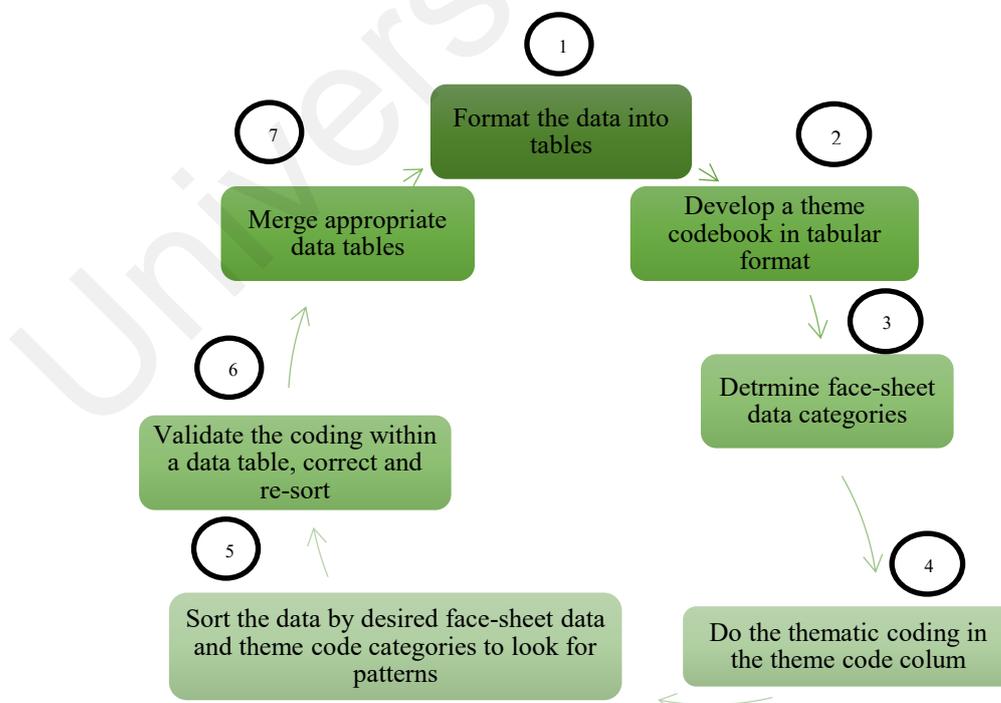
Figure 3.6: Phases in Qualitative Data Analysis (La Pelle, 2004)

As shown above, data can also be analysed using general purpose software tools like word-processing functions besides the usage of qualitative softwares which is NVivo. Various kinds of data gathered from key informant interviews, focus groups, documents and literature reviews as well as open-ended survey questions can be analysed using this tool (La Pelle, 2004). Here, the analysis is much simpler and reliable as compared to other software which possess functions of Table, Table Sort, Insert File, Find/Replace and Insert Comment. The Table structure is actually a powerful tool for data analysis as it can perform various functions. It can format informants; it can document or survey data in a table structure for analysis; it can be modified for coding purposes; it can be merged with the tables of data; it can search for keywords using the Find function; it can sort in various ways and it can edit using standard editing functions (Miles & Huberman, 1994). Hence, seven steps are involved in the coding and retrieving of qualitative data as demonstrated in Figure 3.5. These are also applied in the current study. They involve: (1) Format the data into tables, (2) Develop a theme codebook in tabular format to define linkages between numeric codes and theme categories, (3) Determine face-sheet data categories on which retrieval will be done, (4) Do the thematic coding, (5) Sort the data by desired face-sheet data and theme code categories to look for pattern, (6) Validate the coding within a data table and (7) Merge appropriate data tables and validate coding across data tables.

Table 3.7: The first step of formatting interview data

Participant Name	Theme Code	Moderator Question/ Participant Response	Sequence
Moderator	1.00	I believe all of you have an experience with speeding…May I know your understanding on speeding?	1
Shirley	1.05	Speeding means you drive the speed more than what is indicated on the road	2
Cheong	1.10	Always overtake…	3
Tania	1.15	Speeding…exceed the speed limit	4
Goh	1.20	Okey, can I say something? Speeding has good and bad points. The bad points first, speeding can cause fatal, lost and injuries, things like that. These are the bad effects. The good effects of speeding sometimes, occasionally can save time. Can save a lot of time.	5

The first step involves formatting the interview data into tables as shown in Table 3.7. Here, the researcher has to use the insert function so as to introduce a four-column table comprising ID, indexing, actual utterances and a chronological sequence number for each speaker. However, if the interview data were already written in unformatted Word document, the data can easily be converted using the Convert Text to Table option on the Table menu.

Table 3.8: Developing a theme codebook

Level			
1	2	3	**Theme**
1			**Understanding about concept of speeding**
	1.05		Speeding means that u drive the speed more than what is indicated on the road (F1, G4)
	1.1		Always overtake (M3, G4)
	1.15		Speeding…exceed the speed limit (F5, G4)
2			**The consequences of speeding**
	2.05		Speeding has good and bad points. The bad point first, speeding can fatal, can cause lost and injuries, things like that. These are the bad effects M4, G4)
	2.1		Definitely is harmful (F2, G4)
	2.15		Dangerous (F11, G4)
3			**Tendency to speed (time)**
	3.05		Someone sick in the car, passenger. (F11, G4)
	3.1		On the 1st day on New Year or Raya or what, normal la… sure to go 90 and like that…(M4, G4)
4			**Emotional influence**
	4.05		When they are angry, they tend to speed. I think mostly because they want to show their anger (F2, G4)
		4.051	Release their anger (M9, G4)
		4.052	When somebody overtake you…
5			**Motivation to speed**
	5.05		What makes you speed? Ok, rushing for time (F1, G4)
	5.1		Someone sick in the car, passenger (F11, G4)

The second step is displayed in Table 3.8. It involves developing a theme codebook. The researcher has to take note of the themes that appear or that have significance to the study. The codebook could contain major themes and subthemes within the major theme. A separate table can be created for the codebook by assigning numeric codes to the various categories noted in the themes. These will be used for subsequent sorting of text data according to theme code.

Table 3.9: Face sheet data

Org ID	Role ID	Theme Code	Interview Question/ Key Informant Responses	Sequence
A	1	1.05	Interviewer: How do you perceive enforcement in Malaysia?	1
A	1	1.05	Ha? You didn't pay also? Then it comes again enforcement. Some people got 10, 28 summonses.	183

Org ID	Role ID	Theme Code	Interview Question/ Key Informant Responses	Sequence
A	2	1.05	Interviewer: How do you think the enforcement in Malaysia, is it sound enough?	1
A	2	1.05	Our problem is enforcement la…enforcement is very poor. Like Singapore, my friend got speeding, 1^{st} time they don't fine you. They will send you warning letter. But 2^{nd} time you have to pay. Careful when you got 2^{nd} times. They are very defined.	187

The third step involves adding column and codes to capture the face-sheet data as referred to Table 3.9. The researcher has to identify whether there is any other information such as gender, affiliation, role within groups of interest that may be of particular interest to the study. For example, in the table 3.9 above, there is only one organisation ID, that is senior citizen association. However, two role IDs are assigned refer to Role ID one and two. The role ID one indicates a person who has been fined but refuses to pay the fine, while the role ID two indicates a person who shares experience of others who has been fined.

Table 3.10: Coding with multiple theme codes

Participant ID	Theme Code	Question/ Response	Sequence
Moderator	8.000	May I get your opinion, what about speed limit on highway. Is it suitable to put and design speed limit 110km/h for highway and 90km/h for federal road? Is it suitable that design speed limit?	100
Ivy	8.010	For normal car, normal driving 110 is ok. I do realize those people who drive powerful car, 110 is nothing.	101
	8.011	…… but those people who drive bigger car and younger age, maybe it's a bit slow.	
	8.012	...Let say I drive; I do comply to the limit specified in the limit there. But of course, they are so many cars overtaking me.	
Wee	8.010	I think better put this way. Speed limit must be implemented, the professional should study the condition of the road, whether it is suitable 220 or just 110. Whether the car, old car or new car, old man or new man, young man, I think the speed limit must be implemented, must be enforced based on the professional study the road suitable for whatever speed. I think I know they are talking about increasing the speed limit from 110 to 120 all this. I think not just at what type of car they drive, but it should be looked at the condition of the road whether can accept that kind of speed, whatever car it is. When they implement it then enforce, cannot say I drive Ferrari, 110 is not suitable.	102

The fourth step is presented in Table 3.10. It involves categorising the coding process into one theme or multiple themes. For example, if one part of the utterance relates to one theme and other parts relate to other themes, the researcher can segregate the response into multiple rows by creating new rows in the table. Then the parts can be copied from the original row into the new row by cutting and pasting the text that relates to each theme into the new rows. Referring to the Table 3.10, there are multiple theme codes can be assigned from the responses. For example, refers to participant name of Ivy, three theme codes can be identified. In the theme code of 8.010, indicates the suitability of the speed limit of 110km/h, while in theme code of 8.011, indicates the incompatibility of the speed limit due to age and vehicle factors. Meanwhile in the theme code of 8.012 indicates the participant's stand of adhering the speed limit.

Table 3.11: Coded focus group table excerpt

Participant ID	Theme Code	Question/ Response	Sequence
Moderator	7.00	Do you think people around you influence you to speed like when you bring your family members/ spouse	188
Ivy	7.10	No, it's not influences on speeding, but is good company on the driver. So, it's should not have any influence on drivers to speed. Like young people, they got so many friends can chit chatting, whereas for senior, let say my spouse is driving, I advise him not to speed. So that's the advantage.	189
	7.20	Like if you sleepy, you can chat with him and just keep him alert.	189.01
	7.20	Those younger age group tend to feel like playful, they tend to be more harmful to the drivers	189.02
	7.20	One of my children said, "why so slow"? They want you to go faster.	189.03

The fifth step is illustrated in Table 3.11 which involves sorting the data table and finding patterns. The researcher can use the Sort function to sort the data according to thematic code, participant characteristics or sequence number. The primary key for sorting is done using the numeric theme code followed by the face-sheet data column and numeric sequence number. If the researcher wants to look for a specific theme from four informants across an organisation, data tables for roles 1 and 2 from the three organisations can be merged. The merged file can be sorted using the text theme code as the primary key while the organisational code is the secondary key, the role code acts as the tertiary key and the sequence number serves as the fourth sort key.

The sixth step involves reading all the text segments for each code after the data table have been sorted by theme code and sequence number. Corrections can be made subsequently if the text segments do not belong to a category. Finally, the seventh step

involves merging the data tables from all the interviews into one table. Code validation across transcripts can be done when merging is completed. Once the data table have been merged and sorted, the researcher can read again all the text segments and decide whether it needs further correction.

3.4.2.2 Qualitative Data Analysis using Nvivo Software

On the other hand, the qualitative data has also been analysed using the Nvivo 12 Pro software. This software is produced by QSR International for qualitative researchers to analyse the non-numerical data. Various functions are available for researchers to classify, sort and arrange information, examine relationships and combine analysis with modeling. The researchers can also identify trends using the function of search engine and query functions. A wide range of research methods such as discourse analysis, grounded theory, ethnography, literature reviews and mixed methods apply this software.

For this research, the researcher has applied the Nvivo 12 Pro software to analyse and produce the word cloud, mind map and word frequency. The results of the qualitative data analysis are presented in Chapter 5 subsequently.

3.5 Summary

This chapter has justified why the current study uses a combination of the quantitative and qualitative research design. It has also outlined the process employed to determine the instrument, the sampling or respondents/participants as well as the steps involved for the data analysis for both types of research designs.

CHAPTER 4: QUANTITATIVE RESULTS

4.1   Introduction

This chapter presents the results generated from the data that were collected from the attitude survey. The first section of the results contains the quantitative aspect derived from the attitude survey which was simultaneously divided into several sub-sections and relate to section 4.2 until section 4.6. The first section, section 4.2 comprises the general analysis of the socio-demographic characteristics, trip characteristics and driver factor. The second section, section 4.3 involves detailing the key factors that affected drivers' speeding behaviour. These key factors were derived from the socio-demographic characteristics, trip characteristics and driver factor which were investigated through the Binary Logistic Regression. The results were presented into two tables to cover the Expressways and Federal roads. This will focus to the first research objective which aims "to investigate the key factors that affect drivers' speeding behaviour.

The third section, section 4.4 contains the data reduction gathered through Factor Analysis so as to identify the attitude components that had emerged from the attitude variables. Subsequently, the Kendal's Tau B Correlation Coefficient was performed to measure the direction of the association that exists between two variables: attitude and speeding behaviour. Apart from this, the Binary Logistic Regression was also conducted to identify which attitude component was more prevalent in affecting drivers' speeding behaviour. Furthermore, section 4.5 covers the *t*-test and the analysis of variance (one-way ANOVA) between the independent variables (socio-demographic and driver factor) and the dependent variables (reported speed or Max speed from the attitude survey) when on different road types - Expressways and Federal roads were performed to confirm the research hypotheses. These results will focus to the second objective which aims "to explore attitude, components of attitude and their relationship with speeding behaviour".

Additionally, section 4.6 covers the driver typologies that can be summarised from the quantitative results.

4.2 Quantitative Results: Socio-Demographic Characteristics, Trip Characteristics and Driver Factor derived from the Attitude Survey

The participants' information regarding their socio-demographic characteristics, trip characteristics and driver characteristics were gathered from the attitude survey questionnaire. The participants' socio-demographic characteristics include their gender, age, marital status, education level, employment and income level. The participants' trip characteristics contain their trip purpose, travel distance and travel time. The drivers' characteristics examine the length of their driving experience, speed violation record and crash experience for the past 12 months.

4.2.1 Frequency of Socio-demographic characteristics for Expressways and Federal roads participants

The socio-demographic characteristics of the participants using the Expressways and Federal roads are presented in Table 4.1.

Table 4.1: Socio-demographic characteristics of participants on Expressways and Federal roads

Socio-Demographic	Expressways N=203 (%)	Federal road N=300 (%)
Gender		
Male	157 (77.3)	237 (79.3)
Female	46 (22.7)	63 (20.7)
Age		
Young (18-24 years old)	44 (22.0)	60 (20.0)
Middle (25-31 years old)	54 (27.0)	63 (21.0)
Middle (32-38 years old)	25 (12.0)	50 (17.0)
Middle (39-45 years old)	25 (12.0)	40 (13.0)
Middle (46-52 years old)	25 (12.0)	40 (13.0)
Middle (53-59 years old)	25 (12.0)	40 (13.0)
Old (60 years and above)	5 (2.0)	7 (2.0)
Marital status		
Single	68 (33.5)	84 (28.0)
Married	135 (66.5)	215 (71.7)
Separated	0	1 (0.3)
Education level		
Primary	0	15 (5.0)

'Table 4.1, continued'.		
Secondary	5 (2.5)	184 (61.3)
Pre-university/ Diploma	88 (43.3)	56 (18.7)
Undergraduate	63 (31.0)	43 (14.3)
Postgraduate	47 (23.2)	2 (0.7)
Employment		
Employed	176 (86.7)	280 (93.3)
Unemployed	27 (13.3)	20 (6.7)
Income level		
Low (Below than RM 3,000)	80 (39.4)	153 (51.0)
Middle (RM3,001-RM7,000)	76 (37.4)	105 (35.0)
High (RM 7,001 and above)	47 (23.2)	42 (14.0)

As can be seen, there are six variables in the socio-demographic characteristics encompassing: gender, age, marital status, education level, employment and income level. In total, 203 participants of the Expressways took part in the attitude survey. Majority of the Expressways participants were males *N*= 157 (77.3%), middle-aged drivers of between 25 to 59 years old *N*=154 (76.0%) and mostly married *N*=135 (66.5%) as compared to the single status *N*=68 (33.5%). Those with pre-university/ diploma education dominated the overall education level *N*=88 (43.3%), followed by undergraduate *N*=63 (31%), postgraduate *N*=47 (23.2%) and secondary education level *N*=5 (2.5%). Majority of the participants were employed *N*=176 (86.7%) while the unemployed accounted a small percentage *N*=27 (13.3%). In addition, a higher proportion of the Expressways participants *N*=80 (39.4%) were low income earners with household income of below RM3,000 while the middle-income earners accounted for about a third of the percentage, *N*=76 (37.4%) and the high-income earners accounted for about a quarter *N*=47 (23.2%).

In contrast, there were 300 Federal roads participants involved in the attitude survey. Majority of the participants were males (237 - 79.3%), followed by females *N*=63 (20.7%). About three quarters of the participants *N*=215 (71.7%) were married, followed by the single status (84 - 28.0%) and separated status *N*=1 (0.3%). The age range of the participants was between 18 to 62 years old with more being in the middle-aged range of

25-59 years old *N*=233 (78.0%) and a smaller number of the younger group in the age range of 18 - 24 years old *N*=60 (20.0%) followed by those above 60 years old *N*=7 (2.0%). Most of these participants held secondary level education *N*=184 (61.3%), with the smallest percentage being those with postgraduate level education *N*=2 (0.7%). Almost all of these participants were employed *N*=280 (93.3%) with half of them being dominated by the low-income earners *N*=153 (51.0%), followed by the middle-income earners (105 - 35.0%) and high-income earners *N*=42 (14.0%). The low-income earners were those earning below RM 3,000 while the middle-income earners were those earning between RM 3,001 and RM 7,000, as defined by Malaysian household statistics (Department of Statistics Malaysia, 2017). From these results, it can be summarised that majority of the participants on both roadways were males, in the middle-aged range, mostly married, employed and earning below RM3,000 per month.

4.2.2   Frequency of Trip Characteristics for Expressways and Federal roads participants

Table 4.2 illustrates the trip characteristics frequency of the participants using Expressways and Federal roads.

Table 4.2: Frequency of trip characteristics for Expressways and Federal road participants

Trip characteristics	Expressways *N*=203 (%)	Federal road *N*=300 (%)
Trip purpose		
Education & work	43.0	49.4
Leisure/vacation	32.8	34.7
Shopping	1.6	4.3
Home trip	22.6	11.7
Travel distance		
Less than 30 km	0.5	16.7
30-49km	3.0	12.0
50-90km	8.9	4.3
More than 91km	87.7	67.0
Travel time		
Less than 1 hour	3.0	27.6
1 hour- 2 hours	11.3	10.7
2-4 hours	38.9	19.7
More than 4 hours	46.8	42.0

From the results provided, it can be said that majority of the participants for the Expressways and Federal roads mainly travelled for education and work (43.0% for Expressways and 49.4% for Federal roads). A large number of the participants also travelled for leisure/vacation (2.8% for Expressways and 34.7% for Federal roads). Home trips also contributed to the trip characteristics (22.6% for Expressways and 11.7% for Federal roads). Shopping was the lowest among the trip characteristics (1.6% for Expressways and 4.3% for Federal roads). Based on the results, it can be deduced that majority of the participants used these roads for long distance trips (87.7% for Expressways and 67.0% for Federal roads) with many travelling for more than 91 km for their respective trips. Meanwhile, those who used the roads for short trips of less than 30km accounted for a small percentage (0.5% for Expressways and 16.7% for Federal roads). Moreover, most of the participants also spent long hour trips (more than four hours) for both the Expressways and Federal roads. They accounted for 46.8% and 42.0% respectively. Those who spent between two to four hours also contributed a considerable percentage (38.9% for Expressways and 19.7% for Federal roads). Based on these results, it can be understood that majority of the Expressways participants used these roads for long distances trips and they tend to spend longer hours of travelling time on the Expressways than when compared to the Federal roads participants.

Thus, it can be summarised that majority of the participants were travelling on Expressways and Federal roads for education and work trip purposes as well as for long distance journeys involving extensive hours of travelling.

4.2.3   Frequency of Driver Factor for Expressways and Federal roads participants

Table 4.3 illustrates the driver factors which comprise length of experience, record of speed violation and crash experience in the past 12 months.

Table 4.3: Frequency of driver factor for Expressways and Federal roads

Driver factor	Expressways N=203 (%)	Federal road N=300 (%)
Length of experience		
Less than 1 year	1.2	2.0
1-3 years	15.3	15.7
4-10 years	30.6	31.3
More than 10 years	52.9	51.0
Speed violation record in the past 12 months		
Never	52.2	46.0
1-4 times	35.5	42.0
5-10 times	7.9	10.0
More than 10 times	4.4	2.0
Crash experience in the past 12 months		
Never	36.3	55.7
1-4 times	30.7	43.0
5-10 times	29.7	1.0
More than 10 times	3.3	0.3

As is shown in the table, majority of the participants using Expressways and Federal roads have extensive driving experience of more than 10 years (52.9% for Expressways and 51.0% for Federal roads). Those with four to ten years of accumulated experience accounted for 30.6% for Expressways and 31.3% for Federal roads. Participants with one to three years of experience contributed to 15.3% for Expressways and 15.7% for Federal roads while those who had less than a year of experience made up 1.2% for Expressways and 2.0% for Federal roads.

The table above illustrates the speed violation and crash experience of drivers in the past 12 months. Many of the Expressways and Federal roads participants had no record of speed violation (52.2% for Expressways and 46.0% for Federal roads). However, those who had one to four records of speed violation accounted for 35.5% for Expressways and 42.0% for Federal roads, respectively. Those with more than ten cases of speed violation records totalled 4.4% for Expressways and 2.0% for Federal roads.

From their crash experiences, a substantial percentage (30.7% for Expressways and 43.0% for Federal roads) had between one to four crash experiences while those with no crash experiences comprised 36.3% for Expressways and 55.7% for Federal roads.

This implies that participants on both roadways have extensive driving experience with those having the highest level of speed violation record being the Federal roads participants while those with the highest crash experiences were noted among the Expressways participants.

4.3 Key Factors for Speeding Behaviour

This section discusses the application of the Binary Logistic Regression in investigating the key factors for speeding behaviour. The Binary Logistic Regression was conducted when the dependent variable was dichotomous since the reported speed generated from the survey was ranked based on two levels: below or within the speed limit and above the speed limit. The factors investigated include the socio-demographic characteristics, trip characteristics and driver factor.

4.3.1 Key factors for Speeding Behaviour using Binary Logistic Regression - Expressways drivers

The results generating the key factors which affect drivers' speeding behaviour are presented through the Binary Logistic Regression in Table 4.4. The application of Enter Method yielded two variables for estimating the drivers' speeding behaviour.

Table 4.4: Key factors affecting drivers' speeding behaviour for Expressways

	B	S.E.	Wald	df	Sig.	Exp(B)
Marital Status (Male) (reference)	1.031	.462	4.966	1	.026	2.803
Young Age (reference)	-.011	.016	.470	1	.493	.989
Driving Experience (Low) (reference)	-.870	.725	1.440	1	.230	.419
Employment (Employed) (reference)	-.451	.589	.586	1	.444	.637
Trip Purpose (Education & Work) (reference)	-.552	.427	1.674	1	.196	.576
Speed Violation Record (No) (reference)	-1.144	.462	6.146	1	.013	.318
Crash Experience (No) (reference)	-.863	.426	4.114	1	.043	.422
Travel Distance (Short) (reference)	1.560	.902	2.993	1	.084	4.758
Travel Time (Short) (reference)	.701	.989	.502	1	.479	2.015
Constant	.037	.982	.001	1	.970	1.037

The results showed that the marital status, male was significant in affecting drivers speeding behaviour, $p < 0.05$ and the odds ratio of 2.80. Similarly, drivers with speed violation records and crash experiences, were also significant as the key factors for drivers speeding behaviour, $p < 0.05$. These three factors appeared to be good predictors for predicting drivers' speeding behaviour among the Expressways drivers. On the other hand, the other factors such as age, driving experience, employment, trip purpose, travel distance and travel time were not significant as predictors for drivers speeding behaviour as $p > 0.05$. The same analysis was also conducted for the Federal roads data to identify which factor was significant and would be a good predictor for predicting speeding behaviour among Federal road drivers.

4.3.2 Key Factors for Speeding Behaviour derived from the Binary Logistic Regression for Federal roads participants

The outcome of the socio-demographic characteristics influencing drivers' speeding behaviour on Federal Roads are presented in the Binary Logistic Regression as shown in Table 4.5.

