ENVIRONMENTAL FACTORS AFFECTING COMMUTING ACCIDENT IN PUBLIC UNIVERSITY KUANTAN, PAHANG

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BACHELOR DEGREE OF OCCUPATIONAL SAFETY AND HEALTH WITH HONOUR

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ENVIRONMENTAL FACTORS AFFECTING COMMUTING ACCIDENT IN
PUBLIC UNIVERSITY KUANTAN, PAHANG

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Report submitted in fulfillment of the requirements

for the award of the Bachelor of

Occupational Safety and Health with Honours

Faculty of Engineering Technology

UNIVERSITI MALAYSIA PAHANG

JANUARY 2018

Bachelor Final Year Project Report

Thesis submitted in fulfilment of the requirements for the award of the

degree of Bachelor of Occupational Safety and Health with Honour

Dedicated for my family, supervisor and friends who guided and motivated me for this

Final Year Project

ACKNOWLEDGEMENT

ABSTRACT

The purpose of this study is to identify factors that may cause commuting accident among staffs in Universiti Malaysia Pahang (UMP). The number of road accidents continues to grow rapidly every year in Malaysia. However, the unseen fact is the number of road victims mentioned is come from the commuting accident. According to the statistic from Social Organisation (SOCSO), number of industrial accidents is diminishing from 35,898 in 2013 and 35,294 in 2014 meanwhile the number of commuting accident rise up from 27,659 in 2013 and 28,037 in 2014. The objective of this study is to identify whether environmental factors is contributing to the commuting accident or not. The factors listed in this study are time of day, weather, road condition, road design, road lanes and infrastructure. Thus, a questionnaire is distributed among staffs in UMP to be answered by those who involved in accident from 2013 to 2017. Data from the questionnaires is analysed by using Statistical Package for the Social Sciences (SPSS) and the Spearman's Rho method is used to find the correlation between environmental factors with commuting accident. The result shows that there is strong correlation between time of day with commuting accident which p-value (0.006). Therefore, the government and employer should propose some recommendations to decrease the number of commuting accidents.

ABSTRAK

Tujuan kajian ini dijalankan adalah untuk mengetahui faKtor-faktor yang boleh menyebabkan kemalangan sewaktu perjalanan terhadap staf di Universiti Malaysia Pahang.(UMP) Jumlah kemalangan di jalan raya terus meningkat setiap tahun di Malaysia. Walaubagaimanapun, fakta yang tidak diketahui ialah mangsa kemalangan jalan raya yang dinyatakan tersebut adalah disebabkan kemalangan semasa perjalanan. Menurut statistik yang dikeluarkan oleh Pertubuhan Keselamatan Sosial (PERKESO), jumlah kemalangan industri telah berkurang daripada 35,898 pada tahun 2013 dan 35,294 pada tahun 2014 manakala, kemalangan disebabkan perjalanan meningkat daripada 27,659 pada tahun 2013 dan 