Table 4.5: Key factors affecting drivers' speeding behaviour on Federal roads

	B	S.E.	Wald	df	Sig.	Exp (B)
Marital Status (Single & Separated) (reference)	1.026	.396	6.699	1	.010	2.789
Driving Experience (Low) (reference)	-1.602	.497	10.392	1	.001	.202
Employment (Employed) (reference)	-1.005	.646	2.419	1	.120	.366
Purpose of Trip (Education & Work) (reference)	-1.411	.307	21.069	1	.000	.244
Age (Young) (reference)	.696	.521	1.782	1	.182	2.005
Speed violation past 12 months (No record) (reference)	-.262	.308	.724	1	.395	.770
Crash Experience past 12 months (No crash) (reference)	-1.065	.298	12.772	1	.000	.345
Gender (Male) (reference)	1.080	.370	8.521	1	.004	2.945
Travel Distance (Short) (reference)	.068	.491	.019	1	.889	1.071
Travel Time (Short) (reference)	-.063	.456	.019	1	.890	.939
Constant	1.927	.696	7.654	1	.006	6.867

The application of the Enter Method for the results yielded five variables which can be used to estimate speeding behaviour. Table 4.5 shows that both the status of being single and separated was more significant than the status of being married, with the odds ratio of 2.79 and $p < 0.05$. Similarly, males seemed to be a significant contributor towards speeding behaviour as the odds ratio for males was 2.95 and $p < 0.05$. In contrast, low driving experience was not a contributing factor to speeding behaviour as the odds ratio value showed 0.20 and $p < 1.00$. This shows that the variable of vast driving experiences

was more likely to be a predictor for predicting drivers' speeding behaviour when compared to other variables.

Further to that, trip purposes which were meant for education and work purposes were not significant predictors for speeding behaviour. The odds ratio for education and work trip purposes was only 0.24. Nonetheless, leisure and vacation trips could predict speeding behaviour. On the same note, participants with no crash experience for the past 12 months appeared to be an insignificant predictor for predicting speeding behaviour as the odds ratio showed 0.35. The variable which embraced drivers with crash experiences for the past 12 months suggests that these drivers have the tendency to engage in speeding behaviour. On the contrary, other variables such as employment type, age, speed violation records in the past 12 months, distance of driving, and duration of driving emerged as insignificant predictors for predicting speeding behaviour on Federal roads since the $p > 0.05$. Based on this, it can be summed up that the five significant variables which served as good predictors for predicting speeding behaviour on Federal roads are: marital status, gender, driving experience, trip purpose and crash experience in the past 12 months.

From both the results extracted from participants using Expressways and Federal roads, it can be deduced that the key factors affecting drivers' speeding behaviour came mainly from driver factors comprising drivers' crash experience and speed violation records in the past. These two variables also reflected the drivers' attitude in driving as past researches have highlighted that crash experience and speed violation records are one of the bases in attitude (Fazio, 1989).

4.4   Exploring Attitude and Attitude Components

There are 31 attitude variables in the attitude survey questionnaire. In order to explore the attitude and the underlying components that emerged from the attitude construct, data reduction was performed. This is to classify the total number of variables

that share similar characteristics into a few interpretable underlying factors. This is termed as factor analysis.

4.4.1 Factor Analysis for Exploring Attitude and the Underlying Components

The Principal Component Analysis (PCA) was performed in the factor analysis to understand the structure of the large set of variables (31 variables). This helps to reduce the data set to be more manageable without losing too much information about the variables. These variables were tested to see how much variance was shared before being grouped into suitable components (Theofilatos & Yannis, 2014).

Table 4.6: Principal component analysis for attitude variables

| Items | Rotated Component Matrix | | |
	Component 1	Component 2	Component 3
C1. I tend to speed when other road users start speeding	0.534		
C2. I tend to speed as friend encourages me to speed	0.507		
C3. I tend to speed when I need to meet a deadline	0.674		
C4. I tend to speed as I want to reach the place quickly	0.728		
C5 I tend to speed when there is no enforcement around	0.720		
C6. I tend to speed when driving alone	0.709		
C7. I tend to speed when hearing certain types of music	0.580		
C8. I tend to speed when the weather is clear	0.728		
C9. I tend to speed during the day as compared to night	0.738		
C10. I tend to speed when driving a bigger vehicle	0.610		
C11. I tend to speed as feeling safe in vehicle	0.589		
C12. I tend to speed when the speed limit is low	0.486		
C13. I tend to speed on wide lanes	0.671		
C14. I tend to speed when there is no warning sign	0.564		
C16. I tend to speed due to slow drivers	0.504		
C15. Speeding when I am in angry mood		0.488	
C17. Speeding when I am moody		0.515	
C18. Speeding feeds my ego by giving me sense of power and control		0.544	

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C19. Feeling excitement and thrill while speeding	0.703		
C20. I like the feeling of speeding	0.713		
C21. Feeling more relaxed when speeding	0.709		
C23 I feel that I am skilful enough to avoid accident while speeding	0.455		
C24. I feel that speeding is a normal driving behaviour	0.561		
C26. I feel that I would not be caught speeding by the authorities	0.581		
C27. I fear the police; thus, I rely on technology to inform me the presence of police	0.566		
C22. Speeding has direct link to accident		0.534	
C25. I believe in my ability to overtake another vehicle safely		0.463	
C28. I follow the speed limit at all times		0.738	
C29. I follow the speed limit to avoid being summoned		0.763	
C30. I follow the speed limit when there is accident warning sign		0.781	
C31. I follow the speed limit when entering curved roads		0.660	
Eigenvalue	9.48	3.17	1.93
% variance explained	30.59	10.21	6.23
Cronbach alpha	0.91	0.77	0.62

Extraction Method: Principal Component Analysis
Rotation Method: Varimax with Kaiser Normalization

The Principal Component Analysis (PCA) was used to examine the underlying structure of the scales. Bartlett's test of sphericity reached statistical significance X^2 (465) =7120.51, p < 0.001, which points to the factorability of the correlation matrix. The Kaiser-Meyer-Olkin (KMO) indicator verified the adequacy of the sample size intended for the analysis, KMO = 0.91, which exceeds the value of 0.60 for the lowest recommended value acceptable for an adequate factor analysis (Tabachnick & Fidel, 2007). These 31 attitude variables were tested in the PCA using Varimax rotation. The aim was to identify a smaller number of components that could be used in subsequent analysis. An examination of the factors with eigenvalues of above one revealed a three-component solution as presented in Table 4.6 which explains 47.03% of the total variance.

Factor 1, labelled as *Behavioural*, explains 30.59% of the variance with eigenvalue of 9.48 and the Cronbach alpha value of 0.91. Factor 2, labelled as *Affective*, accounts for an additional 10.21% of the variance with eigenvalue of 3.17 and the Cronbach alpha value of 0.77. The third factor, *Cognitive*, explains 6.23% of the variance with eigenvalue of 1.93 and the Cronbach alpha value of 0.62.

From these results, three main factors were detected: Affective, Behavioural and Cognitive. These factors were found to be suitable for representing 'attitude' since attitude embraces emotions, actions and beliefs. These outcomes have also been validated by past studies which claimed that these three components of attitude are the basis for attitude formation. The three factor scores were saved as part of the PCA analysis and then used in the subsequent analysis such as frequency, to examine the level of agreement and disagreement of each attitude variable in the attitude component. The correlation between the attitude components and behaviour was also observed so as to determine the relationship between the variables and regression. This can help to detect the relevance of the attitude components for predicting speeding behaviour.

4.4.2 Exploring the Relationship between Attitude Components and Reported Speed (Max Speed)

A Kendall's tau-b correlation was run to determine the relationship between attitude components and speeding behaviour (referred as reported speed in the attitude survey) amongst 503 participants.

Table 4.7: Correlation between attitude components and reported speed

			Reported Speed Limit	Behavioural Component	Affective Component	Cognitive Component
Kendall's tau_b	Reported Speed	Correlation Coefficient	1.000	.303**	.195**	-0.045
		Sig. (2-tailed)		0.000	0.000	0.239
		N	503	503	503	503

'Table 4.7, continued.'

Behavioural Component	Correlation Coefficient	.303**	1.000	.482**	0.022
	Sig. (2-tailed)	0.000		0.000	0.484
	N	503	503	503	503
Affective Component	Correlation Coefficient	.195**	.482**	1.000	0.033
	Sig. (2-tailed)	0.000	0.000		0.300
	N	503	503	503	503
Cognitive Component	Correlation Coefficient	-0.045	0.022	0.033	1.000
	Sig. (2-tailed)	0.239	0.484	0.300	
	N	503	503	503	503

**. Correlation is significant at the 0.01 level (2-tailed).

As shown in Table 4.7, there was positive correlation between the behavioural component and speeding behaviour, which was statistically significant (τb = .303, p = .000). Similarly, there was positive correlation between the affective component and speeding behaviour, which was statistically significant (τb = .195, p = .000). In contrast, there was negative correlation between the cognitive component and speeding behaviour and the result was also not statistically significant (τb = -.045, p = .239). This result showed that two components; affective that is emotional component and behavioural that is tendency to act were significant in predicting speeding behaviour. However, cognitive component was not significant in predicting speeding behaviour.

4.4.3 Exploring Predictors from the Attitude Components through Binary Logistic Regression

Table 4.8 shows the probability of the attitude components in predicting drivers' speeding behaviour.

Table 4.8: Predictors from attitude components for Expressways and Federal road participants

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	Behavioural Component	0.113	0.018	37.825	1	0.000	1.120
	Affective Component	-0.001	0.030	0.000	1	0.986	0.999
	Cognitive Component	-0.047	0.032	2.145	1	0.143	0.954
	Constant	-3.256	0.712	20.895	1	0.000	0.039

a. Variable(s) entered on step 1: Behavioural Component, Affective Component, Cognitive Component.

The results highlighted that the behavioural component emerged as a good predictor for predicting drivers' speeding behaviour, with the significance of $p < 0.05$. Among all, the behavioural component appears to be the strongest component for predicting drivers' speeding behaviour as the odds ratio from Exp (B) value was 1.12. The other two components did not emerge as predictors since the odds ratio from the affective component was shown to be 0.99 and the cognitive component was shown to be 0.95, with both standing at $p > 0.05$. Based on this, it is reasoned that the behavioural component was 1.12 times more likely to predict speeding behaviour, when compared to the affective and cognitive components.

4.5 Analysing the Relationship between Driver's Demographic Characteristics and Reported Speed on Different Road Types - Expressways and Federal Roads

The relationship between the drivers' demographic background and their self-reported speed on different road types is presented through the *t*-test and the one-way analysis of variance (ANOVA).

4.5.1 *T*-test results between gender and reported speed (Max speed) for Expressways participants

The *t*-test results of gender and self-reported speed is tabulated in Table 4.9. This analysis is conducted to investigate the possibility of gender in affecting driver speeding behaviour and to confirm the hypothesis of the study.

Hypothesis 1: There is significant difference between male and female in their speed behaviour when on different road types, Expressways and Federal roads.

Table 4.9: Independent *t*-test for gender and reported speed for Expressways participants

Gender	N	Mean	SD	*t*	*P*
				1.644	.102
Male	157	2.48	1.035		
Female	46	2.20	.980		

The result shown above reflects the descriptive table which consists of 157 male participants (M= 2.48) and 46 female participants (M= 2.20) who were identified from the four locations. The result of the t-test between gender and self-reported speed indicated that the *p* value was bigger than 0.05, hence the *p* value was not statistically significant. Therefore, it can be deciphered that there was no statistically significant difference between the mean of the self-reported speed for males and females. However, the mean for males was 2.48 and standard deviation 1.04 as compared to females, with the mean of 2.20 and standard deviation 0.98 and the *t* – test (of 201) being 1.64 and *p* = 0.10.

4.5.2 *T*-test Results between Gender and Reported Speed (Max speed) for Federal Roads participants

Subsequently, table 4.10 describes the t-test results between gender and self-reported speed for Federal road participants.

Table 4.10: Result of Independent Sample *t*-test between gender and self-reported speed for Federal roads participants

Variable	N	Mean	SD	*t*	*P*
Gender				2.259	.025
Male	237	2.18	1.113		
Female	63	1.83	1.040		

As can be seen, the descriptive table consists of 237 male participants (M=2.18) and 63 female participants (M=1.83) for six locations. The table highlighted the result of the t-test between gender and self-reported speed. The result indicated that the *p* value was smaller than 0.05, hence the *p* value was statistically significant. Therefore, there was a statistically significant difference between the mean of the self-reported speed for males and females, with the mean for males being 2.18 and standard deviation 1.11 as compared to females, 1.83 and standard deviation 1.04 and the *t* -test (of 298) = 2.26, and *p* = 0.03. Thus, it is confirmed the Hypothesis 1 that there is significant difference between male and female in their speed behaviour when on different road types, Expressways and Federal roads.

4.5.3 *T*-test Results between Marital Status and Reported Speed (Max speed) for Expressways participants

The *t*-test results of the marital status and self-reported speed are tabulated in Table 4.11.

Table 4.11: Independent *t*-test for marital status and reported speed for Expressways participants

Marital status	N	Mean	SD	*t*	*P*
				0.848	.398
Single	68	2.50	1.113		
Married	135	2.37	.983		

The results showed that the participants comprised 68 single status participants (M=2.50) and 135 married participants (M=2.37) for the four locations. The results further informed that the *p* value was bigger than 0.05, hence the *p* value was not statistically significant. In this regard, there was no statistically significant difference between the mean of the self-reported speed for single and married participants, with the mean for single status participants being 2.50, 1.11 as compared to married participants (2.37, 0.98), *t* (201) = 0.85 and *p* = 0.40.

4.5.4 *T*-test results between Marital Status and Reported Speed (Max speed) for Federal Roads participants

The *t*-test results of marital status and self-reported speed are tabulated in Table 4.12.

Table 4.12: Independent *t*-test for marital status and reported speed for Federal road participants

Marital status	N	Mean	SD	*t*	*P*
				0.997	.320
Single	85	2.20	1.050		
Married	215	2.06	1.128		

Here, the participants consisted of 85 single status participants (M=2.20) and 215 married participants (M=2.06) for the six locations. The table also indicated that the *p* value was bigger than 0.05, hence the *p* value was not statistically significant. Therefore, there was no statistically significant difference between the mean of self-reported speed for single

and married participants, with the mean for single participants being 2.20, 1.05 as compared to married participants (2.06, 1.13), with t-test (298) = 0.99 and p = 0.32.

4.5.5 One-Way Analysis of Variance (ANOVA) Results between Education Level and Reported Speed (Max speed) for Expressways participants

The ANOVA analysis showing the results between education and self-reported speed for Expressways participants is given in Table 4.13.

Table 4.13: Result of Analysis of Variance between education level and reported speed for Expressways participants

Variable	N	Mean	SD	F	P
Education level				5.990	.001
Secondary	5	1.60	.600		
Pre-univ./diploma	88	2.15	.104		
Undergraduate	63	2.57	.119		
Postgraduate	47	2.79	.152		

Multiple Comparisons

Dependent Variable: Self-reported speed (km/h)

Tukey HSD

(I) Education Level	(J) Education Level	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower Bound	Upper Bound
Secondary	Pre-university/Diploma	-.548	.456	.626	-1.73	.63
	Undergraduate degree	-.971	.461	.154	-2.16	.22
	Postgraduate degree	-1.187	.466	.056	-2.40	.02
Pre-university/Diploma	Secondary	.548	.456	.626	-.63	1.73
	Undergraduate degree	-.424	.164	.050	-.85	.00
	Postgraduate degree	-.640*	.179	.003	-1.10	-.18
Undergraduate degree	Secondary	.971	.461	.154	-.22	2.16
	Pre-university/Diploma	.424	.164	.050	.00	.85
	Postgraduate degree	-.216	.191	.672	-.71	.28
Postgraduate degree	Secondary	1.187	.466	.056	-.02	2.40
	Pre-university/Diploma	.640*	.179	.003	.18	1.10
	Undergraduate degree	.216	.191	.672	-.28	.71

*. The mean difference is significant at the 0.05 level.

The one-way ANOVA test results indicated that the value of F (df = 3, 199, p < 0.05) = 5.99 was significant. The null hypothesis was thus rejected. In this regard, the ANOVA test showed that there was significant difference in the self-reported speed of participants with different levels of education. The Tukey HSD post hoc multiple comparison test results further showed that the significance difference occurred between pre-university or diploma, undergraduate and postgraduate holders and secondary level participants. The homogeneous sub-sets and mean plots table also stressed that the mean score of the pre-university or diploma was higher than the mean score of the secondary level, undergraduate and postgraduate degree participants. The ANOVA and post hoc comparison test results suggest that the outcome of those participants with secondary level, undergraduate and postgraduate degree were not significant in influencing speeding behaviour.

4.5.6 One-Way Analysis of Variance (ANOVA) Results between Education Level and Reported Speed (Max speed) for Federal Roads participants

The ANOVA analysis showing the results between education level and self-reported speed for Federal roads participants is given in Table 4.14.

Table 4.14: : Result of Analysis of Variance between education level and reported speed for Federal roads participants

Variable	N	Mean	SD	*F*	*P*
Education level				10.109	.000
Primary	15	2.53	1.187		
Secondary	184	1.82	0.974		
Pre-Uni/ Diploma	56	2.59	1.141		
Undergraduate	43	2.47	1.162		
Postgraduate	2	4.00	0.000		

(I) Education level	Std. Error	Sig.	95% Confidence Interval

		Mean Difference (I-J)			Lower Bound	Upper Bound
Primary	Secondary	0.718	0.280	0.080	-0.05	1.49
	Pre-university/Diploma	-0.056	0.304	1.000	-0.89	0.78
	Undergraduate degree	0.068	0.313	0.999	-0.79	0.93
	Postgraduate degree	-1.467	0.786	0.338	-3.62	0.69
Secondary	Primary	-0.718	0.280	0.080	-1.49	0.05
	Pre-university/Diploma	-.774*	0.159	0.000	-1.21	-0.34
	Undergraduate degree	-.650*	0.177	0.003	-1.14	-0.16
	Postgraduate degree	-2.185*	0.742	0.029	-4.22	-0.15
Pre-university/Diploma	Primary	0.056	0.304	1.000	-0.78	0.89
	Secondary	.774*	0.159	0.000	0.34	1.21
	Undergraduate degree	0.124	0.212	0.977	-0.46	0.71
	Postgraduate degree	-1.411	0.751	0.332	-3.47	0.65
Undergraduate degree	Primary	-0.068	0.313	0.999	-0.93	0.79
	Secondary	.650*	0.177	0.003	0.16	1.14
	Pre-university/Diploma	-0.124	0.212	0.977	-0.71	0.46
	Postgraduate degree	-1.535	0.755	0.253	-3.61	0.54
Postgraduate degree	Primary	1.467	0.786	0.338	-0.69	3.62
	Secondary	2.185*	0.742	0.029	0.15	4.22
	Pre-university/Diploma	1.411	0.751	0.332	-0.65	3.47
	Undergraduate degree	1.535	0.755	0.253	-0.54	3.61

As can be noted, the one-way ANOVA test result showed the value of F (df = 4, 295, p < 0.05) = 10.11, hence it was significant. This means that the null hypothesis was rejected. The ANOVA test also stressed that there was a significant difference in the self-reported speed within the education levels. The Tukey HSD post hoc multiple comparison test result also showed that there is significant difference for secondary level, suggesting that those with secondary level of education has higher tendency to involve in speeding

behaviour compared to other education levels, primary, pre-university/diploma level, undergraduate and postgraduate degree. This means that those participants who had primary level education, pre-university/diploma level, undergraduate and postgraduate degree were not significant in influencing speeding behaviour.

4.5.7 One-Way Analysis of Variance (ANOVA) Results between Income Level and Reported Speed (Max speed) for Expressways participants

The ANOVA analysis showing the results between income level and self-reported speed for Expressways participants is given in Table 4.15.

Table 4.15: Results of Analysis of Variance between income level and reported speed for Expressways participants

Variable	N	Mean	SD	F	P
Income level				1.832	0.163
Low-income	33	1.15	0.364		
Middle-income	123	1.15	0.363		
High-income	47	1.28	0.452		

The table 4.15 above shows that the result of ANOVA between income level and reported speed of Expressways participants. The one-way ANOVA test results indicated that the value of F (df = 2, 203, p > 0.05) = 1.83, hence it was not significant. Thus, the null hypothesis was accepted. Therefore, it can be said that there was no significant difference between the income types, whether low-income, middle-income or high-income, with self-reported speed on Expressways.

4.5.8 One-Way Analysis of Variance (ANOVA) Results between Income Level and Reported Speed (Max speed) for Federal roads participants

The ANOVA analysis showing the results between income level and self-reported speed for Federal roads participants is given in Table 4.16.

Table 4.16: Results of Analysis of Variance between income level and reported speed for Federal roads participants

Variable	n	Mean	SD	F	P
Income level				2.397	.093
Low-income	34	2.35	1.323		
Middle-income	224	2.02	1.048		
High-income	42	2.33	1.183		

The one-way ANOVA test results indicated that the value of F (df = 2, 297, p > 0.05) = 2.40, hence it was not significant. Thus, the null hypothesis was accepted. Therefore, it can be said that there was no significant difference between the income types, whether low-income, middle-income or high-income, with self-reported speed on Federal roads.

4.5.9 One-Way Analysis of Variance (ANOVA) Results between Employment Type and Reported Speed (Max speed) for Expressways participants

The ANOVA analysis showing the results between employment type and self-reported speed for Expressways participants is given in Table 4.17.

Table 4.17: Results of Analysis of Variance between employment type and reported speed for Expressways participants

Variable	N	Mean	SD	F	p
Employment type				2.259	0.107
Self-employed	35	1.06	0.236		
Full-time employed	141	1.21	0.406		
Unemployed	27	1.22	0.424		

As can be seen, the results indicate that the value of F (df = 3, 203, p > 0.05) = 2.26, hence it was not significant. Therefore, the null hypothesis was accepted. This showed that there was no significant difference between employment types and self-reported speed on Expressways.

4.5.10 One-Way Analysis of Variance (ANOVA) results between employment type and reported speed (Max speed) for Federal roads participants

The ANOVA analysis showing the results between employment type and self-reported speed for Federal roads participants is given in Table 4.18.

Table 4.18: Results of Analysis of Variance between employment type and reported speed for Federal roads participants

Variable	n	Mean	SD	F	p
Employment type				0.895	.444
Full-time	228	2.14	1.137		
Part-time	4	2.00	1.414		
Self-employed	48	1.88	0.981		
Unemployed	20	2.25	0.967		

The one-way ANOVA test result given above illustrated that the value of F (df = 3, 296, p > 0.05) = 0.90, hence it was not significant. Therefore, the null hypothesis was accepted. This showed that there was no significant difference between employment types and self-reported speed on Federal roads.

4.5.11 ANOVA Results between Speed Violation and Reported Speed (Max speed) for Expressways

The ANOVA analysis showing the results between speed violation and self-reported speed for Expressways participants is given in Table 4.19. This analysis is conducted to investigate the possibility of speed violation record in affecting the speed behaviour. The hypothesis is outlined below:

Hypothesis 2: There is significant difference between those who have been fined compared to those who have not been fined in their speed behaviour.

Table 4.19: Results of Analysis of Variance between speed violation record and reported speed

Variable	N	Mean	SD	F	p
Speed violation record				7.807	.000
Never	106	2.15	.964		
1-4 times	72	2.54	1.020		
5-10 times	16	3.19	.834		
More than 10 times	9	3.11	1.054		

Multiple Comparisons

Dependent Variable: Self-reported speed (km/h)

Tukey HSD

(I) Speed violation record	(J) Speed violation record	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower Bound	Upper Bound
Never	1 - 4 times	-.391*	.150	.047	-.78	.00
	5 - 10 times	-1.037*	.263	.001	-1.72	-.36
	More than 10 times	-.960*	.340	.027	-1.84	-.08
1 - 4 times	Never	.391*	.150	.047	.00	.78
	5 - 10 times	-.646	.271	.083	-1.35	.06
	More than 10 times	-.569	.346	.356	-1.47	.33
5 - 10 times	Never	1.037*	.263	.001	.36	1.72
	1 - 4 times	.646	.271	.083	-.06	1.35
	More than 10 times	.076	.408	.998	-.98	1.13
More than 10 times	Never	.960*	.340	.027	.08	1.84
	1 - 4 times	.569	.346	.356	-.33	1.47
	5 - 10 times	-.076	.408	.998	-1.13	.98

*. The mean difference is significant at the 0.05 level.

The one-way ANOVA test results emphasised that the value of F (df = 3, 199, p < 0.05) = 7.81, hence it was significant. This implies that the null hypothesis was rejected. Therefore, there was significant difference in the self-reported speed of speed violation records. The Tukey HSD post hoc multiple comparison test results further showed that

the significance difference occurred between never had the speed violation record and the other three groups. The mean plots table also showed that the mean score of never had the speed violation record was lower than the mean score of the speed violation record for one to four times, five to ten times and more than ten times. This suggested that those with speed violation record for one to four times, five to ten times and more than ten times have the higher likelihood to involve in speeding compared to never had the speed violation record.

4.5.12 ANOVA results between speed violation and reported speed (Max speed) for Federal roads participants

Subsequently, the Table 4.20 showing the result of ANOVA analysis between speed violation and reported speed for Federal road participants.

Table 4.20: Result of Analysis of Variance between speed violation record with reported speed (Max speed) for Federal roads participants

Variable	n	Mean	SD	F	p
Speed violation record				4.781	.003
Never	138	1.87	1.031		
1-4 times	126	2.25	1.095		
5-10 times	30	2.57	1.194		
More than 10 times	6	2.00	1.549		

Multiple Comparisons

(I) Speed violation record		Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
Never	1 - 4 times	-.384*	0.134	0.022	-0.73	-0.04
	5 - 10 times	-.697*	0.219	0.009	-1.26	-0.13
	More than 10 times	-0.130	0.453	0.992	-1.30	1.04
1 - 4 times	Never	.384*	0.134	0.022	0.04	0.73
	5 - 10 times	-0.313	0.221	0.489	-0.88	0.26
	More than 10 times	0.254	0.454	0.944	-0.92	1.43

5 - 10 times	Never	.697*	0.219	0.009	0.13	1.26
	1 - 4 times	0.313	0.221	0.489	-0.26	0.88
	More than 10 times	0.567	0.486	0.648	-0.69	1.82
More than 10 times	Never	0.130	0.453	0.992	-1.04	1.30
	1 - 4 times	-0.254	0.454	0.944	-1.43	0.92

In this context, the one-way ANOVA test result showed that the value of F (df = 3, 296, p < 0.05) = 4.78, hence it was significant. Therefore, the null hypothesis was rejected. This means that there was significant difference in the self-reported speed of speed violation records for each respondent. The Tukey HSD post hoc multiple comparison test results further showed that the significance difference occurred between never had the speed violation record with one to four times record and with five to ten times record. No significance difference can be assumed between never had the speed violation record with more than ten times speed violation record. The ANOVA and post hoc comparison test results proposed that those who had more than ten times speed violation record was not significant when compared to others. This implies that when comparing never had the record with less than four times and less than ten times record, the results were significant. However, when comparing with more than ten times record, the result was not significant.

These results have confirmed the possibility of speed violation record in affecting speed behaviour among Expressways and Federal road participants. As stated in hypothesis 2, there is significant difference between those who have been fined compared to those who have not been fined in their speed behaviour. Thus, hypothesis 2 is accepted.

4.5.13 ANOVA Results between Crash Experience in the Past and Reported Speed (Max speed) for Expressways participants

The ANOVA analysis showing the results between crash experience in the past and reported speed for Expressways participants is given in Table 4.21. This analysis is

conducted to investigate the possibility of crash experience in affecting driver speeding behaviour. The hypothesis is outlined below:

Hypothesis 3: There is significant difference between those who have crash experience than those without crash experience in their speed behaviour.

Table 4.21: Results of Analysis of Variance between crash experience and reported speed (Max speed) for Expressways participants

Variable	N	Mean	SD	F	p
Accident				3.357	.020
Never	109	2.27	.919		
1-4 times	92	2.62	1.108		
5-10 times	1	1.00	-		
More than 10 times	1	1.00	-		

The one-way ANOVA test results showed that the value of F (df = 3, 199, p < 0.05) = 3.36, hence it was significant. Therefore, the null hypothesis was rejected. This means that there was significant difference in the involvement in accident for self-reported speed. The multiple comparison done through Turkey HSD could not be performed as each class contained only one case.

4.5.14 ANOVA results between crash experience in the past and reported speed (Max speed) for Federal roads participants

Subsequently, the ANOVA analysis showing the results between crash experience in the past and reported speed for Federal roads participants is given in Table 4.22. This analysis would also investigate the hypothesis 3 of the study.

Table 4.22: Result of Analysis of Variance between crash experience and reported speed (Max speed) for Federal roads participants

Variable	n	Mean	SD	F	p
Crash experience				7.071	.000
Never	167	1.86	1.029		
1-4 times	129	2.40	1.128		
5-10 times	3	2.33	1.155		
More than 10 times	1	4.00	-		

The one-way ANOVA test result showed that the value of F (df = 3, 296, p < 0.05) = 7.07, hence it was significant. Therefore, the null hypothesis was rejected. This means that there was significant difference in the self-reported speed of involvement in accident for each respondent. The Tukey HSD post hoc multiple comparison test results could not be performed as one of the categories that had more than ten times involvement in accidents had less than three participants. However, referring to the mean result suggested that those with more than 10 times have the highest chances to involve in speeding than the others.

Both of the results, the Expressways and Federal roads have confirmed the hypothesis 3 stating that there is significant difference between those who have crash experience than those without crash experience in their speed behaviour. Hence, there is possibility of crash experience in affecting driver speeding behaviour. Hypothesis 3 is accepted.

4.6 Typologies of drivers for Expressways

The drivers' attitude was classified into several categories in the cluster analysis. This helped to distinguish the relatively homogeneous clusters through the multivariate analysis procedure. The cluster analysis will shed light on the characteristics shared by the categories as well as those that differed from one another. The procedure of the cluster analysis was done by selecting six variables from the attitude variables. This means that two variables from each of the attitude component (affective, behavioural and cognitive)

were chosen. The variables for affective component are: "I feel that speeding is a normal driving behaviour" and "I feel that I am skilful enough to avoid accidents while speeding". Meanwhile, variables from behavioural that were chosen are: "I tend to speed when the speed limit is low" and "I tend to speed as a sense of urgency". The variables that were chosen from cognitive component are: "Speeding has a direct link to accident" and "I believe in my ability to overtake other vehicles safely. As a result, four typologies of Expressways drivers were developed: law-abider, cautious, pragmatic and risk-taker.

Referring to the EKOS Research (2005), the law-abider can be described as someone who is less likely to indicate he/she drives over the speed limit; he/she has the most negative view of speeding such as strongly disagree that speed limits are set too low, that driving over the speed limit is not dangerous for skilled drivers and trip takes less time if one drives faster. Meanwhile, the cautious can be described as someone who is least likely to indicate that he/she personally drives over the speed limit; he/she also has the most negative view of speeding. The third type, the pragmatic, can be described as someone who would declare that he/she frequently drives over the speed limit; he/she also holds the view that people should keep pace with the flow of traffic regardless of the speed limit and he/she would also agree that speed limits are set too low. Finally, the risk-taker can be described as someone who has the same characteristics as the pragmatic However, the difference lies in that the risk-taker is usually driven by emotional reasons for speeding. Figure 4.1 further illustrates.
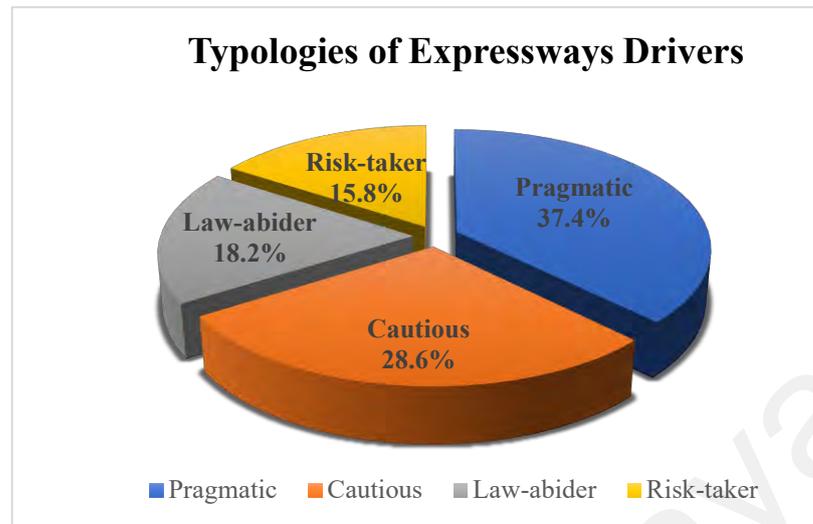
Figure 4.1: Four typologies of Expressways drivers

The results of this cluster analysis revealed that Expressways drivers can be categorised into four segments based on their views on the six attitude variables. Figure 4.1 illustrates that the highest composition of Expressways drivers was the pragmatic (37.4%), followed by cautious (28.6%), law-abider (18.2%) and then risk-taker (15.8%). Their characteristics are further elaborated. The characteristics of each driver typology can be further segmented into location, length of experience, age, trip purpose, income type, speed violation record, crash experience and reported speed. Some of these typologies share the same characteristics while others differed.

(a)   Pragmatic

The pragmatic drivers were composed of experienced drivers and most of them travelled around the Pagoh area mainly for work trips. They had more than 10 years of drivingexperience, belonged mainly to the middle-age group and they earned middle-income salaries. They have received speeding fines but had never been involved in any crash in the past. This group declared that they frequently drove over the speed limit. As

such their reported speed at the Pagoh area was between 111 to 120km/h, which is 20 to 30km/h over the speed limit.

(b) Cautious

The cautious are those drivers found mostly around the Ayer Keroh area. Majority of them travelled for work trips and leisure or vacation purposes. They have also attained extensive driving experiences of more than 10 years. Their income belonged to the middle-income range with most of them being in the middle-age group. Interestingly, this group of drivers never received any speeding fines and had never been involved in any crash in the past. Similarly, they were also least likely to indicate that they were driving over the speed limit. As such, their reported speed was between 80 to 90km/h, which is within the speed limit.

(c) Law-abider

The law-abider are those who mostly travelled along the Rawang area. Most have extensive driving experience of 10 years and above. They also travelled for leisure or vacation and tend to belong to the middle age range. They earned middle-income salaries and never received any speeding fines or faced any crash experiences in the past. This group is also less likely to indicate that they had exceeded the speed limit. As such their reported speed was between 100 to 110km/h, which is 10 to 20km/h over the speed limit.

(d) Risk-taker

The risk-taker can be described as being similar to the pragmatic group. They comprised drivers with more than 10 years of driving experience. Most of them travelled around the Tapah area for work trip purposes. They belonged to the middle-age group and earned middle-income salaries. Unlike the pragmatic, the risk-taker has never received any speeding fines, but they have been involved in crashes before. Similar to the pragmatic

group, they too declared frequently driving over the speed limit. Their reported speed at the Tapah area was between 100 to 110km/h, which is 10 to 20km/h over the speed limit.

4.6.1 Typologies of driver for Federal roads
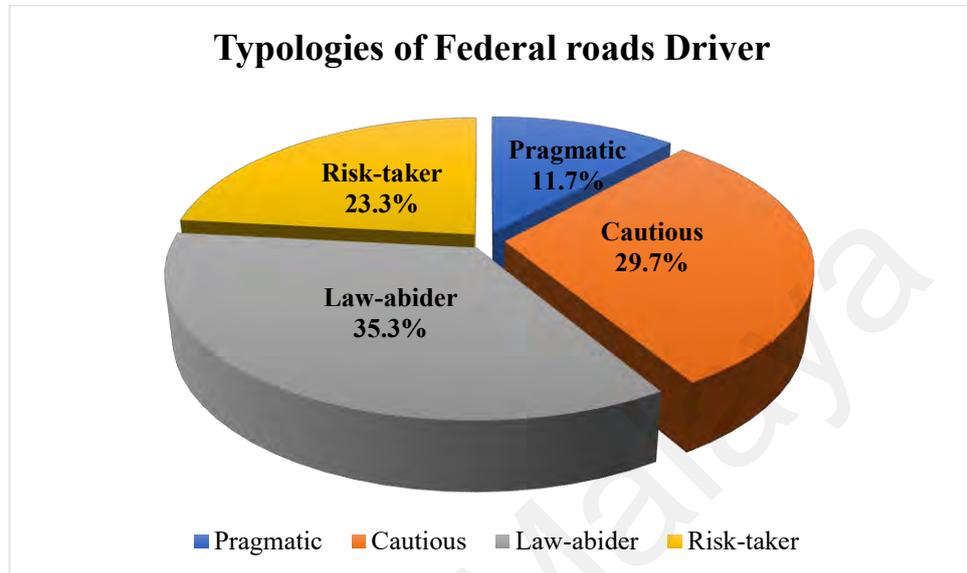
Figure 4.2: Percentages of four typologies for Federal road drivers

The results of this cluster analysis revealed that the Federal roads drivers can be classified into four segments, based on their views on the attitude variables, as presented in Figure 4.2. Among the four segments, the law -abider drivers were in the highest percentage (35.3%), followed by cautious (29.7%), risk-taker (23.3%) and pragmatic (11.7%). Further to this, the four categories of drivers were then cross-tabulated with multiple variables such as location, length of experience, age, trip purpose, income type, speed violation record, crash experience and reported speed so as to gain a better understanding of the characteristics of each driver typology. The characteristics of the four typologies of drivers can be segmented into location, length of experience, age, trip purpose, income type, speed violation record, involvement in accident and reported speed. Several categories share the same characteristics while others differed.

a)   Law-abider

The law-abiding drivers were located mostly at the Grik-Jeli area. The road stretch here is quite narrow with sharp corners. This can explain why there were many law-abider drivers in this area. Majority were experienced drivers, with many having acquired more than 10 years driving experience. Most were also in the middle-age group who were mainly on their work trips. Majority earned between RM 3001-RM 7,000 monthly. Although they were classified as law-abider drivers, they have received speeding fines but never had any crash experiences in the past. They also reported driving between 80 to 90km/h which is within the speed limit of the Federal roads.

b)   Cautious

The cautious drivers can be found mostly at the Lipis-Merapoh-Gua Musang area. Majority were experienced drivers, and many had also acquired more than 10 years driving experience. Most were on leisure/vacation trips, thus they reported driving between 91 to 100km/h, which is 1 to 10km/h over the speed limit. Majority were in the middle age group and were also middle-income earners. They had received speeding fines but no crash experiences in the past.

c)   Risk-taker

The risk taker drivers were mostly located in the Kota Tinggi-Rompin area. They had acquired an extensive driving experience of more than 10 years. All of them were in the middle-age range and earned middle-income salaries. Most of them were on work trip purposes. They had received speeding fines but had never been involved in any crashes in the past. Interestingly, they reported driving within the speed limit, between 80 to 90km/h.

d)   Pragmatic

The pragmatic drivers can be found mostly at the Jalan Tapah-Cameron Highland area. Majority had acquired extensive driving experience of more than 10 years. All of them were in the middle-age group and they earned middle-income salaries. Most were on work trips. This group of drivers had never received any speeding fines, but they had crash experiences in the past. They were known as pragmatic because they were more realistic and practical in their reasons for speeding. They were not simply being driven by emotional issues. Surprisingly, the pragmatic drivers drove within the speed limit, 80 to 90km/h.

4.7   Summary

This chapter has demonstrated the quantitative results of drivers' speeding behaviour on different road types; Expressways and Federal roads. Several key factors contributed to drivers' speeding behaviour namely the trip purpose, vehicle factors and human factors. However, further analysis revealed that human factors contributed to the significant factors of all. Further to that, the attitude element within the human factor has proven to be the most significant factors particularly, the affective (emotion) and behavioural attitude (tendency to act). In addition, the socio-demographic characteristics have also influenced drivers' speeding behaviour. This can be seen that gender; particularly male drivers have higher tendency to speed compared to female drivers. The education background, drivers with speed violation record and crash experiences have also affected drivers' speeding behaviour. On the other hand, majority of the Expressways drivers can be clustered into pragmatic drivers compared to the Federal road drivers which clustered into law-abiding drivers.

CHAPTER 5: QUALITATIVE FINDINGS

5.1 Introduction

This part of the analysis will demonstrate the qualitative results derived from the focus group discussion which was based on the Theory of Planned Behaviour. The qualitative data will help to shed light on how the drivers' speeding behaviour were affected on both roadways - Expressways and Federal roads. This section presents the findings for the qualitative results that was conducted among participants of various socio-demographic characteristics such as age, gender, race, education level and employment.

Participants were also asked about their attitudes concerning their past experiences (crash experience and speed violation record). This chapter provides a summary of the key findings extracted from the qualitative results which are aimed at complementing the quantitative results (attitude survey), incidentally fulfilling the third research objective which aims "to uncover the reasons and intentions of drivers' involvement in speeding behaviour". The research design and methodology for this section have been elaborated in Chapter 3 (Methodology). The results of the participants' socio-demographic characteristics and the key findings are presented in the subsequent sub-chapter.

5.2 Participants Demographic Characteristics and Vehicle Characteristics

The participants demographic characteristics is presented subsequently in the table below. The frequency of those variables is summarised in terms of age, gender, race, education background, employment and length of driving experience. Subseqently, the vehicle characteristics outline the car brand and car age. The driver's characteristics

(attitude) focusses on past experiences in term of speed violation and crash experiences

in the past 12 months.

Table 5.1: Participants Demographics

Name	Age	Gender	Race	Car Brand/ Age (years)	Marital Status	Employ -ment	Experi -ence (years)	Speed violation record	Crash experie -nce
Shafiq	26	Male	Malay	Hyundai/ > 7	Single	Student	4-10	Yes	No
Faris	37	Male	Malay	Proton/4-6	Married	Private	>10	Yes	Yes
Amalina	26	Female	Malay	Proton/ > 7	Single	Student	4-10	No	No
Ain	23	Female	Malay	Perodua/ 1-3	Single	Student	4-10	No	No
Shairah	24	Female	Malay	Proton/ 4-6	Single	Student	4-10	No	No
Sangeetha	27	Female	Indian	Perodua/ 1-3	Single	Student	1-3	No	Yes
Dinesh	28	Female	Indian	Proton/ 1-3	Single	Student	>10	Yes	Yes
Clifford	71	Male	Chinese	Perodua/ 4-6	Married	Retiree	>10	No	No
Tina	71	Female	Chinese	Honda/ 4-6	Married	Retiree	>10	No	No
Nancy	76	Female	Chinese	Perodua / 4-6	Married	Retiree	>10	No	No
Sek Moi	69	Female	Chinese	Honda/ > 7	Married	Retiree	>10	No	No
Yeow	81	Male	Chinese	Camry/ > 7	Married	Retiree	>10	No	No
Casey	72	Female	Chinese	Toyota/ 4-6	Married	Retiree	>10	No	No
Tania	68	Female	Chinese	Toyota/ 4-6	Married	Retiree	>10	No	No
Goh	74	Male	Chinese	Mercedes/ > 7	Married	Retiree	>10	Yes	No
Cheong	67	Male	Chinese	Toyota/ 4-6	Married	Retiree	>10	Yes	No
Yip	72	Female	Chinese	Perodua/ 4-6	Married	Retiree	>10	No	No
Ivy	71	Female	Chinese	Toyota/ 4-6	Married	Retiree	>10	No	No
Wee	80	Male	Chinese	Honda/ 4-6	Married	Retiree	>10	Yes	No
Hidayah	27	Female	Malay	Mazda/ 1-3	Single	Private	4-10	No	Yes
Mohd	31	Male	Malay	Proton/ 4-6	Married	Private	>10	Yes	Yes
Azuwan	25	Male	Malay	Mercedes/ > 7	Single	Private	4-10	No	Yes
Amin	28	Male	Malay	Proton/ 4-6	Single	Private	>10	No	Yes
Azlina	30	Female	Malay	Perodua/ 4-6	Single	Private	>10	No	Yes

Name	Age	Gender	Race	Car Brand/ Age (years)	Marital Status	Employ -ment	Experi -ence (years)	Speed violation record	Crash experie -nce
Rozila	38	Female	Malay	Honda/ 1-3	Married	Private	>10	Yes	Yes
Aznor	42	Male	Malay	Proton/ > 7	Married	Private	>10	Yes	Yes
Megat	30	Male	Malay	Perodua/ 4-6	Single	Private	>10	Yes	Yes
Zharif	26	Male	Malay	Perodua/ 4-6	Single	Private	4-10	Yes	Yes
Amri	31	Male	Malay	Perodua/ > 7	Married	Private	>10	No	Yes
Rahiman	24	Male	Malay	Honda/ 1-3	Single	Private	1-3	No	Yes

Table 5.2: Frequency of socio-demographic, vehicle characteristics and driver characteristics

Characteristics	Percentage (%)
Socio-Demographic Characteristics	
Gender	
Male	53.3
Female	46.7
Age	
Young (18-24 years old)	10.0%
Middle (25-31 years old)	40.0%
Middle (32-38 years old)	7.0%
Middle (39-45 years old)	3.0%
Middle (46-52 years old)	0
Middle (53-59 years old)	0
Old (60 years and above)	40.0%
Race	
Malay	53.3
Chinese	40.0
Indian	6.7
Education level	
Malaysian Certificate of Education	20.0
Diploma	30.0
Undergraduate	30.0
Postgraduate	20.0
Employment	
Executive	30.0
Non-executive	6.7
Self-employed	3.3
Student	23.3
Housewife	3.3
Retiree	33.3
Driving experience	
1-3 years	6.7
4-10 years	23.3
10 years and above	70.0
Vehicle characteristics	
Car brand	
Honda	20.0
Hyundai	3.3

Mazda	3.3
Mercedes	6.7
Perodua	30.0
Proton	20.0
Toyota	16.7
Car age	
1-3 years	20.0
4-6 years	53.3
More than 7 years	26.7
Driver characteristics (attitude)	
Speed violation in past 12 months	
Yes	36.7
No	63.3
Crash experience in past 12 months	
Yes	46.7
No	53.3

The table above displays the details of the participants recruited for the focus group discussion. The male participants comprised 53.3% while the female participants comprised 46.7%. The race distribution of the participants encompassed Malays (53.3%), followed by Chinese (40.0%) and Indians (6.7%). The education level of the participants was composed of Diploma (30.0%) and Undergraduate level (30.0%). Those with secondary certificates known as Malaysian Certificate of Education (or Sijil Pelajaran Malaysia) and postgraduate degrees shared a similar percentage of 20.0% each.

Majority of the participants were retirees (33.3%) followed by executive employees (30.0%) and students (23.3%). The other component of the participants comprised non-executives (6.7%), housewives (3.3%) and self-employed (3.3%). This means that those who were employed made up one fourth of the participants (40.0%) while those who were unemployed accounted for 60.0% of the overall participants. The length of the participants' driving experience showed that majority had acquired more than 10 years of driving experience (70.0%), followed by those with four to ten years' experience (23.3%) and those with less than three years' experience (6.7%). Majority of the participants possessed extensive driving experience. They also belonged to the

middle-age group (50.0%) which is slightly higher than the older participants (40.0%) than younger participants (10.0%).

Focussing on vehicle characteristics, this section also elaborates on the car brands of the participants. The results indicated that majority of the participants used car brands such as *PERODUA* (30.0%), followed by *PROTON* (20.0%), *HONDA* (20.0%) and *TOYOTA* (16.7%). The other car brands include *MERCEDES* (6.7%), *MAZDA* (3.3%) and *HYUNDAI* (3.3%). This shows that half of the participants were driving Malaysian car brands, *PERODUA* and *PROTON* (50.0%) while more than one third of the participants owned Japanese car brands such as *TOYOTA* and *HONDA* (36.7%).

The frequency of the drivers' characteristics (attitude) in terms of speed violation record in the past 12 months was also presented. Based on the figures, it was deduced that majority of the participants had no record of speed violation (63.3%) whereas those who had speed violation records comprised one third of the overall number (36.7%). Besides, the frequency of those who had crash experiences was also presented. It was found that more than half of the participants (53.3%) had never experienced any crashes whereas those who had experienced crashes total about half of the participants (46.7%).

Table 5.3: Frequency of participants' reported speed for Expressways and Federal roads

Reported speed	Percentage (%)
Expressways (km/h)	
60-70	6.7
71-80	6.7
81-90	10.0
91-100	3.3
101-110	30.0
111-120	30.0
Above 121	13.3
Federal roads (km/h)	
60-70	16.7
71-80	33.3
81-90	16.7
91-100	23.3
101-110	6.7
111-120	3.3

From the above figure, it can be noted that about one third of the participants drove between 101 to 110km/h (30.0%). Those who went beyond the speed limit of 110km/h (the posted speed on Expressways) made up nearly half of the participants (43.3%), with those driving between 111 to 120km/h being 30.0% and the remaining 13.3% driving more than 121km/h. In addition, 26.7% of the overall participants drove within the posted speed, 3.3% drove between 91 to 100km/h, 10.0% drove between 81 to 90km/h, 6.7% drove between 71 to 80km/h and 6.7% drove between 60 to 70km/h. This implies that those who followed the speed limit totalled 56.7% whereas those who speeded on Expressways comprised 43.3% of the overall participants.

The distribution of the reported speed on Federal roads was also deliberated. The posted speed for the Federal road was 90km/h. From the table, it can be summarised that 66.7% of the participants adhered to the speed limit of 90km/h but 16.7% of them drove at a speed of between 60 to 70km/h, a third or 33.3% of them drove at a speed of between 71 to 80km/h and 16.7% of the participants drove at a speed of between 81 to 90km/h. In contrast, those who drove above the posted speed limit can be calculated to be 33.3% with 23.3% of them driving between 91 to 100km/h, another 6.7% driving between 101 to 110km/h and a small number, 3.3% driving between 111 to 120km/h. This confirms that two thirds of the participants were following the speed limit and only a third was speeding on Federal roads.

5.3   The Reasons for Drivers' Involvement in Speeding Behaviour

The thematic findings generated from the participants' actual data are then presented. In this section, the participants were labelled according to alphabetical order to ensure the anonymity of the participants. For example, *Male 1*, refers to the first male participant while *G1* refers to group number 1. Findings are presented and then discussed according to the interview schedule mentioned in Chapter 3, with reference to the Theory

of Planned Behaviour. This theory considers three constructs, namely: attitude, subjective norm and perceived behavioural control, to predict drivers' intention towards performing the behaviour. Several constructs have also been added to the questions/statements and they include: habit, demographic background and attitude concerning past experiences.

5.4 The Influence of Attitude, Normative Belief and Perceived Behavioural Control

5.4.1 Attitude

a) Cognitive aspect (knowledge about speeding behaviour)

All the participants involved have a good grasp on the cognitive aspect about speeding behaviour. They have clear understanding on the definition of speeding behaviour. This can be attributed to their responses which were provided below as evidence.

"Driving fast on highway" (Female 1, G3, 27 years old, drive a PERODUA car).

"Speeding means that you drive the speed more than what is indicated on the road" (Female 1, G4, 71 years old, drive a Toyota car).

"Speeding…exceed the speed limit" (Female 5, G4, 68 years old, drive a Toyota car).

It seems evident that their responses raised issues on the factors contributing to the drivers' speeding behaviour.

Dangerous to other people, is also include factor of age, depends on younger or matured people. The young people do not feel like, they do not care about anything, to try the sometimes they buy high class car, sometimes they want pride compared to matured people who drive slowly" (Male 1, G3, 28 years old, drive a Proton car)

"If like in expressways, consider 110km/h right, 111 is not bit difference. It is better reduced or maintain 80-90km/h. below the border of 110. Even though you drive 110, you still speeding" (Male 2, G2, 37 years old, drive a Proton car).

b) Cognitive aspect (Belief about speeding behaviour)

Overall, the participants showed that they have a strong belief that speeding is harmful. The participants noted the dangers of speeding and their consequences on the loss of lives, injuries and other road users.

"Speeding can fatal, can cause lost and injuries, things like that. These are the bad effects." (Male 4, G4, 74 years old, drive a Mercedes car).

"Speeding can lead to a bigger accident." (Male 1, G2, 26 years old, drive a Hyundai car)

"For me, speeding is dangerous for yourself and to other road users." (Female 4, G2, 23 years old, drive a PERODUA car)

"Definitely is harmful." (Female 2, G4, 72 years old, drive a PERODUA car)

"On the other hand, it can be harmful if the driver is reckless and allowed emotion to take over them." (Male 1, G5, 31 years old, drive a Proton car)

"I think whether we like it or not, speeding is certainly not healthy. You know why as they said cause accident, we are normally hurt, injured ourselves and injured other people, you go and kill yourself and kill another person........ (Male 2, G2, 37 years old, drive a Proton car)

"...Above 110 anything can happen, tyre burst. You suddenly, split second not looking at the side mirror, you hit something, you gone already. It happened you know. People didn't

know car is coming out, they just go very fast, so cannot break in time" (Male 1, G3, 71 years old, drive a PERODUA car.

However, there were responses from participants who claimed that speeding can save time if speeding was done in a smart way, that is, 'if you know how to control your vehicle'.

"The good effect of speeding sometime, occasionally speeding can save time. Can save a lot of time. But depends we speed recklessly possible it is no good. You speed in a very smart way, in a control environment, speeding is good." (Male 4, G4, 74 years old, drive a Mercedes car)

"Speeding can be beneficial if the driver is careful and apply sound judgement while overtaking other cars or drive above the speed limit." (Male 1, G5, 31 years old, drive a Proton car)

"There is no problem if the driver drives above the speed limit if he is aware with the surroundings, very aware with other driver who changed lane. He knows how to expect, and he has awareness if something or emergency occurs, he still can control the situation" (Male 1, G1, 42 years old, drive a Proton car.

"Speeding in safety zone, means that he knows about the safety distance between front vehicle and following vehicle" (Male 2, G1, 30 years old, drive a PERODUA car)

"Speeding is okay as long the driver understands their own capability and car's capability" (Male 6, G1, 31 years old, drive a PERODUA car)

c)   Affective aspect (Emotions towards speeding behaviour)

The participants in the focus group discussion felt that negative emotions influence drivers into speeding most of the time. They also noted that besides negative emotions,

positive emotion also play a role in influencing drivers to speed although most people seldom realised it.

"It influences me as a lady, especially when I am in angry and sad." (Female 2, G2, 26 years old, drive a Proton car)

"For me, emotion is not only referred to negative, happy and excitement is kind of emotion. Sometimes, we don't realize that we speed when we hear fast song. Emotion does play a major role in influencing someone" (Female 5, G2, 24 years old, drive a Proton car)

"When they are angry, they tend to speed. I think mostly because they want to show their anger." (Female 2, G4, 72 years old, drive a PERODUA car)

"To release the anger." (Male 9, G4, 80 years old, drive a Honda car)

"Yes, at times especially negative emotion when I am in angry". (Male 1, G5, 31 years old, drive a Proton car)

"Yes, if you are in good mood or stable emotion, you tend to drive cautiously while you are in rush or late or anger, you tend to drive recklessly and speeding." (Female 2, G5, 26 years old, drive a Mazda car)

"Basically, that car overtake me. He honked me and blamed me that I was wrong. So, I chase the car and close-following him about 1 km or 20 minutes, from University Malaya's entrance gate until Federal road." (Male 6, G1, 31 years old, drive a PERODUA car)

"For me, I personally feel that emotion can cause someone to speeding. For example, in terms of positive and negative, as negative just now as you said stressful like that for me,

I feel as personal I won't speed of that kind of speeding because I always bring family. In terms of positive side, let say after work or some achievement we get, on the way back to home, definitely sometimes I will be speeding cause too hyper or too much happiness (Male 2, G3, 28 years old, drive a Proton car)

d)   Behavioural aspect (Past behaviour)

Regardless of their age and gender, the behavioural aspect does affect speeding behaviour. Majority of the participants stated that they usually speed when the road was clear, but the tendency would be higher during the night and during work trips.

"If there is nothing, clear as what the other respondent said, then I tend to speed a little bit, but not too far and will come down. Scared may lost control." (Female 2, G4,72 years old, drive a PERODUA car).

"The road is clear sometime tend to overspeed. That time I overspeed and I realize, then I calm down because senior people has nothing to rush for. Like young man has appointment and girlfriend all this." (Male 9, G4, 80 years old, drive a Honda car).

"Even normal days, normal time also especially you see at night, certain area like Klang valley… Oh not Klang valley, Cyberjaya and Putrajaya… especially at night after 9 until early morning. There are a lot of racing cars, bikes." (Male 2, Group 3, 28 years old, drive a Proton car)

"I speed usually during on my way to village, when the road is clear." (Male 2, G2, 37 years old, drive a Proton car)

"I usually speed at night." (Female 5, G2, 24 years old, drive a Proton car)

"My speeding behaviour was determined by the situation when I need to reach a certain location at a particular time especially when rushing to workplace." (Male 1, G5, 31 years old, drive a Proton car)

"From Jalan Duta to Shah Alam, around 10-11pm, there are no cars, so I certainly speed at 160km/h." (Female 5, G2, 24 years old, drive a Proton car)

5.4.2 Subjective norm

a) Important and significant other who approves or disapproves speeding behaviour

In this regard, the participants mentioned that they tend to speed when their peers accompanied them, or when their passengers were people of the same age. There were also respondents who claimed that they drove within the speed limit when there were passengers in the car. Similarly, for senior drivers, it was noted that their spouses were a good company for advising them not to speed.

"Family members disapproved me to speed. But if I bring along friends, usually I didn't notice that I speed" (Male 1, G2, 26 years old, drive a Hyundai car)

"For me, just now you said family members, girlfriend, wife or husband, is kind of good, they tend not to make you to speed. They more just drive safely to the destination compare to another group maybe put like youngster or group of friends if they mingle up, maybe too excited or something else, that kind of situation tend to make for speeding. Like I can differentiate two groups of people." (Male 2, G3, 28 years old, drive a Proton car)

"Like for young people they got so many friends, can chit chatting, whereas for senior people, let say my spouse is driving, I advise him not to speed. So that's the advantage point." (Female 1, G4, 71 years old, drive a Toyota car)

"If I have somebody like older people sitting beside me, they will ask to slow down."
(Female 2, G4, 71 years old, drive a Toyota car)

"Usually when I have other passengers in my car, I tend to drive within the speed limit."
(Male 1, G5, 25 years old, drive a Mercedes)

"I mean with my family, I don't speed. I mean if I speed, they will disapprove it. With friends sometimes, they say why you are going so slow…speed up…" *(Female 1, G3, 27 years old, drive a PERODUA car)*

"That is of course my children, one of my children said, "why so slow"? they want you to go faster." *(Female 2, G4, 72 years old, drive a PERODUA car)*

5.4.3 Perceived Behavioural Control

a)   Self-efficacy for speeding behaviour

There were respondents who claimed that road conditions and their respective priorities that were reasons facilitating speeding.

"I mean the length of the road, is too big and mostly empty. So that kind of thing." *(Male 2, G2, 37 years old, drive a Proton car)*

"It is all down to priority at that point of time. If I need to reach a certain location fast within a certain timeframe, most likely I will drive above the speed limit." *(Male 1, G5, 31 years old, drive a Proton car)*

"Boredom (boring)…You see the road, highway, then you travel at 110, some time you over limit, I think should increase the limit to 130 or 150. Because the road is safe." *(Male 4, G4, 74 years old, drive a Mercedes car)*

"Familiar with the road…" *(Female 3, G2, 26 years old, drive a Proton car)*

b) Barriers to commit speeding behaviour

The participants claimed that weather conditions, road and car conditions, family and authorities were the barriers in preventing them from speeding.

"In terms of the weather, maybe especially the rainy day if there is to heavy most of the drivers do not speed because they know the consequences, they might face it in future." (Male 2, G2, 37 years old, drive a Proton car)

"I think more than 110, but depends on certain condition also, curve, have to reduce. If more than that can consider speeding." (Female 3, G2, 26 years old, drive a Proton car)

"Those who drive Kancil car or whatever, I think condition, then you cannot say Kancil car can go at this highway and not at that highway is not that. I think it should be the condition of the road and the highway. The Kancil also know exactly I cannot go 120 so if go slower like that. (Male 9, G4, 80 years old, drive a Honda car)

"Family comes first, I think about them." (Male 3, G5,25 years old, drive a Mercedes car)

"By remembering my loved ones." (Male 4, G5, 28 years old, drive a Proton car)

"I am afraid of being summoned." (Female 2, G5, 27 years old, drive a Mazda car)

"Driving a family car that is more than 10 years, there is no safety system like recent car nowadays." (Female 3, G2, 26 years old, drive a drive a Proton car)

5.5   The Influence of Demographic Background towards Speeding Behaviour

a)   Age

When participants were asked whether age played a role in influencing them to speed, many of the participants agreed that age does influence them into speeding. It was

revealed that young drivers tend to speed more frequently as they enjoyed the excitement speeding brings. In contrast, older drivers were not favourable towards speeding. Nevertheless, there was a senior citizen driver who commented that older drivers also speed but not as frequently as the young drivers.

"Include factor of age, depends on younger or matured people. The young people do not feel like, they don't care about anything, to try the sometimes they buy high class car." (Male 2, G2, 37 years old, drive a Proton car)

"I think speeding… go by the age… Younger driver" (Male 4, G4, 74 years old, drive a Mercedes car)

"Yes, it is true…it is true… excitement and all of that" (Female 2, G4, 72 years old, drive a PERODUA car)

"I think the age… talking to group of senior citizens, if we are 20s, yes…" (Female 10, G4, 76 years old, drive a PERODUA car)

"I think the three you said like gender, normally males are faster. Second, younger people tend to speed compared to ours. Third one is driving experience, the driver who just got the licence tend to speed than the older drivers. Like older driver speed at certain times not all the time. (Male 3, G4, 67 years old, drive a Toyota car)

b)   Gender

Besides that, gender plays a significant role in influencing driver's to speed. Apparently, most of the previous studies highlighted that male drivers are more frequently to speed than the female drivers. Findings of this study also highlighted higher tendency of male participants to speed compared to female participants. However, some of the participants

mentioned that both parties are involved in speeding. Some of the excerpts from the discussion are as follow.

"I think the 3 you said like gender, normally males are faster" (Male 3, G4, 67 years old, drive a TOYOTA car)

"I feel like can categorise two sides, speeding- we cannot say that one side only speeding, cause when I drive car, I feel like men are speeding more because women are driving slowly". (Male 2, G3, 28 years old, drive a PROTON car)

"It can be both parties. Speeding no differences either males or females. Women also speed, men also speed. I think no differences". (Male 3, G3, 71 years old, drive a PERODUA car)

"Both also involved in speeding…" (Female 1, G3, 27 years old, drive a MYVI car)

"If I want to compare with my wife, I can say that my wife is impatient sometimes" (Male 2, Group 2, 37 years old, drive a PROTON car).

c) Length of driving experience

Driving experience is another component in the participants' demographic background which could influence drivers' speeding behaviour. The participants stated that experienced drivers have a wider experience in determining the safe location for speeding, hence they speed under certain circumstances and conditions. In contrast, the young drivers lacked experience, so they could not make sound judgements which could potentially lead them to become involved in speeding. Besides that, the participants also admitted that experienced drivers were confident in speeding compared to the inexperienced drivers.

"I mean the younger one, low experience compared to the experienced they know which place can speed, which place cannot speed." (Female 3, G2, 26 years old, drive a Proton car)

"Experienced driver is more confident. I think experience does not go by age. For example, even the person is old, but he started to drive at old age and not confident to speed." (Female 5, G2, 24 years old, drive a Proton car)

"Young people lack experience... Lack of experience, mental and mindset not equal." (Female 3, G2, 26 years old, drive a Proton car)

"The driver who just got the licence tend to speed than the older drivers. Like older driver speed at certain times not all the time." (Male 3, G4, 67 years old, drive a Toyota car)

"The driver experience is important. If you don't have experience, you do not know how to predict, your alertness level is low, and it facilitates accident." (Male 3, G1, 23 years old, drive a Honda car)

5.6 The Influence of Driver Characteristics (Attitude) towards Speeding Behaviour

a) Speed violation record

On the other hand, the speed violation record is another component in the participants' demographic background which could influence drivers' speeding behaviour. From the exceprt, it is understood that less experienced drivers could have higher tendency to be summoned as a result from speeding.

"One time, I don't know, I drive in Scotland, I got a caught first over, 1week after that, they came to my house with my picture, my picture is there. 70 pounds fine, very fast (Male 4, G4, drive a Toyota car)

"For me I personally experience when I firstly took my license, I have few summonses but nowadays no." (Male 2, G3, 28 years old, drive a Proton car)

"I received 5-6 times on my way to KLIA… I thought the camera didn't working." (Male 3, G4, 67 years old, drive a Toyota car)

b) Crash experience

Similarly, crash experience is another component in the participants' demographic background which could influence drivers' speeding behaviour.

"Usually around 1-2 months after the accident, I am not speeding… I am still not recovered." (Male 2, Group 2, 37 years old, drive a Proton car)

5.7 The Influence of Habit towards Speeding Behaviour

When participants were asked about their habits to speed and which roads they usually speeded on, majority of them responded that they usually speed on Expressways compared to Federal roads. However, there was one respondent who admitted that he speeded on both the Expressways and Federal roads.

"It is always to be on the expressways than the federal roads." (Male 2, G2, 37 years old, drive a Proton car)

"Usually I speed on the expressways. Seldom on Federal roads." (Female 5, G2, 24 years old, drive a Proton car)

"I speed once. It's on the expressway." (Female 6, G4,72 years old, drive a Toyota car)

"I usually speed on both expressways and federal roads, equal frequency for both, if to evaluate on ten scales, eight for both." (Male 1, G5, 31 years old, drive a Proton car)

"Four times speeding on federal. For highways three times speeding." (Male 2, G3, 28 years old, drive a Proton car)

5.8   Practicality of speed limit in Malaysia

The participants were asked about their perception of the speed limit on Expressways and Federal roads, in terms of its suitability and practicality for Malaysian roads. The participants agreed that speed limit of the Expressways is set at 110km/h and 90km/h for Federal roads. The speed limit is deemed suitable considering Malaysia's climate is categorised as equatorial, being hot and humid throughout the year, the car and the road conditions. In fact, the participant has suggested the government and authorities to find ways in reducing the accident rates instead of increasing the speed limit.

"For federal roads, it depends on the road also let say Federal road that kind of thing is a big road, 90 is very suitable for that kind of situation and 110 for the highway, 110 nowadays the ratio and rate of accident among Malaysians especially in festive season is too high, so if want to increase to 130-140, it is not suitable to increase more and more. So, must come up with steps to how to overcome the accident rather increasing the rate of speed limit in highways." (Male 2, G3, 28 years old, drive a Proton car)

"I think 110km/h is quite safe for Malaysian roads… I think cause wet and not like in New Zealand when you drive there all the weather are almost consistent, so it's different." (Male 9, G4, 80 years old, drive a Honda car)

"For normal car, normal driving 110km/h is ok for Expressways." (Female 1, G4, 71 years old, drive a Toyota car)

"I think the speed limit is depends on the condition of the road. The federal road is not too bad. So, I am comfortable with the speed limit, 90km/h. Because the lower the speed limit, you caught more jam, possible." (Male 3, G3, 71 years old, drive a Perodua car)

5.9 Intention of Drivers' Involvement in Speeding Behaviour

Before the discussion ended, the participants were asked about their intention to commit speeding in the future. Majority of the young drivers responded that they were likely to speed in the future, but this depends on situations and conditions. One of the respondents also mentioned that he was more inclined to speed as he was afraid he might fall asleep whenever he did not speed. On the contrary, the older drivers would not have the tendency to speed in the future.

"As usual, I cannot convince that I will follow the speed limit, depends on the condition" (Male 1, G2, 26 years old, drive a Hyundai car)

"I want to follow but most of the times, I failed. When I get used to speeding, suddenly I need to adhere to the speed limit, I feel sleepy as I get used to speed." (Female 5, G2, 24 years old, drive a Proton car)

"No, of course, we all will follow to the speed limit." (All participants group 4, older participants aged between 60 years to 80 years old)

"I am unsure about that, depends on the condition…" (Male 2, G3, 28 years old, drive a Proton car)

"Every time I drive at highway, 80% of them speeding, usually speed at 120km/h and 130km/h (Male 5, G1, 26 years old, drive a Proton car)

5.10 Intention to Comply to Speed Limit in Future

The participants admitted that they would like to follow the speed limit, but it was hard for them as they had frequently been involved in speeding. Several of the participants also admitted that they had difficulties in complying with the Expressways speed limit and

some claimed that they would follow the speed limit. There were also respondents who confessed that they would follow the speed limit, depending on the condition.

"I think I will comply the speed limit for Federal road and rural road, but for Expressways is a bit hard." (Male 1, G1, 30 years old, drive a Perodua car)

"I cannot promise I can comply to the speed limit; I find it hard for Expressways." (Female 4, G1, 38 years old, drive a Honda car)

"I will say personally, federal will comply..." (Male 2, G3, 28 years old, drive a Proton car)

"Federal road…yes…because I had to... If Expressways, I think it is difficult…30% from the time I will speed and 70% I will follow to the speed limit from the total driving." (Male 5, G1, 26 years old, drive a Proton car)

"Of course, will comply…" (Female 3, G2, 26 years old, drive a Proton car)

"Depends on the condition…" (Female 4, G2, 23 years old, drive a PERODUA car)

"I want to follow the speed limit, but most of the time I failed to comply. I usually speed, when I slow down, I feel sleepy…" (Female 5, G2, 24 years old, drive a Proton car)

"Of course, we all will follow." (All participants from G4, older age between 60-80 years old).

5.11 Differences of drivers' speeding behaviour between younger and older drivers

Finding 1: The differences in motivation to speed between younger and older drivers

(a) Older drivers are seldom to speed. However, if they are speeding, usually it is not due to emotional reasons, more to practical reasons

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Evidence 1:

"Someone sick in the car" (*Female 11, G4, 71 years old, drive a Honda car*)

Evidence 2:

"To avoid some other dangerous transportation, so when you speed, you overtake them. Maybe a big lorry carrying loads or whatever, or big trucks something like that." (*Female 2, G4, drive a Perodua car*)

Evidence 3:

"Want to follow, tailing me. I don't like heavy vehicle tailing me or in front of me. I always try to go faster. Other than holding me" (*Female 6, G4, 72 years old, drive a Toyota car*)

Evidence 4:

"If one of my passengers do not feeling well maybe I will overtake" (*Female 10, G4,76 years old, drive a Perodua car*)

Evidence 5:

"When I realize somebody is after me, and I am in danger, ok so I need to speed" (*Female 5, G4, 68 years old, drive a Toyota car*)

(b)   Younger drivers are always speeding for emotional reasons

Evidence 1:

"As a girl, especially during sadness and mad…" (*Female 3, Group 2, 26 years old, drive a Proton car*)

Evidence 2:

"On the way to airport for honeymoon purpose, I feel that it is late. So, I speed at the MEX Expressways" (*Female 4, Group 2, 23 years old, drive a Perodua car*)

Evidence 3:

"Emotional plays very crucial role. For example, when I plan to do some business and I already planned the time properly, but it did not work. Normally, I tend to speed" (*Male 1, Group 2, 26 years old, drive a Hyundai car*)

Evidence 4:

"For me, I personally feel that emotion can cause someone to speeding. For example, in terms of positive and negative, as negative just now as you said stressful like that for me, I feel as personal I won't speed of that kind of speeding because I always bring family. In terms of positive side, let say after work or some achievement we get, on the way back to home, sometimes I will speed cause too hyper or too much happiness" (*Male 2, Group 3, 28 years old, drive a Proton car*)

Evidence 5:

"*Emotion can also cause people to speed. Sometime people who are in angry mood, they don't know where to show their madness"* (*Female 1, Group 3, 27 years old, drive a Perodua car*)

Finding 2: The role of an accompanying person is different between younger and older drivers

(a)   Older drivers who are accompanying the drivers may not influence the drivers to speed

Evidence 1:

"No, it's not influences on speeding, but is good company on the driver. So, it should not have any influence on drivers to speed" *(Female 11, Group 4, 71 years old, drive a HONDA car)*

Evidence 2:

"Like for young people they got so many friends, can chit chatting, whereas for senior people, let say my spouse is driving, I advise him not to speed. So that's the advantage point" (*Female 5, Group 4, 68 years old, drive a TOYOTA car*)

Evidence 3:

"Like if you sleepy then you can actually chat with him and just keep him alert" (*Female 1, Group 4, 71 years old, drive a TOYOTA car*)

Evidence 4:

"If I have somebody like older people sitting beside me, they will say slow down. Even, it is already very slow" (*Female 2, Group 4, 72 years old, drive a PERODUA car*)

Evidence 5:

"*The family members always deter you from speeding"* (*Male 1, Group 2, 26 years old, drive a HYUNDAI car*)

(b)   Younger drivers who are accompanying the drivers may influence the drivers to speed

Evidence 1:

"Those younger age group they tend to feel like playful, they tend to be more harmful to the drivers" (*Female 1, Group 4, 71 years old, drive a TOYOTA car*)

Evidence 2:

"That is of course my children, one of my children say, "why so slow"? They want you to go faster" (*Female 2, Group 4, 72 years old, drive a PERODUA car*)

Evidence 3:

"The younger people drive, I sit beside I dare not to close my eyes. I will be looking at the metre. And every time I said already exceeded after some time, mommy can u please take over. That's the situation. The younger people always want to go fast. They don't care about speeding." (*Female 8, Group 4, 69 years old, drive a HONDA car*)

Evidence 4:

"For me, just now you said family members, girlfriend, wife or husband, is kind of good, they tend not to make you to speed. They more just drive safely to the destination compare to another group maybe can put like youngster or group of friends if they mingle up, maybe too excited or something else, that kind of situation tend to make for speeding." *(Male 2, Group 2, 37 years old, drive a PROTON car)*

Evidence 5:

"My sister sometimes laa…my sister sometimes does…you are going so slow and ask to speed up. Of course, younger sister, my parent does not allow. When I'm going with my siblings then my sister asks to speed. But if we are going with parents, my sister doesn't say la (Female 3, Group 2, 26 years old, drive a PROTON car)

Finding 3: Discrepancy of opinions between younger and older drivers on the practicality of speed limit in Malaysia

(a)   Older drivers perceive the current speed limits are acceptable for Malaysian roadways

Evidence 1:

"Ok, I personally feel speed limit at 110 depend on 3 conditions. Like he said, condition road, condition of car, the third thing should put is age of driver. If these 3 things qualify

can increase the speed limit. But if the conditions do not satisfy, 110 is suitable." *(Male 3, Group 4, 67 years old, drive a TOYOTA car)*

Evidence 2:

"*I'm insist the professional should study the condition of the road; what speed car can take, whether it is Ferrari or whether it is average car or than you cannot say lower car cannot travel on that road as there is no reasons for travel. But that is the maximum the enforcement must apply to them. I think 110 is quite safe for Malaysian roads I think cause wet and not like in New Zealand when you drive there all the weather are almost consistent, so it's different*" (*Male 3, Group 4, 67 years old, drive a TOYOTA car*)

Evidence 3:

"*Speed limit of Expressway is 110km/h, the Federal road should be 90km/h*" (*Male 3, Group 2, 71 years old, drive a PERODUA car*)

Evidence 4:

"*Speed limit must be implemented, the professional should study the condition of the road, whether it is suitable 220 or just 110. Whether the car, old car or new car, old man or new man, young man, I think the speed limit must be implemented, must be enforced based on the professional study the road suitable for whatever speed*" (*Male 9, Group 4, 80 years old, drive a HONDA car*)

(b)   The younger drivers perceive the current speed limit should be increased

Evidence 1:

"*If the speed limit is 130, I can drive at 120...smoother journey*" (*Female 4, Group 2, 23 years old, drive a PERODUA car*)

Evidence 2:

"Can suggest to highway concession to increase the speed limit from 110km/h to 120km/h" (*Male 2, Group 1, 30 years old, drive a PERODUA car*)

Evidence 3:

"I think should be increased to 130km/h…" (*Female 3, Group 2, 26 years old, drive a PROTON car*)

Evidence 4:

"*In my opinion, the government should consider increasing the speed limit of Expressways to 120km/h or 130km/h and maintain the federal roads speed limit to 90km/h"* (*Male 2, Group 5, 31 years old*)

Finding 4: Frequency of speeding between younger and older drivers

(a)   The older drivers are rarely involved in speeding

Evidence 1:

"*Zero occurrence for speeding at highway and federal"* (*Female 1, Group 4, 71 years old, drive a TOYOTA car*)

Evidence 2:

"*I can say once…"* (*Male 4, Group 4, 74 years old, drive a MERCEDES car*)

Evidence 3:

"Ok federal road no, maybe Expressway once" (*Female 8, Group 4, 69 years old, drive a HONDA car*)

Evidence 4:

"*I should say two times on Expressways, Federal roads no because I don't drive outside KL…"* (*Female 2, Group 4, 72 years old, drive a PERODUA car*)

Evidence 5:

"Once only. It's on Expressways." (Female 6, Group 4, 72 years old, drive a TOYOTA car)

(b)   The younger drivers are frequently involved in speeding

Evidence 1:

"*Most of the time, I speed. On the Expressways I can say eight times out of ten" (Male 1, Group 2, 26 years old, drive a HYUNDAI car)*

Evidence 2:

"Every time I use the Expressways, 80% of it is speeding, usually my speed limit at 120km/h and 130km/h" (Male 3, Group 1, 23 years old, drive a HONDA car)

Evidence 3:

"*It depends on the road conditions. If I am forced to speed, I will speed. Usually, half of the situations I will speed." (Male 5, Group 1, 26 years old, drive a PROTON car)*

Evidence 4:

"Four times speeding on Federal roads and three times speeding on Expressways" (Male 2, Group 3, 28 years old, drive a PROTON car)

Evidence 5:

"Most of the times, I will speed on Expressways compared to Federal roads." (Male 2, Group 5, 31 years old, drive a PROTON car)

Finding 5: The intentions to comply to the speed limit in future are different among younger and older drivers

(a)   The intentions of older drivers to comply to the speed limit is strong in the future

Evidence 1:

"Of course, will comply…" (All group members of Group 4, aged 60 years old and above)

(b)   The intentions of younger drivers to comply to the speed limit is low in the future

Evidence 1:

"I cannot promise that I will comply to the speed limit in the future. It is difficult especially on the Expressways." (Male 1, Group 1, drive a Proton car)

Evidence 2:

"As usual I will speed when the situation allows me to speed." (Male 1, Group 2, 26 years old, drive a HYUNDAI car)

Evidence 3:

"I have an intention to follow the speed limit but most of the time it does not work. I feel sleepy whenever I have to follow the speed limit as I am used to speed." (Female 5, Group 2, 24 years old, drive a PROTON car).

Based on the qualitative findings mentioned as above, it can be understood that the older drivers are more cautious while driving for several reasons; the tendency for older drivers to speed are more rational than the younger drivers, the role of the older passenger who accompanies the drivers are different than the younger drivers, the rationality of speed limit by the older drivers, less frequency of speeding among the older drivers and high intentions for speed limit compliance by the older drivers. This situation is applicable on both roadways, Expressways and Federal roads as the respondents are experiencing both roadways during the interview was conducted.

5.12   Driver typologies

From the discussion conducted with the participants in the focus group discussion, it was found that they could classify themselves accordingly. Majority classified themselves as cautious drivers, *N*=17 (56.7%) followed by pragmatic drivers, *N*=5 (16.7%), risk-taking

drivers N=4 (13.3%), law-abiding drivers, N=3 (10.0%) and ambivalent drivers N=1 (3.3%).

5.13   Recommendations to the Government and Authorities

To improve and reduce drivers' speeding behaviour, the participants also offered a few suggestions. For instance, conducting courses about safe driving, driving attitude and discipline. Without doubt, education plays a major role in educating the drivers, especially those who received numerous summonses. More importantly, the government should enforce the law strongly and continue to tighten the enforcement.

(a)   Education about safe driving to drivers

"The government should continue to give education about safe driving…I mean those who educational can do it. First is age. Second is those who get many fines. I think that's part of educational." (M9, G4, 80 years old, Honda car)

(b)   Discipline and driving attitude course for drivers

"There's certain countries they encourage drivers after certain years of number you have to go to for discipline course." (MALE 3, G4, 67 years old, Toyota car)

"Those who get many fines, I think that's part of educational." (F6, G4, 72 years old, Toyota car)

"Driving attitude course." (F5, G4, 68 years old, Toyota car)

(c)   Strengthen the enforcement

"I think UK enforced the law strongly, our neighbour Singapore too. They are far in enforcement" (M9, G4, 80 years old, Honda car)

"Increase awareness on speeding, install more AES cameras and reduce tax fee for those without any compound." (F2, G5, 27 years old, drive a Mazda car)

"One time, I don't know, I drive in Scotland, I got a caught first over… 1week after that, they came to my house with my picture, my picture is there. 70 pounds fine, very fast (M4, G4, 74 years old, drive a Mercedes car)

(d)   Road-tax incentive for compliance drivers

"But why don't they give road tax incentive." (M7, G4, 81 years old, drive a Honda car)

(e)   Hang up accident pictures on the billboard along the roadways

"If at highway, u put the accident picture, the car hangs up there, you put date and number and, the driver who look at that got scared already, in Iran. They put real car (M4, G4, 74 years old, drive a Mercedes car)

(f)   Installing in-vehicle device to alert drivers

"Lorry need to install speed alarm (M9, G4, 80 years old, drive a Honda car)

(g)   Sitting for examination before renewing driving license especially for older drivers

"They say can renew your licence. So far, they had no implement if you want to renew your licence, you have to sit for test. I think in Australia you have to go for test before you want to renew your license. I think above 90 years old, like eye sight is very important (M9, G4, 80 years old, drive a Honda car)

There were also some recommendations on what drivers can do to improve the situation of driver's speeding behaviour.

(a)   Self-consciousness among drivers

"We need to have self-conscious… "(MALE 2, G2, 37 years old, drive a Proton car)

"As a driver, we have to be alert with the AES cameras, as normally AES will be placed at accident-prone location" (G5)

"Speeding only in practical situation, not every time and obey to the speed limit." (F2, G5, 27 years old, drive a Mazda car)

(b) **Be an exemplary to the younger drivers**

"If I bring kids or my brother/sister below 18 years old, I will comply with the speed limit, shows an example to them." (F5, G2, 24 years old, drive a Proton car)

5.14 Word Cloud

Besides analysing the respondents' excerpts to identify various themes, the excerpt has been analyed in Nvivo software to study the distinct phrases or words that emerge, so as it combines to make a word cloud.
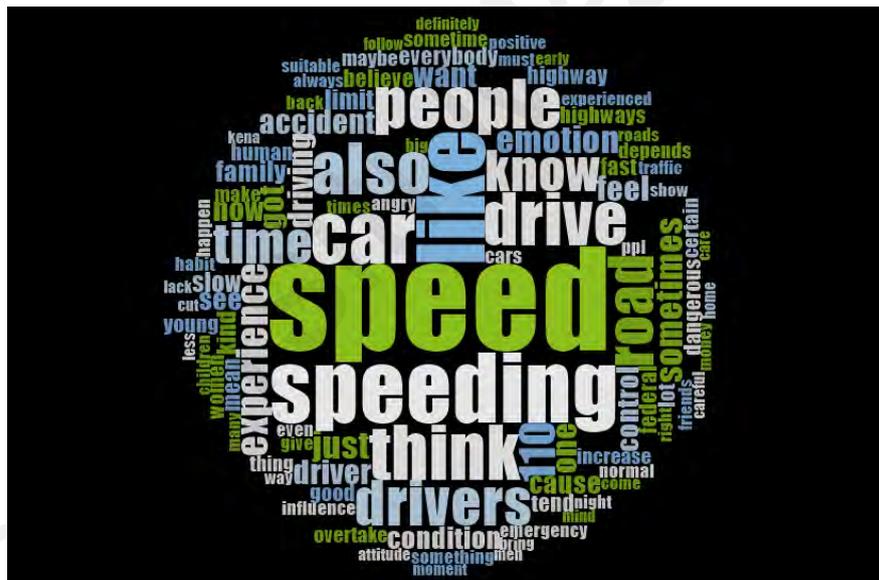
Figure 5.1: Word Cloud

Based on the Figure 5.1 above, the obvious word that can be seen are speed, speeding, think, drivers, people, car, know, drive, road, condition and the others. The words that appear in larger fonts are the most frequent words utter by the respondents. Meanwhile, words that appear in smaller fonts are the less frequent words utter by the respondents. This has shown that most of the respondents' utter words that relate to the topic and this

also has given us an understanding and a summary picture of what speeding behavour is all about.

5.15 Mind Mapping from Respondents' Excerpt

After the word cloud output, the findings from respondets' excerpt can also be presented in a mind map. This mind map comprised a summary of factors that affect drivers' speeding behaviour.
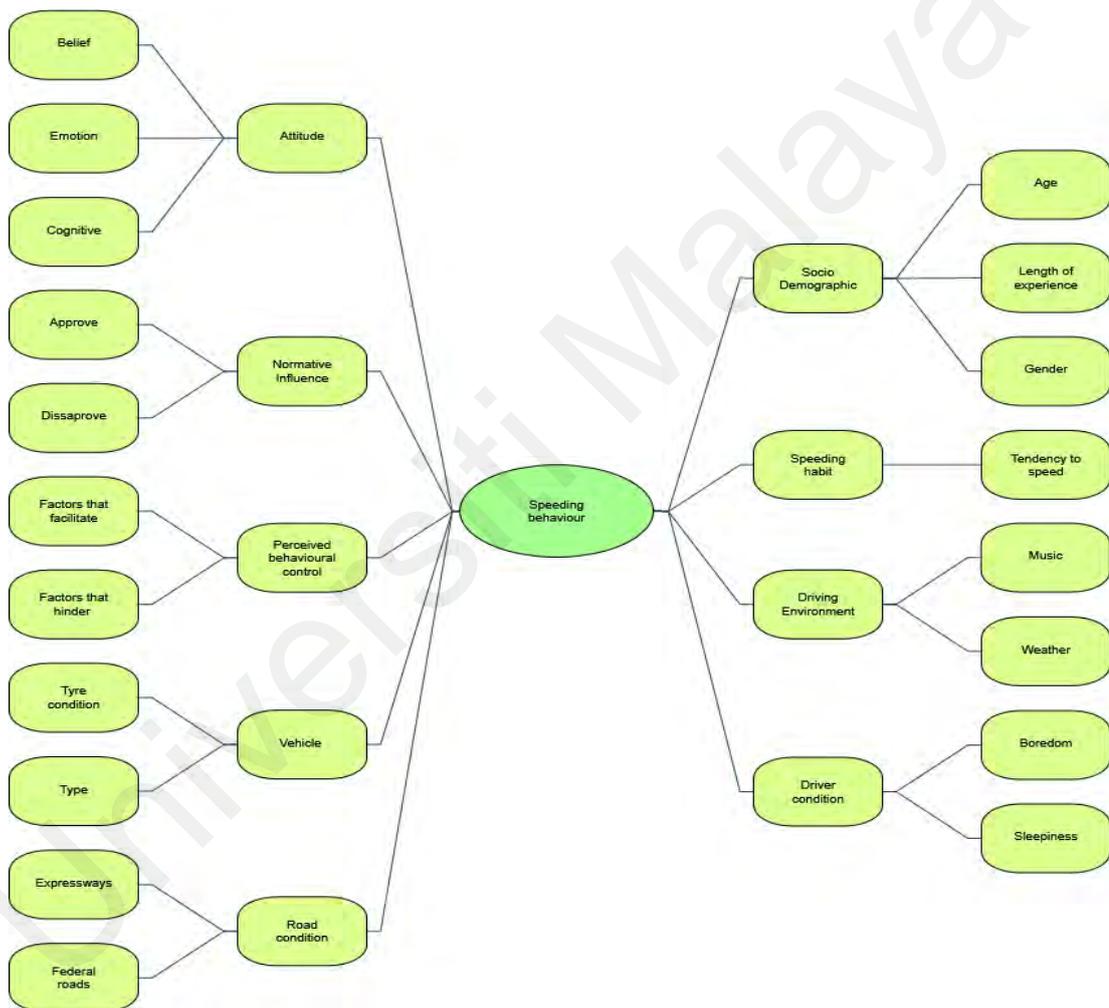
Figure 5.2: Mind Mapping from Respondents' Excerpt

Referring to Figure 5.2, several variables emerged such as attitude which comprise of belief, emotion and cognitive; normative influence which consist of the significant others who approve and disapprove the behaviour; perceived behavioural control which consist of factors that facilitate or hinder the behaviour.

Besides that, vehicle condition comprise by tyre condition and type of vehicle; road condition that can be divided into two types which are Expressways and Federal roads; socio-demographic such as age, experience length and gender; habit or tendency to speed; driving environment either internal environment such as music and external environment such as weather; and finally, drivers' condition refers to boredom and sleepiness during driving. All of these variables act as the independent variables, which later affect the dependent variable which is speeding behaviour.

5.16   Triangulation Concept

Referring to the concept of triangulation that has mentioned in Chapter 3, both quantitative and qualitative data has been conducted. Thus, relevant results from both methods could be discovered and identified to further examine the significant of each result. The triangulation concept as referred to the diagram below itemised the mixed methods involve in the study which are the quantitative method with the use of face-to-face survey and empirical research. From these methods, two research objectives have been achieved. The first research objective is to identify the key factors that affect drivers' speeding behaviour. The factors that affect drivers' speeding behaviour for both roadways are different as it involves different road types and different socio-demographic backgrounds.

Nevertheless, the second research objective which is to explore the attitude and the components of attitude that affect drivers' speeding behaviour reveal the same finding. Both the affective and behavioural attitudes have higher correlation to speeding behaviour compared to the cognitive attitude. Meanwhile, the result for empirical research reveals that three locations are reported of speeding cases with each location reported to have higher 85^{th} percentile of speed compared to the posted speed limit, 110km/h. The highest 85^{th} percentile of speed is KM431.5 Rawang with 130.3km/h, followed by KM42 Nilai

with 126.1km/h and KM232 Kuala Kangsar with 112.1km/h. These results show to us that speeding behaviour occur among drivers on Expressways. This can also be linked to the the trip purpose, speed violation record, affective and behavioural attitudes which have influenced drivers to speed.

In addition, a thorough explanation and justification of why drivers involve in speeding behaviour on Expressways can be obtained from the qualitative finding, focus group discussion. Majority of the drivers admit that they have higher intention to speed on Expressways as compared to the Federal roads because of their socio-demographic backgrounds, road types, vehicle type and vehicle conditions. They also explain the role of habit in influencing their behaviour in which the habit is somehow related to the frequency of speeding behaviour.
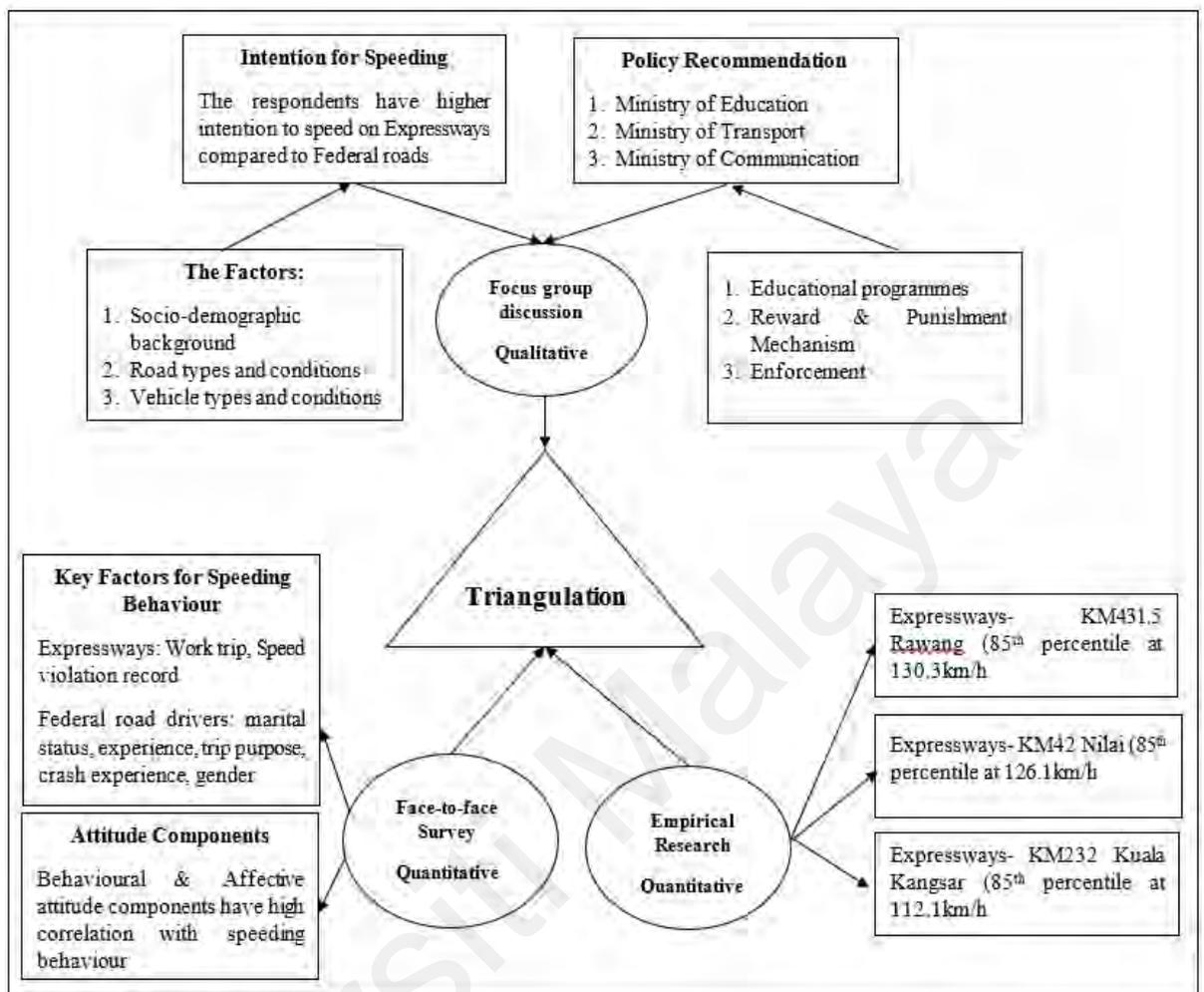
Figure 5.3: Triangulation Concept for Speeding Behaviour

5.17   Discussion

In the focus group discussion, majority of the participants were males, Malay ethnicity and they have extensive driving experience, covering more than 10 years. Since this study needs variation in the kind of responses, it was found that majority of the participants had acquired undergraduate and diploma educational background; one third of the participants were retirees while others held executive or student statuses. Many had no previous speed violation records and crash experiences; many also used Malaysian car brands such as *PERODUA* and *PROTON* and majority owned cars for between one to five years long.

The frequency distribution of the reported speed for Expressways and Federal roads as revealed by participants suggest that one third of the participants reported speeding, with about half of them speeding on Expressways. This demonstrates that participants had a higher tendency to speed on Expressways as compared to Federal roads. In addition, findings drawn from the focus group discussion also provided some insights on the influential factors of speeding. This encompassed the participants' attitude towards speeding such as perception and emotional elements in influencing speeding, subjective norm like peers who approved the behaviour and spouses who disapproved the behaviour.

Another influential factor involved the participants' perceived behavioural control such as road conditions and driving environment which facilitated the speeding behaviour. The third influential factor was the demographic influence such as younger age and lesser driving experience. In addition, habit and past experiences also influenced their attitude towards the intention to commit speeding behaviour.

The findings of this study are an extension of the original framework of TPB. This study used attitude, subjective norm and perceived behavioural control to measure

drivers' behavioural intention of speeding. This extension is believed to provide additional insights and understanding towards the actual behaviour of speeding. Furthermore, the recommendations given by the participants to reduce speeding on the roads were also seen as another aspect of the significant findings generated by this study. The participants had proposed that the government and authorities should strengthen the speeding enforcement and to take exemplary models from other countries such as the United Kingdom, Japan and Singapore.

Further, it is important to cultivate self-control so as to control the physiological condition and to not allow emotions to influence and control the individual as a person. Thus, there should be more education for drivers on this aspect. Parents, on the other hand, should play their roles by being an exemplary model to their children such that they adhere to driving speed limits whilst also advising their children should they violate the speed limit while driving. In contrast, road tax incentives could be given to drivers with good driving records while social works can be imposed on habitual traffic offenders.

5.18   Summary

This chapter has demonstrated the application of the Theory of Planned Behaviour (TPB) which was fortified by some additional constructs in understanding drivers' reasons and intention towards speeding on different road types - Expressways and Federal roads. The original framework of the TPB is suitable for explaining the drivers' behaviour especially in speeding. However, the researcher believes that by incorporating additional constructs such as demographic characteristics, habit and attitude involving past experiences to the original TPB, a more thorough understanding of the matter being discussed can be accomplished.

In this regard, the findings from demographic background suggest that the age and driving experience influence driver's speeding behaviour. This means, young drivers admit that they are prone to involve in speeding behaviour compared to the older drivers. Similarly, the experienced drivers tend to speed under certain circumstances and conditions. However, with the experiences they have eventually made them to speed more frequently than the inexperienced drivers. The influence of habit on speeding behaviour indicates that drivers have higher frequencies to speed on Expressways than the Federal roads. Meanwhile, drivers with crash experience and speed violation record tend to cease from speeding momentarily.

Furthermore, several important issues being discussed and highlighted by the researcher, such as the practicality of speed limit for both roadways in Malaysia, driver typologies and recommendations for road users can be implemented in the Malaysian road context. All of these excerpts provided by the participants highlight their reasons and intentions for speeding. Therefore, their recommendations should be given the highest consideration and priorities by government, authorities and enforcement agencies. Doing so can help the country to improve drivers' attitude and behaviour while they are driving on the Expressways and Federal roads in Malaysia.

CHAPTER 6: DISCUSSION, RECOMMENDATION & POLICY

IMPLICATIONS

6.1 Introduction

The number of road fatalities in Malaysia has continued to escalate every year, from 6,706 in 2015 to 7,152 in 2016 (MIROS, 2016). The growth in these fatalities can be attributed to one significant cause, drivers' speeding behaviour. Although speeding contributes substantially to the statistics of road fatalities (The Borneo Post, July 18, 2018), drivers nevertheless, are still speeding (Fauziah, 2017). Research looking at the speeding behaviour of Malaysian road drivers has been ongoing because this is a crucial issue since it causes huge damages to the country including disastrous effects to the drivers themselves as well as their passengers, other road users who share the same roads as well as national organisations which also provide support during road accidents, such as the Fire department, Police department, Insurance, Hospitals and many more. Drivers' speeding behaviour can be attributed to their bad attitudes and behaviour (Nora, 2017). Therefore, a solution directed towards improving the drivers' attitude and behaviour is necessary for reducing drivers' frequency of speeding, which leads to road fatalities on Malaysian Expressways and Federal roads. This phenomenon is a great challenge to the Malaysian government, authorities and enforcement agencies as many lives are lost. As such, this study was conducted with the aim of examining Malaysian drivers' speeding behaviour by focussing on their attitudes and behaviours. Based on this aim, four research objectives were developed to complement the research aim. They include:

1. To investigate the key factors that affect drivers' speeding behaviour.

2. To explore the attitude, components of attitude and their relationship with drivers' speeding behaviour.

3. To uncover reasons and intention for drivers' involvement in speeding behaviour.

4.   To propose policy recommendation to improve driver speeding behaviour and reduce speed-related road crashes.

To accomplish these four research objectives, a mixed method approach was employed. This refers to the integration of the quantitative research method and data with the qualitative research method and data. In the quantitative research method, an attitude survey questionnaire was conducted among Expressways and Federal roads participants. The outcome generated from the survey analysis addressed Research Objective 1, Research Objective 2 and Research Objective 3. Further to this, the qualitative research method applied the focus group discussion on selected participants to generate an interview session which also draws on their expressed views and opinions. The goal was to use their spoken data which disclosed their reasons and intention for involving in speeding behaviour as supplementary information. The interview questions of the focus group discussion were guided by the Theory of Planned Behaviour. In this phase of the study, three additional constructs were also added to the qualitative research namely habit, past experiences and socio-demographic characteristics in explicating the drivers' reasons and intention of involvement in speeding behaviour. This information complements the quantitative data results. The qualitative approach helps to fulfil Research Objective 4. The results and findings obtained from both methods - the attitude survey and the focus group discussion were already explained in Chapter 4. The current chapter discusses the attitude survey and focus group outcomes together with the practical implications that emerged from this study.

6.2   Key factors for Drivers' Speeding Behaviour

The first research objective of this study is related to the investigation of key factors that affect drivers' speeding behaviour. To achieve this research objective, several variables namely socio-demographic characteristics (comprising age, gender, marital

status and employment), trip characteristics (comprising trip purpose, travel distance and travel time) and driver factors (comprising driving experience, speed violation records and crash experience) were examined in the Logistic Binary Regression. From these variables, it was noted that two factors that are trip purpose and drivers' speed violation record had emerged quite evidently as key factors of the drivers' speeding behaviour on the Expressways. In contrast, five factors that are gender, marital status, trip purpose, driving experience and crash experience had emerged as key factors of the drivers' speeding behaviour on the Federal roads.

The results of the Expressways have highlighted that trip purpose and those with speed violation record are keen to speed on the road. Those who travelled for work trip purposes were more liable to commit speeding behaviour while those who had speeded before and had been fined for speeding in the past 12 months also carried a higher tendency to commit the speeding behaviour. [2]Meanwhile, the results of the Federal roads revealed that drivers with trip purposes for leisure and home trip, marital status single/separated, those with long driving experience, males, and those with crash experiences in the past 12 months are keen to speed on the road. These findings are in line with prior studies, for example, trip purpose has profoundly contributed to speeding behaviour (Broughton et al., 2003; Fleiter & Watson, 2006; Stradling et al., 2000; Transport Research Laboratory, 1999). According to Maat et al. (2005), speed increases whenever travel distance and time increase. As for leisure trips, Dominic et al. (2017)

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[2] This paragraph contains some of the sections that was taken from a peer-reviewed journal article that was accepted for publication. The PhD candidate is the principal author and responsible for all aspects of manuscript preparation. The paper was cited as Farah Fazlinda M., Jamilah M., & Ahmad Saifizul, A. Are Socio-Demographic Characteristics and Attitude Good Predictors of Speeding Behaviour among Drivers on Malaysia Federal Roads? *Traffic Injury Prevention, 20* (5), 478-483.

contended that speed tends to increase as a result of uncommon leisure traffic or periodic private visits or leisure events as part of short vacations or same-day visits.

Besides that, participants with crash experiences were more likely to speed on the road. Those with traffic crash record displayed lower risk perception towards speeding than those who did not (Health and Safety Executive and Scottish Executive, 2002). Those with the road traffic crash involvement tend to speed more often when late, feeling stressed, listening to music or because of hot weather (Stradling, 2005). Subsequently, males have been continuously found to be a significant contributor for speeding, in comparison to their female counterparts (Cestac et al., 2011; Moller & Haustein, 2014; Williams et al., 2006).

Based on these results, it can be summarised that between the two types of roads, driver factor is the main contribution to drivers' speeding behaviour on both the Expressways and Federal roads. In this regard, these variables comprising drivers' speed violation records and their crash experiences need to be taken into account more seriously by authorities. These results imply that the drivers' past behaviour can be used to predict future possibilities of speeding. Past behaviour is typically the strongest predictor of intention and behaviour in the Theory of Planned Behaviour variables (Ajzen, 1991; Conner & Armitage, 2008).

It is reported by Conner and Armitage (2008) that the addition of past behaviour to the Theory of Planned Behaviour variables has increased about 7% of the variance in intention and 13% of the variance in the behaviour. It should be noted that past behaviour does not cause the subsequent behaviour to occur. Nevertheless, the regular performance of a behaviour may bring the subsequent behaviour under the control of habitual processes and make subsequent performance of the behaviour more likely (Conner et al., 2007).

On the other hand, these factors are attributable to the behavioural attitude emphasised by the ABC Model of Attitude. It appears that such behavioural attitude has an influence on the person's overall attitude towards speeding behaviour. Prior studies elucidated that affective is stronger than the others in facilitating the risky behaviour such as speeding behaviour (Lawton et al., 2009). Nonetheless, Katz and Stotland (1959) and Kothandapani (1971) corroborated that apart from affective, the behavioural component should be evaluated to predict behaviour. Taken these statements together, both components have the capability to significantly influence speeding behaviour, although this study has shown only one component that is the behavioural is significant to influence speeding behaviour.

As a further support, the drivers' details on speeding are further elaborated. It appears that drivers, or in the case of this study, participants' frequency in receiving speeding fines for the past 12 months also contribute to their speeding behaviour. Results indicated that they comprised 47.8% for Expressways drivers. On the same note, attitudes towards high and low-risk violations and observed that those drivers who regularly commit traffic violations, such as speeding, have a positive attitude towards committing these violations (Rothengatter, 2000). However, a cohort study was conducted among 30,000 Maryland drivers who have ticketed for speeding and it was found that those who have ticketed for speeding have lower risks of subsequent speeding citations compared to those who have chosen to appear in court, which have shown a higher risk of speeding citations (Li et al., 2011).

Meanwhile, records of past crashes were also contributory to drivers' speeding behaviour. It seems that participants who had experienced crashes for the past 12 months were substantial, 44.3% for Federal roads. In contrast, Iversen & Rundmo (2011) found that associations between driving attitudes and crash involvement existed but were less

strongly predictive than biographical variables. These results highlight the possibility of past behaviours (attributable to behavioural attitude) facilitating the overall attitude of the drivers' speeding behaviour. This finding affirms the results of previous research (Fazio, 1987) which asserts the capability of past behaviours (behavioural attitude) in affecting the overall attitude of drivers towards the speeding behaviour.

The basis of behavioural attitude in influencing the overall attitude can be referred to as the concept of self-perception (Fazio, 1987). This implies that the observation of past behaviour could result in either a positive evaluation or negative evaluation towards the attitude. This means that, if positive evaluation was produced as a result of not receiving any speeding fine and not being involved in any crash during the observation, the person may perceive the evaluation as desirable, thereby continuing to be involved with the speeding behaviour. However, if a negative evaluation was produced as a result of the speeding fine or involvement in a crash during the observation, the person may perceive it as undesirable, hence ceasing to be involved in the speeding behaviour.

This study has evidence to confirm that the driver factor serves as the key factor in affecting drivers' speeding behaviour for Expressways and Federal roads participants. In relation to this, the attitude construct has been explored in subsequent sub-chapters toexamine the components, the relationship among the components and their relationship with speeding behaviour.

6.3 Exploring Attitude, Attitude Components and their Relationship with Speeding Behaviour

The second research objective of this study is related to the exploration of attitude, its components and their relationship with speeding behaviour. The exploration of the attitude construct in the factor analysis yielded three attitude components: affective, behavioural and cognitive. The outcome generated by the attitude components was

comparable to the ABC Model of Attitude. This model also carried three attitude components that were beneficial in developing the drivers' attitude which will later, facilitate their overall attitude which then affect their behaviour. The first attitude component was the affective component which was derived from the emotional base. In this study, the affective component was described by ten attitude variables which are: "Speeding when I am in an angry mood", "Speeding when I am moody", "Speeding feeds my ego by giving me a sense of power and control", "I feel excitement and thrill while speeding", "I like the feeling of speeding", "I feel more relaxed when speeding", "I feel that I am skilful enough to avoid accidents while speeding", "I feel that speeding is a normal driving behaviour", "I feel that I would not be caught speeding by the authorities" and "I fear the police, thus, I rely on technology to inform me of the police's presence".

In a study among New South Wales drivers revealed that despite their understanding that speeding is the key factor in motor vehicle crashes, speeding is common and is not yet seen as socially unacceptable (Walker et al., 2009). Furthermore, the role of emotion and affective component in evaluating the risk is also pervasive. The previous study has highlighted that emotions and affective component through a heuristic affect have high chances in influencing human decision-making and perceived risk (Slovic et al., 2007), which could explain the risky driving behaviour (i.e. speeding) among drivers.

The second component of the attitude construct was the behavioural component which looks at tendency or action and the observation of past behaviour. In this study, the component was described by 15 attitude variables which include: "I tend to speed when other road users start speeding", "I tend to speed because my friend encourages me to speed", "I tend to speed when I need to meet a deadline", "I tend to speed as a sense of urgency", "I tend to speed when there is no enforcement around", "I tend to speed when

driving alone", " I tend to speed when listening to certain types of music", "I tend to speed when the weather is clear", "I tend to speed during the day as compared to night", "I tend to speed when driving a bigger vehicle", "I tend to speed because I feel safe in the vehicle", "I tend to speed when the speed limit is low", "I tend to speed on wide lanes", "I tend to speed when there is no warning sign at the location" and "I tend to speed due to slow drivers".

Majority of drivers admit for intentional speed limit violations in the condition where they are in hurry, enjoy driving fast and bored (Elvik & Vaa, 2004). Similarly, driver's perception on safety and travel speeds could be strongly influenced by the cross-section elements such as the width and the number of lanes (Shuo, Junhua & Ting, 2016), by which this element (i.e. lane width) interact with the speed-crash rate relationship (Shuo et al., 2016). These actions have signified the behavioural component that is the tendency to act or resolve in a specific way (Garcia-Santillan, 2012). The third component in the attitude construct was the cognitive component which was based on beliefs or thoughts about the attitude object. In this study, the component was described by six attitude variables which consists of: "Speeding has a direct link to accident", "I believe I have the ability to overtake other vehicles safely", "I follow the speed limit at all times", "I follow the speed limit to avoid summons", "I follow the speed limit when I see accident warning signs at the location", and "I follow the speed limit when I enter a curved road".

The evaluation of the cognitive attitude was reflected in four ways. Firstly, the expectancy-value model as introduced by Fishbein and Ajen (1975). In this model, the individual uses and applies the information which is associated with the object when making an evaluation. Each of the attitude object has expectancy and value attached to each of the perceived attributes, such as in this statement "Speeding has a direct link to accident." If the participants valued this variable as positive, then a positive evaluation and attitude was expected. This would result in the participants being unlikely to be

involved in speeding behaviour. However, if the participants held negative values towards this variable, then a negative evaluation and attitude would be expected and so the participants were likely to be involved in speeding behaviour.

Secondly, the information integration theory postulated that as the information was processed and interpreted, it would later be integrated with the belief that one already holds (Anderson, 1981). This is represented by the variable, "I believe I have the ability to overtake other vehicles safely". Prior to overtaking, the participant has the information that overtaking other vehicles can reduce the journey time. Hence this information has been interpreted and integrated with the belief that he/she holds. As the participants embraced such positive beliefs during the overtaking of other vehicles, this has facilitated the attitude into influencing the speeding behaviour more easily.

In addition, the other attitude variables which include "I follow the speed limit at all times", "I follow the speed limit to avoid summons", "I follow the speed limit when I see accident warning sign at the location" and "I follow the speed limit when I enter a curved road" were more likely to evaluate how the participants believed and thought. In other words, whether they evaluated these variables as positive or negative may cause them to have either a favourable or unfavourable attitude towards speeding. From the results generated in this study, it was also observed that majority of the participants agreed with all these variables. In this regard the participants adhered to the speed limit as they are concerned on the possibility of crash and injury as a result of speeding by which the excessive speed could amplify the consequences of serious crash (Stephens et al., 2017).

Another significant finding of this study is that the results of the correlation coefficient between the attitude and behaviour components made clear that the affective and behavioural attitudes were positively related with the speeding behaviour. Both components showed a positive and moderate correlation with $p < 0.05$, except for the

cognitive attitude, which showed a negative correlation with $p > 0.05$. These results signified the capability of the affective and behavioural attitude in affecting the behaviour of the drivers or participants. This outcome was also affirmed by previous research (Glasman & Albarracín, 2006) which asserted that there was substantial positive correlation among the attitude components with behaviour by which attitude had emerged on self-reported measures used to predict a behaviour.

6.4 The Similarities of Drivers' Attitude towards Speeding on Different Road Types, Expressways and Federal roads.

Moving on to the other important findings of this study, the similarities of the drivers' attitudes towards speeding behaviour when on different road types are further discussed. It appears that both the participants on the Expressways and Federal roads showed comparable and favourable attitudes towards speeding behaviour. This is evidenced by the significant results of the analysis of variance between the speed violation records and the reported speed given by the participants when using both roadways. It can be deduced from the results that participants who do not have any speed violation records on Expressways shared similarities in terms of their reported speed, with those who never received any speeding record when on Federal roads. This outcome can be taken to mean that those participants with no speed violation records were more likely to adhere to the speed limit as compared to those who received speed violation records.

In contrast, those who received speed violation records when using Expressways and Federal roads were also more likely to exceed the speed limit. Rothengatter (2000), considered attitudes towards high and low-risk violations and observed that those drivers who regularly commit traffic violations, such as speeding, have a positive attitude towards committing these violations. Besides that, it is reported by Lawpoolsri and Braver (2007), those who have received speeding citations are having higher probabilities of receiving

subsequent speeding citations. This statement has suggested the speeding citation was not able to deter someone from committing subsequent traffic offences considering the context of the current traffic enforcement system.

Similarly, those who have experienced crashes on Expressways and Federal roads also tend to speed. They reported having a higher tendency to exceed the speed limit as compared to those who do not have any crash experiences on Expressways and Federal roads. Those with traffic crash record displayed lower risk perception towards speeding than those who did not (Health and Safety Executive and Scottish Executive, 2002). Those with the road traffic crash involvement tend to speed more often when late, feeling stressed, listening to music or because of hot weather (Stradling, 2005). When assessed through the speed violation records and their crash experience, the drivers' attitude towards driving over the speed limit when using the Expressways and the Federal roads were similar. These results confirmed the findings from Butcher (2017) that driver compliance with speed limit is poor even though different speed zone is concerned.

6.5   The Differences of Drivers' Attitudes towards Speeding on Different Road Types - Expressways and Federal roads.

6.5.1   Quantitative results: survey

Besides the similarities of the participants who used the Expressways and Federal roads, they also had differences, which need to be highlighted in this study. It seems obvious that the reported speed made by the participants using the Expressways were comparably different from those using Federal roads. Here, majority of the Expressways participants reported driving over the speed limit of between 1-10km/h above the speed limit, in other words, driving between 111-120km/h (30.0%). In comparison, majority of the Federal roads' participants reported driving over the speed limit of 1-10km/h, which is driving between the speed limit of 91-100km/h (23.3%). Since the speed limit for

Expressways is usually 110km/h and for Federal roads it is usually 90km/h, it can be deduced that nearly one third of them, 30.0% for Expressways, have exceeded the speed limit while only 23.3% of the Federal roads' participants, have exceeded the speed limit.

This occurrence is possibly due to the road environment and posted speed limit. The road environment which consists of the weather, road signs, road markings, lightings and road geometries can influence driver's speeding behaviour (Monash University Accident Research Centre, 2009). The road width in the road geometries can enhance the driver's tendency to speed as the drivers perceive the road especially the Expressways as wider. Hence, they tend to increase the speed, and this can increase the crash risk (Rista et al., 2018). Similarly, the motorways are usually equipped with median barriers to prevent head-on collisions and controlled access to prevent side impact (T-bone) collisions (Zuo & Tarko, 2016) which this can explain the higher frequency of speeding on Expressways than the Federal roads. Moreover, Tarek and Sacchi (2016) has discovered that higher frequency of injury crashes is found on higher speed limits roads (i.e Expressways) than the lower speed limit roads.

On the other hand, education level is also a contributory factor to participants' speeding behaviour. Here, majority of the Expressways participants could be described as those with higher education. They had pre-university/diploma background while majority of the Federal road participants had acquired up to secondary school background only. The dissimilarities in the education background of the drivers could also represent the locality of the participants. This means that participants using Expressways were very likely to be those residing in urban areas while those using Federal roads could be residing in the rural areas.

On the same note, majority of the participants using the Expressways were middle and high-income earners whereas majority of the participants using Federal roads were

of the low and middle-income group. It is well-noted that many job opportunities could be found in urban areas. As such, urban residents could secure good employment and better income generation (United Nation Development Program, 2016). This has translated into improved income levels among the urban residents compared to non-urban residents. As a result of this disparity, these drivers were also very likely to have different vehicle type possessions. Consequently, this helped to establish their reported speed, which were almost differed for the participants using the Expressways and Federal roads. In brief, it can be interpreted as saying that Expressways drivers who were urban dwellers were likely to possess high-technology with modern vehicles (SWOV Institute for Road Safety Research Netherland, 2012). Having both could cause the participants to have a higher frequency of speeding as compared to the Federal roads' drivers.

The discrepancy of the drivers' reported speed and demographic background on both roadways were noted. This then led to the classification of the drivers' typologies. The highest composition of drivers using the Expressways was mainly the pragmatic drivers (37.4%). The pragmatic drivers clarified that they would speed for practical reasons such as for urgency and for meeting a deadline. This is referred to as the behavioural attitude towards speeding. Therefore, in this context of understanding participants' speeding behaviour when using the Expressways, it can be deduced that drivers or participants chose to speed when influenced by their behavioural attitudes. In fact, driving is a tiring activity especially when driving on Expressways since the straight and long road infrastructure increase driver monotony than a varied road (Thiffault & Bergeron, 2003). Furthermore, the automobile manufacturer has equipped cars with recent technologies that enable the cars to go faster (Atombo et al., 2016; SWOV Institute for Road Safety Research Netherland, 2012) together with government initiative in improving the road design and facilities (Monash University Accident Research Centre, 2009). As a result,

these have increased driver comfort, task under loading and increase speed drastically and monotony on the Expressways (Zainon, Zaly, Chiroma & Kafi, 2018).

In contrast, the highest distribution of drivers using Federal roads can be categorised as the law-abider drivers (35.3%). Among participants using Federal roads, it appears that the law-abider drivers dominated the overall driver typologies. This outcome can be attributed to their cited reasons from the qualitative results (focus group discussion) which mentioned the road environments such as rows of trees, lamp posts, shop lots and residential areas nearby roadsides. It appears that these factors have caused the drivers or participants to adhere to and obey the speed limit stated for Federal roads. It also seems that road conditions may be contributory thereby explaining why the drivers were more of the law-abider category. The Federal roads which participants were using were only of two-lanes. The driving environment was also poorly lit, with limited lighting at certain road stretches and road sections. All these variables also contributed to their behaviour. However, it appears that these drivers were more conscious while driving on Federal roads.

6.5.2 Qualitative findings: focus group discussion

Apart from that, majority of the participants using the Expressways indicated a strong habit of speeding on Expressways as compared to the Federal roads' participants. This outcome is also supported by the findings gathered from the focus group discussion where most of them reported having a higher likelihood to speed on Expressways than on Federal roads. There were several excerpts cited. According to a male respondent, aged 37 years old who drive a PROTON car:

 "*It is always to be on the expressways than the federal roads*" (Personal communication, July 26th, 2017).

Meanwhile, according to a female participant, aged 24 years old who drive a PROTON car:

"Usually I speed on the expressways, seldom on Federal roads." (Personal communication, July 26th, 2017).

In this regard, some of the participants mentioned that the road design on Expressways have facilitated them to speed. According to a male respondent, aged 37 years old who drive a PROTON car:

"I mean the length of the road, is too big and mostly empty. So that kind of thing." (Personal communication, July 26th, 2017).

While some of them mentioned that the driving environment (boredom) also triggered them into speeding on Expressways. Referring to a male participant, aged 74 years old who drive a MERCEDES car:

"Boredom (boring)…You see the road, highway, then you travel at 110, some time you over limit, I think should increase the limit to 130 or 150. Because the road is safe." (Personal communication, October 18th, 2017).

These excerpts have supported the previous studies indicating that road design and environment have greater influence on drivers speeding behaviour (Monash University Accident Research Centre, 2009; Road Safety Bureau and Federal Office of Road Safety, 1993).

In comparison, the Federal roads participants explained that the road design of the Federal roads where narrow lanes and road furniture along the Federal road also impelled them to speed on Federal roads. According to a male, aged 42 years old who drive a PROTON car:

"*I cannot speed on Federal roads as there are lots of barriers. For instance, pedestrian, driver from other junctions, trees along the roads and road furniture*" (Personal communication, March 31st, 2017).

Besides that, bumpy road surface could also hinder them from speeding. Referring to a female participant, aged 24 years old who drive a PROTON car:

Gua Musang road has a bumpy road surface, so I could not speed along the route." (Personal communication, July 26th, 2017).

These excerpts have supported previous study notifying that reducing lane width to as narrow as 10 feet can reduce speeds. Furthermore, it was also stated that no crashes and injuries were further reported on urban and suburban roadways as a result of narrow lane width (Potts, 2007). The narrowing lane may also increase the perceived risk; thus, drivers tend to slow down while driving on the narrow lane (Godley et al., 2004).

Another outcome drawn from this study was that majority of the participants using the Expressways mentioned the difficulty of having to comply to the speed limit stated for Expressways. They admitted that their intention to comply to the speed limit was low when using the Expressways. According to a male participant, aged 30 years old who drive a PERODUA car:

"...for Expressways is a bit hard." (Personal communication, March 31st, 2017).

Besides that, a female participant aged 38 years old who drive a Honda car responded that:

"I cannot promise I can comply to the speed limit, I find it hard for Expressways." (Personal communication, March 31st, 2017).

Furthermore, a male participant aged 26 years old who drive a PROTON car elucidated that:

"...If Expressways, I think it is difficult...30% from the time I will speed and 70% I will follow to the speed limit from the total driving." (Personal communication, March 31st, 2017).

Nonetheless, participants' intention to comply with the speed limit were higher among those using Federal roads when compared to the Expressways. This is because they had no choice and had to follow the driving norms on the Federal roads such as not overtaking and following other vehicles' speed limit. Referring to the excerpt of a male participant aged 28 years old who drive a PROTON car:

"I will say personally, federal will comply..." (Personal communication, September 9th, 2017*).*

Besides that, a male participant aged 30 years old who drive a PERODUA car responded that:

"I think I will comply to the speed limit for Federal road and rural road." (Personal communication, March 31st, 2017).

In addition, a female participant aged 26 years old responded that:

"Of course, will comply..." (Personal communication, July 26th, 2017).

The driver's intention to comply to the speed limit can be related to one of the constructs in the Theory of Planned Behaviour as introduced by Ajzen. It is explained in the Theory of Planned Behaviour that behavioural intention is the main determinants in the theory (Conner et al., 2007). Hence, behavioural intention refers to the efforts the

individual put in to achieve something and the ability to carry out the behaviour. Thus, three constructs can influence behavioural intention which are attitude towards the behaviour, the subjective norm and perceived behavioural control (Ajzen, 1991). These three constructs represent sets of salient beliefs that correspond with expectancy-value theory (Fishbein & Ajzen, 1975).

Besides that, intention is observable and measured through the constructs of attitude, subjective norm and perceived behavioural control which act as proxies for the belief-based measures (Elliot et al., 2007; Newman et al., 2004). Additionally, there is additional variable that can predict speeding behaviour which is past behaviour. According to Conner and Armitage (1998), past behaviour can predict an additional 7% of the variance in intention and 13% of the variance in behaviour. Hence, past behaviour can be regarded the strongest predictor of intention and behaviour, explaining discrepancy over and above that accounted for by the TPB variables (Ajzen, 1991; Conner & Armitage, 1998).

6.6   Theoretical Implication of the Research

From a theoretical standpoint, this study makes important contributions to the transportation literature beyond previous studies. Even though there are some similarities with past studies such as in study of Schroeder et al. (2013) and Warner (2006), these studies show relative difference with the present study. In the study of Schroeder et al. (2013), the focus is to discover driver behaviour and attitudes towards speeding in the United States. The study examines driver's attitude based on driver types, when on different road types and the influence of demographic characteristics towards speeding. In addition, study of Warner (2006) investigates driver's attitude towards speeding behaviour by using the Theory of Planned Behaviour as frame of reference. These two studies show similarity in investigating attitude towards speeding behaviour.

However, the are some differences between those previous studies and the present study. Firstly, regarding the context of study, the present study is focusing on the Southeast-Asian drivers particularly Malaysian drivers. In contrast, Schroeder et al. (2013) was conducted in different regions of the United States and involves different ethnicity. The study of Warner (2006) was conducted in a scandinavian country, Sweden which was ranked as one of the safest roads in the world. Thus, the results from the previous studies could be differed from the present study due to contextual and geographical differences.

Second, the present study concentrates on attitude as one of the core factors in influencing driver speeding behaviour. In contrast, study of Schroeder et al. (2013) concentrates on attitude towards various risky behaviours such as seatbelt use and cell phone use. Hence, the study of Schroeder et al. (2013) is also focusing on other risky driving behaviours besides speeding behaviour. Meanwhile, Warner (2006) concentrates on attitudes of car and truck drivers. This could possibly produce different kind of attitude between these two types of drivers. Thus, it does not clearly point out the car drivers' attitude and behaviour.

Thirdly, the present study utilises a mixed-method which incorporate the quantitative and qualitative methods. The mixed method study is believed to be a comprehensive method in addressing the issue with the quantitative method responds to 'what' questions and qualitative responds to 'why' questions. However, the previous studies only incorporate the quantitative study such as Schroeder et al. (2013) utilise the telephone interview. This approach could only cover the stated preferences of drivers and not their actual preferences. Similarly, Warner (2006) utilises survey to discover driver's speeding behaviour, while the empirical method was utilised to study the effectiveness of Intelligent Speed Adaptation (ISA) in reducing speed. Hence, the present study is

believed to be more comprehensive in the methodology and in addressing the issue compared to the previous studies.

Additionally, a noticeable of present study is the ability of behavioural attitude in influencing the behaviour. This has not been investigated in both of the studies. Besides that, this study points out the Theory of Planned Behaviour as the reference of the qualitative study, in which attitude, subjective norm and perceived behavioural control are good determinants to mediate the intention towards the behaviour. These constructs have been seen significant in mediating the intention to commit the behaviour since all participants recognised the capabilities of these constructs. Unlike both studies which do not utilise this theory as frame of reference.

6.7 Practical Implication and Policy Recommendation

6.7.1 Improving speeding behaviour based on drivers' typologies

So far, this research has focused on drivers' attitude towards speeding behaviour. It is now necessary to explain the practical implications that can be generated from this study. The results obtained in the quantitative research method via the attitude survey revealed that there were four driver typologies: the law-abider, cautious, pragmatic, and the risk-taker for both roadways: Expressways and Federal roads. Each of this typology has its own unique characteristics whereby the risk-taker has the highest possibility of speeding accentuated by emotional reasons, followed by the pragmatic driver who are inclined to speed for practical reasons. The cautious driver and the law-abider drivers have the least tendency to be involved in speeding behaviour. Based on these characteristics, several corrective measures were proposed as improvements to enhance drivers' attitude and their speeding behaviour for both the drivers using Expressways and Federal roads.

As the first category, the risk taker has the highest score for behavioural and affective attitude components. This means that, this group has a greater tendency to be influenced by emotions and actions together, for their speeding behaviour. Majority of these drivers were found at the Tapah (Expressways) and Kota Tinggi to Rompin (Federal road). Possible corrective measures that can be implemented among these risk-takers are to produce advertising messages that incorporate education with enforcement. The advertising messages should not stand alone since on its own, it is not effective in improving drivers' attitude towards speeding. This claim is supported by Strecher et al., (2006) who mentioned that "one-size-fits-all mass media interventions that run independently of other strategies have demonstrated little or no behavioural improvement" (p.35).

As such, some elements need to be considered so as to establish more successful mass media campaigns. They could include a combination of activities such as enforcement with education and legislation. Other criteria to be considered for establishing a successful mass media campaign may include the use of theoretical models which are derived from prior research, the use of single themes instead of multiple themes and by addressing specific target audience who are segmented according to their demographics or attitude values (Delhomme et al., 2009). A recommendation suggested by Vaa and Phillips (2009) emphasised on the intimacy and immediacy elements in delivering the message. The element of intimacy refers to the use of personal elements to project the message campaign while the immediacy element refers to the provision of news at a specific place and specific time, both of which should be close to the target behaviour.

From this recommendation, it is suggested that the campaign could be conducted among drivers at Rest and Relax (R&R) places throughout the country, for example,

Tapah and lay-bys of Kota Tinggi to Rompin. Doing so will help to fulfil the element of immediacy and intimacy. The figures provided below illustrate some examples of the mass media campaign and messages which had been implemented along the Expressways in South Canterbury, New Zealand and in Japan.

Figure 6.1: Road messages with the crash maps for tourists in the public toilet of South Canterbury

Figure 6.2: Messages on good driving practices in the public toilet along Japan Expressways

Based on these figures, it can be noted that the government and authorities of South Canterbury, New Zealand had initiated the intimacy and immediacy approach in conveying road safety messages to the road users who were using the expressways in

South Canterbury, New Zealand. The government and authorities initiated this approach to gauge drivers' attention and interest on road safety messages. The first image, referred to as Figure 5.1, depicts a message of the road maps of the crash sites over the past five years along the South Canterbury roads. This message has been translated into several languages such as Mandarin/ Hokkien, Tamil, Japanese and Tagalog languages to reach a bigger audience and to enable them to understand the message. Together with the road safety message is the website link that can be browsed and were available in 14 languages.

Similarly, the Japanese government and authorities also initiated the intimacy and immediacy approach in educating the drivers along the roadways. Various road safety messages were conveyed such as complying to speed limit, observing headways with other vehicles, wearing seatbelts, among others. These messages were attached in the public toilets along the rest areas of Japan Expressways.

It can further be pointed out that the risk-taker drivers were more influenced by their emotional elements, as far as their speeding behaviour is concerned. Hence, emotional types of advertising can be adopted along these roadways such as Tapah Expressways and Kota Tinggi to Rompin to improve the speeding behaviour among the risk-taker drivers. The emotional element that is stated in the advertisement, known as Pathos advertising, can be initiated with the use of specific language to trigger specific feelings of the people. Hence, advertising messages that employ positive emotions can be used to attract attention, besides impacting the drivers with the message and its products (Strick, van Baaren, Holland & van Knippenberg, 2009). This is especially more so for male drivers (Lewis, 2008) who can be influenced into reducing the maladaptive responses (speeding behaviour). In this regard, such types of advertisement are believed to be suitable for risk-taker drivers using the roadways, Tapah and Kota Tinggi to Rompin.

Other than that, is the pragmatic driver who is characterised by similar characteristics of the risk-taker. The only difference is that the pragmatic driver is not influenced by the emotional element as compared to the risk-taker. This means that the core factor that can influence the pragmatic driver is the behavioural and cognitive attitude factor. As such, possible corrective actions that can be suggested to influence the pragmatic drivers along the Pagoh Expressways and Jalan Tapah to Cameron Highland is persuasion through logical reasons. This is also known as the logos rhetoric of persuasion. Such technique involves using statistics or real experiences from the speed crash survivors to persuade the pragmatic drivers to abstain from the speeding behaviour.

Since majority of the pragmatic drivers were those on work trips, employers can be recruited to play their roles. By establishing the Safe Driving Policy to their workers, the safe driving policy could be developed by all companies. Doing so demonstrates the managements' commitment towards safe driving for all their workers. The safe driving policy could include safety issues related to speed, seat belt use, distracted driving, emergency preparedness and other safe driving practices (Alberta Motor Association, 2010). If the management of all these companies can initiate this policy, their workers would also be compelled into enforcing the practice and when applied regularly, this can ensure workers' safety on the roadways.

Another alternative is installing a speed warning system in company's vehicles, especially if the workers were using company's vehicle. A speed warning system can alert the drivers when they exceed the speed limit by giving audible warning stating such as "Speeding violation". This implementation is useful for the drivers to slow down the vehicle's speed, thereby changing the driver's behaviour (NHTSA, 2014). Nevertheless, a suggestion to install Intelligent Speed Adaptation (ISA) in private vehicles is also feasible. A study by Carsten et al. (2008) had revealed that installing the Intelligent Speed

Adaptation (ISA) in private cars is effective in reducing drivers' speeding behaviour, thereby reducing 37% of fatalities and serious injuries in United Kingdom. Meanwhile, 50% of reduction in traffic deaths in other European countries could be predicted with the implementation of ISA (Carsten, 2008). Additionally, 12% of road fatalities could be avoided in Norwegian roads with the ISA implementation (SINTEF, 2016).

The cautious driver was the least likely to indicate driving over the speed limit. Based on the results drawn of the cautious driver using the Expressways, it seems evident that this type of drivers has not received any speed violation records, nor had they experienced any crash experience in the past. Nonetheless, they were mainly middle-aged drivers with extensive driving experience and they normally drove within the speed limit of 80 to 99km/h on the Ayer Keroh (Expressways) roadway. In contrast, the cautious drivers using the Federal roads can be found at the Lipis to Merapoh to Gua Musang area. They reported driving slightly above the speed limit, that is, between 91 to 100km/h and they had been fined in the past.

This attitude of the cautious drivers using Federal roads raises some anxiety. The reason is because we have discussed in the earlier section that those who have received speeding citations demonstrate a greater risk of receiving speeding fines. This is also verified by a longitudinal study carried out among Maryland licenced drivers (Lawpoolsri et al. 2007). In this regard, enforcement intensification needs to be implemented by the Road Transport Department of Malaysia because it is believed to be effective in reducing the number of speeding cases along the Federal roads leading Lipis to Merapoh to Gua Musang area. The enforcement should not be viewed as a punishment but rather as a preventive action towards improving drivers' speeding behaviour.

Nonetheless, despite the fact that some of the drivers described have a tendency to contribute to road accidents due to their speeding behaviour, little concern has been

given to the law-abider drivers who followed road rules and regulations. As described, the law-abider drivers were those who demonstrates the least preference, among the four types of drivers, towards speeding. In this regard, the government needs to consider some positive ways of encouraging others to follow the laws of the road, for instance, a special rebate to the law-abider driver in renewing the car license and road tax, for every two years of licensing. This initiative can act as an extrinsic motivation to the drivers in adhering to the roads' speed limit, thereby practising good driving behaviour on the road. According to Wafa (2018), the use of reward has a great impact on driving behaviour, including speeding. One of the ways to achieve this goal is by re-organization of insurance schemes, thus reducing the premiums of law-abiding drivers.

6.7.2   Improving Speeding Behaviour among Young Age Drivers

Moving on to other effects impacting drivers' speeding behaviour, it is believed that age is one of the influential factors that can affect drivers' speeding behaviour. Previous studies narrated that young drivers were more inclined towards speeding compared to the older drivers (Cestac et al., 2011; Williams et al., 2006). They also preferred taking risks; their behaviour was inclined towards risk-taking as they tend to over-estimate their driving abilities while on the roads (Organization for Economic Co-operation and Development, 2006).

The fact that young drivers were more prone towards speeding has remained prevalent in today's situation and condition, particularly those aged between 18 to 24 years old who are also considered as Generation Y (between 16 to 35 years old). It appears that Generation Y people were more concerned about time in whatever actions or decisions they made. Time appears to be one of their relevant criteria, thus in the driving situation, for example, they would want to reach their destination as soon as possible although they

could have begun their journey late. Since their ultimate aim is to save time on the road, it is likely that majority of them would speed.

Based on the above description of the Generation Y people, it is proposed that humour persuasion be used to encourage them to improve their speeding behaviour while on the roads. According to Mitchell-Whittington (2016), this humour persuasion was able to influence the young drivers in Australia. Her study showed that humour persuasion was effective in persuading the young males to slow down while driving. This implies that the advertising message to encourage good driving behaviour should contain humour and to use a light-hearted approach, particularly among male drivers. It was proposed that using strong threats or fear-based anti-speeding advertising message would be less effective for males (Lewis et al., 2008).

In addition, enforcement programmes can be constructed for young drivers so as to increase their perceived risk of detection. Such enforcement programmes could be conducted during the weekends, especially at night, to curb young drivers' speeding behaviour. Such enforcement programmes could be successful if they include additional night-time enforcement activities, focusing on the personal risk of detection as opposed to focussing on the theoretical risks of detection and the use of visible enforcement (Harrison, Triggs, & Pronk, 1999). The night-time enforcement activity had been found to be crucial. This is supported by findings generated from the focus group discussion. According to a male respondent, aged 28 years old and drive a PROTON car:

"*Even normal days, normal time also especially you see at night, certain area like Klang valley. Oh, not Klang valley, Cyberjaya and Putrajaya especially at night after 9 until early morning. There are a lot of racing cars, bikes*". (Personal communication, September 9th, 2017).

Data shown above had indicated that young drivers were involved in night-time activities. Besides that, the night-time enforcement programmes should engage a predictable enforcement location and time so as to maximise the perceived risk of detection at those locations and times. Meanwhile, a randomised enforcement programme should also be conducted to increase the drivers' unpredictability of enforcement activity. This means, warning is given to the drivers after the speed check and not pre-warning enforcement (SWOV, 1998). Drivers aged between 18 to 21 years old can be considered as novice drivers. In the standard driving rule, those who have passed their driving tests (written and practical tests) should undergo a probationary period within two years and they should maintain a clean traffic record before they can register for the full license (The Commissioner of Law Revision Malaysia, 2006).

In this context, it is proposed that the Road Transport Department of Malaysia implement a regulation which states that those who are in their probation period should be restricted from driving at night and from carrying passengers under 25 years of age, unless supervised. This is because findings from the focus group discussion had revealed that majority of the young drivers carried young aged passengers. It appears that this aggravated their tendency to engage in speeding behaviour. According to a male participant aged 28 years old and drive a PROTON car:

For me, just now u said family members, girlfriend, wife or husband, is kind of good, they tend not to make you to speed. They more just drive safely to the destination compare to another group maybe can put like youngster or group of friends if they mingle up, maybe too excited or something else, that kind of situation tend to make for speeding.'' (Personal communication, September 9th, 2017).

Meanwhile, according to a female participant aged 27 years old and drive a PERODUA MYVI car:

"My sister sometimes did…you are going so slow and ask to speed up. Of course, younger sister, my parent does not allow. When I am going with my siblings then my sister asked me to speed. But if we are going with parents, my sister doesn't say…" (Personal communication, September 9th, 2017).

This statement has explicated by road safety organisation in Victoria, Australia in which the organisation is encouraging learners to gain experience, obtain a minimum of 120 hours of supervised or on-road instruction prior to solo driving is advocated. This program is conducted to expose the learners with greater supervised experience through cooperation between parents and driving instructors (Cockfield & Healy, 1999). In addition, Barua et al., (2014) stating that Graduated Driving Licensing System (GDLS) has been adopted in the United States and other countries around the world to help young drivers gain road driving experience, by which supervised driving experience may help them to accumulate driving hours before they undergo the provisional licence. Furthermore, graduated driver licensing (GDL) laws have been introduced in the United States to limit night time driving, restricting teem passengers and ensure teens to get sufficient supervised practice (Insurance Institute for Highway Safety, Highway Loss Data Institute, 2018).

6.7.3 Necessity of road safety education among pre-schoolers, primary school students and secondary school students

Additionally, it is imperative to look at the concept of the 3E's of traffic safety. The concept of the 3E's of traffic safety emphasise on the engineering, enforcement and education as measures to improve risky driving behaviour especially on speeding behaviour. As such, there is a necessity to incorporate traffic safety education among pre-schoolers, elementary school students and high school students. Several countries have incorporated road safety education as part of their school curriculum. The list of the countries can be referred from table below:

Table 6.1: Road safety education program across countries

Country	Type of program	Target Group
Australia	a) School-based road safety education program b) Thematic, intensive and supported by visitors.	Primary and secondary school students
France	a) Road safety education is officially part of the curriculum in primary and secondary schools b) In secondary school, all students are required to study for a road safety certificate (ASSR): pedestrians and two wheeled vehicles in traffic, c) At the age of 16, students must get another ASSR, which covers wider road safety	Primary and secondary school students
Great Britain	a) Road safety education is not part of National Curriculum b) Road safety education is taught in Personal, Social and Health Education (PSHE) c) The principal agencies supporting road safety education in the United Kingdom are the police and health promotion officers, with police forces and the health promotion officers undertaking some kind of road safety activities. d) The preschooler, road safety education exists in the form of Traffic Clubs.	Preschoolers and Primary
Malaysia	a) Road Safety Education (RSE) has been introduced to primary school students. The module has been introduced since 2007 in the teaching and learning of Malay lesson, at least 2 hours per month. b) However, the module has been revised in 2016 which known as Revised Road Safety Education Module (RSE) led by the Road Safety Department of Malaysia (RSD) with the involvement from teachers of Ministry of Education and Malaysian Institute of Road Safety Research (MIROS).	Primary and lower secondary school students

Country	Type of program	Target Group
Spain	a) Road safety education is compulsory in primary and secondary schools. b) It is taught by a subject teacher.	Primary and secondary school students
The Netherland	a) The implementation of road safety education is under The Ministry of Transport b) The Ministry of Education and Science is responsible for these age groups (4 to 18 years old) and decides whether it should be part of curriculum. c) Primary schools- Knowing the rules of road and traffic signs and be able to participate safely as pedestrians, cyclists and independent public transport users	4 to 12 years old 12 to 18 years old

Reference: Dragutinovic and Twisk (2006); Road Safety Department Malaysia (2019)

Referring to the Table 6.1, road safety educaton is the most important part of the national traffic safety policy. The organisation of the curriculum in terms of content of education, methods, responsible instructors and authorities are different across countries. It can be said that road safety education is compulsory among primary and secondary school students. For instance, Australia, France, Great Britain, Malaysia, the Netherland and Spain have incorporated road safety education to the primary and secondary students. In fact, several countries incorporate road safety education among pre-schoolers, like the Great Britain and the Netherland.

The Netherland's implementation of road safety education has been managed by Ministry of Transport, while the curriculum management has been managed by the Ministry of Education and Science. Furthermore, The Great Britain is not implementing the road safety education as part of the curriculum, instead it was taught in Personal, Social and Health education. Moreover, it has received full supports from the enforcement agencies like police and health promotion officers. On the other hand, France covers wider type of education as the secondary students need to study for additional lesson that is the Road Safety Certificate (ASSR). Besides that, the road safety education has been taught by subject teacher in Spain.

On the other hand, the road safety education in Malaysia has been introduced to the primary school students since 2007 in the teaching and learning of Malay Language lesson, at least 2 hours per month. However, the module has been revised in 2016 which known as Revised Road Safety Education Module (RSE) led by the Road Safety Department of Malaysia (RSD) with the involvement from teachers of Ministry of Education and Malaysian Institute of Road Safety Research (MIROS). The focus and theme of RSE among the primary school students are comprehensive as it covers various themes such as the knowing your surrounding, identifying vehicle types, knowing about the road safety, knowing your role as the pedestrians, knowing your role as the cyclist,

knowing your role as passenger, crossing the road safely, the safe place to play, knowing about the public vehicles, risky driving behaviour, the influence of media and popular culture in road safety. Nevertheless, the RSE among the secondary school students also covers a wider perspectives in terms of road safety, human as one of the factor of collisions, road safety equipments, knowing your role as pedestrians, knowing your role as cyclist and motorbikes, knowing your role as driver and passenger (Ministry of Education Malaysia, 2016).

Comparing with other countries, Malaysia's RSE is more comprehensive as it covers wider perspectives in the road safety and not merely the safety of the drivers or passengers. More importantly, the teaching and learning process is interactive as it is conducted not only using the paper pencil method, but it involves the usage of Information and Communication Technology (ICT) such as visuals, graphics and videos. Moreover, the lessons cover both levels of students in primary and secondary schools.

In a nutshell, the road safety education is necessary to be taught in schools. This type of education is necessary to introduce the students with understanding about the road safety, inculcate good driving attitude and behaviour and practise good driving attitude and behaviour. It can be said that most of the developed countries have introduced the road safety education to their citizens. This is similar to Malaysia, in which Malaysia's education system has also introduced the RSE in both schools, primary and secondary.

Despite the introduction and implementation of RSE in Malaysia schools, the lessons can be further strengthened by introducing the attitude and behaviour course. In this course, students will learn about the emotional management such as knowing the effects of positive and negative emotions while driving and how to control anger while driving. Meanwhile, the second aspect in the course could be the time management such as knowing the right time to start the driving, estimating the duration of driving and

anticipating the arrival time to avoid disappointment while driving. This course would be beneficial for students to learn as they are drivers in the future. In return, this hopefully will help to improve drivers' attitude and behaviour which can result to reduce the road crashes and fatalities in Malaysia.

6.7.4 Approaches in Reducing Speeding Behaviour Across Countries

Besides addressing drivers' typology and using evidences to support the finding that drivers' age could be used as possible corrective measures for understanding drivers' speeding behaviour, this study also highlights the approaches which have been employed by several countries as a measure for reducing speeding behaviour. They include Sweden, the United Kingdom and Singapore.

Based on the report made by Kvittingen (2015), it can be seen that Sweden has implemented two approaches in improving drivers' attitude and behaviour. The first approach was by putting the speed camera mostly on the rural road areas. The function of the speed camera was not merely to catch drivers, but also as a gentle and firm reminder for everyone to keep within their speed as there was a history of crashes at the areas identified. The second approach was by reducing the speed limit on roads from 90km/h to 80km/h as an alternative to widen the roads and to convert them into meeting-free roads, multiple lane roads with crash barriers. This was expected to be completed before 2025 where the country aimed to review the 90km/h speed limit for over 4000km of roads (The Local, November 1, 2016).

In another context, the United Kingdom (UK) has also implemented various approaches to improve drivers' attitude and behaviour towards speeding (Stern, 2018). Firstly, the UK has imposed harsher penalties for repeat offenders. Those who are caught with excessive speeding are liable to be fined up to 150% of their weekly income, a rise of 50% from the last penalty. For example, drivers who were caught speeding more than

21mph can be disqualified between seven to 56 days or penalised with six demerit points. Secondly, drivers need to have proper education about speeding. These drivers have to realise that speeding is not exciting, nor is it considered normal driving behaviour. As such, motor manufacturers, national press and TV advertisers should not glamorise speeding as an exciting or exhilarating activity nor should it be portrayed as a normal behaviour.

Thirdly, driver training is another way of improving drivers' attitude and behaviour. The drivers can attend rectification courses as an alternative punishment for low-level speeding offences (Department for Transport, 2018). For example, the UK government has organised a short driver offender retraining known as National Speed Awareness Course with the aim to improve driver's attitude and behaviour. This training enhances drivers' perception, understanding and awareness about their speed choices, which in return helps to change their behaviour. Fourthly, the deployment of safety cameras at speed related areas is also possible to improve drivers' attitude and behaviour (The Royal Society for the Prevention of Accidents, 2018).

Aside from that, the installation of speed warning technology in vehicles is also possible to improve attitude and behaviour. The speed warning device known as Intelligent Speed Adaptation (ISA) is another approach that has been undertaken by the UK government and authorities. There are three categories of the ISA which are Advisory ISA, which generates an audible sound when a driver exceeds the speed limit and the driver decides whether or not to slow down. The second category is the Voluntary ISA which works by default as a speed limiting value by the vehicle hence drivers can choose to disable the use of the device and regain full manual control until new speed limit is encountered. The third category is the Mandatory ISA which works in the same way as the Voluntary ISA, except the drivers cannot disable the device and cancel the speed

limiting functions (Carsten et al., 2008). Notably, it appears that many companies in the UK have also implemented the Safer Speed Policy among their employees. This policy is essential for companies to demonstrate the management's commitment towards safe driving for all their employees, particularly to influence the speeding behaviour of those who tend to speed (ROSPA, 2018).

In contrast, the Land Transport Authority (LTA) of Singapore has also adopted several initiatives and approaches with the aim of improving drivers' attitude and speeding behaviour. According to Shah (2017), there are three types of traffic camera being installed by the LTA Singapore to curb speedsters. Firstly, the Fixed Speed Camera (FSC). This camera is bright in colour and it is noticeable from 500 metres away. Whenever anyone passed by this road, they would notice this camera as it is mounted and rooted to the ground. It is useful in capturing the speedster especially vehicles from afar as it has enhanced functions to better identify speeding vehicles from afar. Secondly, the adoption of the Mobile Speed Camera (MSC). This type of camera is somewhat similar to the FSC with a difference in that it is only positioned temporarily in one location and can be moved around from one location to another. This camera is also useful in handling the speeding vehicles as it runs on battery and can be set up within a week. Moreover, the camera can run unobtrusively at the roadside and also be able to transmit the pictures wirelessly (Danson, 2016; Kelly, 2017).

Thirdly, the authorities of Singapore have adopted the police speed laser camera which is entirely different from the mobile and fixed speed camera. It differs in three ways in which its utilised radar and frequency technology. The size of the speed laser camera is about the same as the DSLR and it is mounted on a tripod. However, this device requires an enforcement officer to supervise. The enforcement officers usually utilise this camera to capture speedsters on overhead bridges, sharp bends and corners. Recently, the

new speed camera known as the Average Speed Camera (ASC) has been installed. This camera calculates the average speed of a vehicle as it enters and exit from the enforcement areas. The vehicle is considered speeding if the average speed exceeds the legal speed limit (Shah, 2017). On the other hand, Safe Driving Course has also been conducted in three driving schools in Singapore with the aim of reducing speeding vehicles (Danson, 2016).

6.8   Policy Implication

The findings of the present study are very helpful for public, government as well as law enforcing agencies. The findings from the focus group discussion had revealed that majority of the young drivers carried young aged passengers while driving in the cars. Moreover, many young drivers are involved in night-driving activity. It appears that these activities aggravated their tendency to engage in speeding behaviour. In this context, it is proposed that the Road Transport Department of Malaysia implement a policy which states that those who are in their probation period should be restricted from driving at night and from carrying passengers under 25 years of age, unless supervised.

Besides that, it is revealed that the younger drivers exhibit unsafe attitudes towards speeding compared to the older drivers. The government should incorporate with Ministry of Education make a policy that prioritise on education in public school systems by introducing compulsory subjects like psychology and road traffic safety at primary and secondary levels. The students should be taught about human behaviour, specifically on attitude and behaviour, emotional crisis and management and other related lessons that are found suitable for the primary and secondary levels. In addition, the ministry can propose to the Ministry of Higher Education to incorporate these lessons as one of the co-curricular activities in order to inculcate good driving practise among young drivers in the public higher institutions.

Additionally, those who are in their work trip purposes also found speeding. Thus, the government can mandate the companies to make specific rules and regulations like implementing safe driving policy among the employees. The safe driving policy could include safety issues related to speed, seat belt use, distracted driving, emergency preparedness and other safe driving practices. This is important since the company should uphold the government's mandate on adhering the speed limit and practising safe driving habit. Besides, it shows that the company is taking care of the employees' wellbeing by prioritising their safety and health and not compromising on the safety issue.

On the other hand, it is also crucial to point out the influence of vehicle technology towards drivers' speeding behaviour. As such, it is suggested that the motor manufacturers and the television advertisers neither glamorise speed as something that is exciting, nor it could be regard as normal driving behaviour. The Ministry of Transport could cooperate with Ministry of Communications and Multimedia Malaysia and the Advertising Standard Advisory Malaysia to establish a policy concerning advertisements that promote vehicle speed as their selling point. Thus, such policy would not permit the motor manufacturers and television advertisers from portraying such advertisements on Malaysian televisions and newspapers. If the motor manufacturers and television advertisers violate the policy, stern warning and action can be imposed towards them.

Based on the finding concerning the repeat offenders, those who have multiple speeding fines in a year, who are caught speeding. It is suggested to the Ministry of Labour to establish a policy under the Employment Act 1955 that hinder these repeat offenders from obtaining jobs or applying for a new job in public or private sector unless they obtain a clearance certificate from the Road Transport Department Malaysia. The repeat offenders should attend discipline course or performing community works at the nearby community centres in order to obtain the clearance certificate from the Road

Transport Department Malaysia. This enforcement is very important to shift the perception of drivers to the spirits of good driving behaviours and always prioritising their safety and others while on the roads.

Eventually, several drivers are found and caught for speeding despite previously they have been fined or involved in crashes. Therefore, the governments and the agencies should continue to organise traffic safety day as an annual event focusing at the state levels to create an awareness among publics on the importance of complying the speed limit, practising safe driving practices and adhering to the traffic laws. This annual event is not merely focusing on creating awareness, but it is more towards sharing session from the victims who have suffered in tragic accidents due to speeding and the sharing session from the close family members who have lost their family members due to accident. In Selangor district for example, the state agencies like Selangor Road Safety Department can initiate the efforts by disseminating the information to the publics, enhancing public's understanding on traffic safety issues and promoting traffic safety and safe driving practices to publics.

6.9 Summary

In a nutshell, the results obtain from both studies can identify the factors that affect drivers' speeding behaviour, which this eventually helps to identify the feasible policies and suitable corrective measures that can be undertaken to drivers.

CHAPTER 7: SUMMARY AND CONCLUSION

7.1   Summary of Key Findings and Reiterate the Research Objectives

A good driver is not only determined by how much knowledge and skills about driving that he or she acquired, instead a good driver can be evaluated through good attitude and behaviour that he or she possessed. Attitude can guide the behaviour as it serves four functions. Firstly, the instrumental function refers to the ability of attitude to differentiate between positive and negative attributes in our social world. The attitude should have the ability to distinguish between good and bad, thus it should be able to guide drivers from engage in speeding behaviour. Secondly, attitude could function as knowledge function by giving information, building up judgment and making sense of the occurrences to properly guide drivers' behaviour and avoid aberrant behaviour.

Thus, when the attitude could function as knowledge provider to the behaviour, the attitude should be able to guide the behaviour. Thirdly, the attitude role is value-expressive which refers to a mental process that recognises both the cognitive and emotion such as concept, goals and is directed either positive or negative directions. Thus, attitude should be able to value people lives such as appreciating and respecting one's life. As such, drivers should be able to evade the risk-taking behaviour. Fourthly, the attitude role is ego-defensive in which it protects the self-image and self-esteem. Therefore, attitude can protect the behaviour from making any erroneous activities that could diminish his or her self-esteem.

The purpose of the current study was to investigate the role of attitude in influencing driver's speeding behaviour. The first finding of this study ascertained that attitude plays a significant role in affecting speeding behaviour. The role of attitude in influencing speeding behaviour can be assessed from the ABC Model of Attitude in the quantitative research design (face-to-face survey), while the Theory of Planned

Behaviour (TPB) in the qualitative research design (focus group discussion). The ABC Model of Attitude asserted three components of attitude namely affective, behavioural and cognitive that combine to form the attitude. Meanwhile, the TPB theory asserted the attitude could influence the behaviour with the mediation of the intention.

The second significant finding is that the face-to-face survey has shown that behavioural component (tendency to act) has the strongest possibility to influence driver attitude more than the affective (emotion) and cognitive (belief) can do. Meanwhile, the findings from the focus group discussion have shown that the attitude can influence speeding behaviour when the intention is present. The third significant finding reveal that each driver could have different types of attitude especially when on different road types such as Expressways and Federal roads. The results of this study indicate that the Expressways drivers could have favourable attitudes towards speeding compared to Federal road drivers as nearly half of them showed non-compliance attitude to the speed limit. Additionally, cluster analysis revealed that pragmatic drivers (frequently speeding but not driven by emotional issues) dominated driver types on Expressways. In comparison, majority of the Federal road drivers show compliance to the speed limit, thus majority of them are categorised as law-abiding drivers.

In achieving four research objectives, this study utilised a mixed method approach, combining a quantitative study and a qualitative study. The first method in the quantitative approach is the face-to-face survey among participants from North-South Expressways and Federal roads. There are 203 participants recruited for the face-to-face survey on Expressways and 300 participants recruited for the Federal roads. The face-to-face survey was conducted supposedly to respond to three research objectives (RO1, RO2 and RO3). Subsequently, the second method involves with qualitative approach by employing a focus group discussion. The participants for focus groups discussion consist

of five groups from various demographic backgrounds to obtain a heterogeneous opinions and thoughts. The focus group discussion was conducted to answer one of the research objectives from the study (RO4).

7.1.1 Achievement of Research Objective 1

In response to Research Objective 1, the result from the face-to-face survey among Expressways drivers revealed that majority of the participants travelled along Tapah and Rawang for leisure and vacation with the majority of them were 18 to 24 years old, while along Ayer Keroh and Pagoh for work trip purposes with the majority age was 25 to 31 years old. A majority of male participants were speeding at Ayer Keroh and the majority of females were speeding at Tapah. Furthermore, the results from binary logistic regression disclosed that work trip and those who have speed violation record as the significant factors for drivers speeding behaviour on Expressways.

In contrast, a majority of the participants are found at Jalan Tapah-Cameron Highland, Kuala Kangsar-Grik- Pengkalan Hulu and Johor Bharu-Ayer Hitam travelled for a work trip and leisure/vacation with the majority of middle-aged participants aged between 25 to 31 years old. Similarly, most participants for Grik-Jeli and Lipis-Merapoh-Gua Musang was middle-age, between 39 to 45 years old. It was revealed that speeding was dominant among males at Tapah-Cameron Highland whereas among females at Kuala Kangsar-Grik-Pengkalan Hulu. Besides that, speeding among young drivers was also dominant for all locations with the most prevalent at Johor Bharu-Ayer Hitam. Nevertheless, the married, some experienced drivers and full-time employed were speeding by far at Jalan Tapah-Cameron Highland and Kuala Kangsar-Grik- Pengkalan Hulu.

The income disparity could also influence the speeding behaviour in which the low-income earners occasionally speed at Jalan Tapah-Cameron Highland, Kuala

Kangsar-Grik-Pengkalan Hulu & Lipis-Merapoh-Gua Musang, while middle-income earners were found speeding by farthest (beyond 111km/h) at Jalan Tapah-Cameron Highland. Speeding among high-income earners were found mostly at Jalan Tapah-Cameron Highland, Grik-Jeli & Lipis-Merapoh-Gua Musang. Additionally, the results from binary logistic regression which respond to Research Objective 1 revealed that single and separated status drivers are more likely to speed than the married drivers. Similarly, long driving experience drivers that acquired more than four years driving experience had higher tendency to speed than the novice drivers. Besides that, those who have crash experiences are more likely to speed than those who did not have any crash experience. Equally, those who were on the home trip and leisure/vacation had the higher probability to speed than other trip purposes. In fact, male drivers were having higher likelihood to speed than the female drivers.

7.1.2   Achievement of Research Objective 2

In response to the Research Objective 2, the results from the Factor Analysis, Correlation Coefficient and Binary Logistic Regression explore the attitude, components of attitude and their relationship with drivers' speeding behaviour. The exploration of attitude components was conducted through Principal Component Analysis (PCA) in Factor Analysis to categorise 31 variables into its component. An examination of the factors with eigenvalues of above one revealed a three-component solution which explains 47.03% of the total variance. The first component is Behavioural, which explains 30.59% of the variance with eigenvalue of 9.48 and the Cronbach alpha value of 0.91. The second component is Affective, accounts for an additional 10.21% of the variance with eigenvalue of 3.17 and the Cronbach alpha value of 0.77. Lastly, the third component is Cognitive, explains 6.23% of the variance with eigenvalue of 1.93 and the Cronbach alpha value of 0.62.

Subsequently, the relationship of the attitude components with drivers' speeding behaviour was explored through Kendal's B Correlation. The results of correlation reveal that the behavioural component has a positive correlation with speeding behaviour, $p < 0.05$. Similarly, positive correlation was obtained between affective component and speeding behaviour, $p < 0.05$. However, negative correlation was found between cognitive component and speeding behaviour, $p > 0.05$. These results reveal that only two components are positively correlated with speeding behaviour, affective and behavioural, while the cognitive component is negatively correlated with speeding behaviour.

The exploration of attitude components is further conducted to determine which component is significant as predictor of driver speeding behaviour. The Binary Logistic Regression was conducted, and results reveal that only one component namely behavioural is significant as predictor of speeding behaviour with $p < 0.05$ and odds ratio from Exp (B) value is 1.12. The affective and cognitive components do not emerge as predictors of speeding behaviour as $p > 0.05$ and odds ratio Exp (B) value is 0.99 and 0.95 respectively. This has confirmed the previous studies stating that the behavioural component could emerge as the predictor of speeding behaviour.

Subsequently, the descriptive analysis, *T*-test and ANOVA revealed that there is a significant different between male and female Federal road participants in their response to speeding behaviour, in which males have higher tendencies to engage in speeding behaviour compared to female participants. In the contrary, no significance difference in response to speeding behaviour is seen among males and females Expressways participants. Similarly, there is significant difference between the education level of Expressways participants in response to speeding behaviour. The results of the Expressways show that those with pre-university/diploma holder has higher tendencies to engage in speeding behaviour compared to the other education levels that are

secondary, undergraduate and postgraduate degree. Notably, there is significant difference between the education level of the Federal road participants in response to speeding behaviour. The results of the Federal road indicate that participants with secondary education level has higher likelihood to involve in speeding behaviour compared to the other education levels that are primary, pre-university/diploma, undergraduate and postgraduate degree.

In addition, the results of speed violation record for Expressways participants with speeding behaviour suggest that there is significance difference between these variables. The results show significant difference between those who do not have speed violation record with those with violation record. This suggests that those with speed violation record have higher tendencies to speed compared to those who do not have the record for the Expressways participants. Likewise, the results of speed violation record for Federal road participants with speeding behaviour also suggest that there is significance difference between these variables. The significant difference can be seen between those who do not have speed violation record with those with violation record. This suggests that those who have 5 to 10 times record shows higher likelihood to involve in speeding compared to the others.

This study has also shown significance difference between Expressways participants with crash experience in the past and without crash experience in the past This result reports that those with 1 to 4 times crash experiences in the past have higher probability to speed compared to the other participants. Similarly, there is significance difference between Federal road participants with crash experience in the past and without crash experience in the past. This suggests that participants with more than 10 times crash experience have the highest probability of getting involve in speeding behaviour than the other participants in the same group.

7.1.3   Achievement of Research Objective 3

In responding to the Research Objective 3, to uncover reasons and intention for drivers' involvement in speeding behaviour, five focus group discussion were conducted. Based on the findings, majority of the participants indicate that attitude, subjective norms and perceived behavioural control facilitate their intentions to speed on both road types. However, their habit and intentions to speed are higher on the Expressways than the Federal roads. It is also interesting to discover that the younger driver's intention to speed in future is uncertain, with most likely to speed in the future. In comparison, the older participants confess their intentions to not speed and to comply to the speed limit in the future. These findings complement the survey results and respond to the fourth research objective.

7.1.4   Achievement of Research Objective 4

Finally, the Research Objective 4 is achieved through constructing new policy recommendations, strategies and approaches. Several policies have been proposed to the government, authorities and agencies in improving driver speeding behaviour in Malaysia. The policies, strategies and approaches have been taken from exemplary countries such as Sweden, the Netherland, United Kingdom, Singapore and Australia and it is believed to be worked out in Malaysia. However, comprehensive assessment by experienced committee members such as from the Road Transport Department, Publics Works Department and Malaysian Institute of Road Safety Research should be carried out to evaluate and assess the suitability of those policies, strategies and approaches before the implementation in Malaysia. In addition, representatives from the driving schools should also take part to ensure the successful of implementation.

## 7.2	Challenges to Policy Adherence

In ensuring the successful of policy adherence, several challenges need to be considered. The first challenge to policy adherence is the attitude of Malaysian people, either to adhere to the policy implementation or negate the policy implementation. It is nevertheless become a barrier for Ministry of Transport to continue the implementation of policy if the publics do not have enough information or knowledge about the policy related to driver speeding behaviour. Ministry of Transport should be able to provide enough information to the publics about the policy relates to transportation especially pertaining to speeding behaviour. The ministry could convey the message about the consequences they may face if they break the policy. This can be carried out with the cooperation from media conglomerates such as Media Prima and MEASAT Broadcast (ASTRO) through its broadcast television channels. Once the publics have the information and knowledge, it would be easier for the ministry to convey the messages. The messages can be diverse from fatal car crash graphic to an extract of Road Transport Act 1987, section 40 about exceeding the speed limit. Thus, the government should make full use of the mass media to inform, educate and advocate the publics on the importance of adhering to the speed limit and consequences of this behaviour especially to the economy, health and the environment.

The second challenge is the publics apprehension that the Automated Enforcement System (AES) is a profit-making business. Apparently, the AES is installed throughout the North-South Expressways as courteous reminders that the locations are the prone-accident locations. Hence, drivers need to slow down whenever they approach the location. Besides that, the purpose of the AES installation is for enforcement to deter speeding behaviour and catching the red-light running driver. However, the publics assume that the AES is meant for profit-making since lots of summonses have been issued to the offenders. The government has taken an action by calling off the summonses since

2012 to 31st August 2018 and take control of the AES from the previous two concession companies that are ATES and Beta Tegap. The government is apparently taking control over the full operation of AES in Malaysia, beginning 1st September 2018 onwards. By this, the Road Transport Department (RTD) has taken over the installation of cameras and issuance of summonses. Therefore, the publics need not to worry of the previous misconduct regarding the AES money collection.

Thirdly, the information about the speed camera location is accessible either through websites or application such as Waze and AES alert and it is easily accessible for everyone. The differences between the Waze application and AES alert is that Waze application only detected the speed camera location few hundred metres away (e.g.: 500m), instead the AES Alert reminded drivers few kilometres away (e.g.: 1 to 3 kilometres) ahead of the camera so that drivers would have ample time to slow down the vehicles. Besides that, AES Alert never go wrong as the camera location is based on the list provided by the Road Transport Department (RTD). The list for speed camera locations provided by Road Transport Department is eventually made known for everyone for the purpose to remind drivers to drive carefully along the road stretch as the locations are identified as accident prone or accident hotspots. However, the software developer gathered the information and built up the application to remind the drivers of the speed limit within the areas. On the contrary, the drivers misuse the information by following the speed limit only at that road stretch and begin to speed once they pass through the speed camera locations. Nevertheless, this can only benefit the drivers and cannot work as a long-term solution to improve driver speeding behaviour. Therefore, feasible and effective instrument, mechanism and measures to reconstruct and re-evaluate the issue, situation and condition before to ensure the policy adherence by Malaysian drivers.

In addition, publics worries that the speed limit should be increased since the road system is improving and the vehicles are equipped with modern technology such as in the new multipurpose vehicle by Proton, X70 that is equipped with the Air Brake System (ABS), remote speed sensing, vehicle-to-vehicle communication, front collision warning, electronic brake-force distribution and brake assist. Despite all of these in-vehicle technology, publics should realise that increasing the speed limit would only bring harmful than the benefit. They should have awareness that increasing the speed limit is not the ultimate solution to traffic safety, instead the current speed limit is set in accordance to the road system, geographical location, weather and road condition in Malaysia.

7.3   Challenges and Way Forward for Sustainable Road Safety Implementation

The implementation of new policy, strategies or approaches are solely dependent on Malaysia's Budget in transportation sector. It is reported that government has allocated a substantial amount to the Ministry of Transport in recent 2019 Budget. Supposedly, this could not be a stumbling block to develop a feasible plan to improve the transportation sector, especially when the road safety is concerned in Malaysia. Referring to the recent government budget, government has allocated the budget to upgrade the Auto gate Malaysia Clearance System and M-Bike at both Johor Causeway and the Second Link and continuing the Pan Borneo Highway encompassing Sabah and Sarawak. Then, improving the public transport services such as Mass Rapid Transit (MRT), Light Rapid Transit (LRT), busses and railway are also the priority within the MOT budget.

It is stated in the World Report on Road Traffic Injury Prevention (2004) by the World Health Organisation that to ensure the successful implementation of road safety performance in a country, enough financial and technical allocation are needed to support the road safety programmes (Evdorides & Zarulazam, 2014). Knowing Malaysia as one

of the low-middle income country (LMIC) with limited human and financial resources, this could be one of the stumbling blocks to realise the road safety performance in the country. Align to this, Downing (2004) asserted that many countries have been forced to cut down their budget on road safety due to lack of funding, thus this has failed the road safety plans to be delivered accordingly.

As such, to ensure enough financial and technical resources are allotted to road safety programmes, enough government budget through general tax revenues is needed. According to Evdorides & Zarulazam (2014), nearly 57% of the total speeding on road safety in the United Kingdom is incurred by the private sector. This can reduce the government budget and spending on the road safety. Nevertheless, private sectors in Malaysia could also work hand in hand with the government to sponsor some of the road safety programmes in Malaysia.

Besides that, earmarked taxes can be utilised to implement the new policies, approaches and road safety programmes. Earmarking is "allocating or setting aside a specific tax for a designated purpose" (Evdorides & Zarulazam, 2014, p.6). Usually, the provision from the traffic fines is set aside and utilised to fund the traffic law enforcement. However, if the government is able to implement better traffic law, the additional money from the traffic fines can be utilised for the policy and road safety programmesimplementation. In the current situation of Malaysia, traffic police acquire portion of the traffic fines. It will be good if the provision is governed by the Ministry of Transport as the department can utilise the fund for road safety programmes, policy and approaches. In the long run, it helps to improve the road safety condition in Malaysia.

Furthermore, sponsorship from the private industries is another way of funding the road safety programmes and implementation (Evdorides & Zarulazam, 2014). There are various kinds of corporate sponsorship that can be executed by various stakeholders

like car manufacturers, and transportation industries that emphasis on themes like road safety education and knowledge transfer, road safety awareness program, enforcement campaign, and driver training and awareness campaign. In return, these initiatives help to convey a good image towards their brands and business.

7.4　Limitation of the Study

Firstly, although this study utilises the convenience sampling for the quantitative method, the limitations of the study do exist in which the availability of the female and older drivers at the rest areas of selected PLUS Expressways and laybys of Federal roads, somehow influence the findings of the study. The results reveal that majority of the drivers are comprised of male, young and middle-aged drivers. Thus, this issue can be highlighted in the future study. Secondly, most of the respondents at the Expressways and Federal roads do not admit of speeding although evidences found from the empirical investigation reveal that majority of the drivers are speeding. This result could also hinder the actual results being reported.

7.5　Recommendations for Future Research

The current study highlights several areas that need further improvement. Firstly, this study was conducted in the year of 2014. The accident hotspots locations as appear in the study represent the actual accident statistics and situation happen in 2014 as suggested by the North-South Expressways concessionaire, PLUS Malaysia Berhad. Nevertheless, the recent accident hotspots locations along the North-South Expressways could be different due to geographical condition and road condition. However, the driver's attitude towards speeding could remain the same, improving or even worse from year to year. Therefore, it is advisable in the future to get the latest accident statistics from the authorities or Expressways concessionaire. This is because, the need to study about the driver behaviour and its requirements could be different.

Secondly, the target participants of this study are the passenger car drivers. It is advisable in the future to include commercial vehicle drivers such as express bus, truck, lorry and taxi drivers as target participants to investigate their attitude towards speeding behaviour. It should be noted that express bus drivers contributed to the highest percentage (58%) of total bus crashes for three consecutive years, 2007 to 2009 which occurred mostly on Expressways (Royal Malaysia Police, 2008; Royal Malaysia Police, 2010). Most of these cases related to express bus drivers can be attributed to speeding during night-time (Ahmad et al., 2017). Besides that, safety behaviour among taxi driver is crucial in taxi operations and services since deficient in safety behaviour can jeopardise taxi operation and the safety of passengers (Azmawati, Jamilah & Awang, 2014). Therefore, future studies addressing this issue is needed.

Thirdly, the future study can consider measuring the actual driver speeding behaviour on objective measures. This includes the use of a driving simulator to evaluate driver's speeding behaviour. For instance, in a study of Elliot et al., (2007) utilise self-report measures and driving simulator to evaluate participant's speeding behaviour. This study indicates that intention and perceived behavioural control predict actual driver speeding behaviour for the self-report measure, whereas the result of driving simulator reveals that intention predicts the actual speeding behaviour. Hence, the combination of both methods could expectantly yield comparable results to understand the actual driver speeding behaviour.

7.6   Conclusion

In conclusion, it is important to recognise that speeding has contributed to a substantial percentage in road traffic crashes. By recognising the contribution of speeding, one need to recognise that the influence of attitude has as one of the important predictors towards speeding behaviour. Recognising attitude can provide us

understanding of how it influences the behaviour. This subsequently can provide us understanding on how attitude can be changed to change the behaviour. Besides that, acknowledging other factors such as socio-demographic characteristics, trip characteristics and past behaviours have on attitude is also necessary. Therefore, publics should have vast understanding on the issue besides the government, authorities and agencies as responsible bodies to work on the solution. By taking example from exemplary countries such as Sweden, the Netherland, United Kingdom from their Safe System Approach, recommendations from previous research and findings of focus group discussion, workable corrective actions can be proposed. However, full cooperation from publics need to be gained and thorough assessment need to be carried out prior to implementation of any corrective actions.

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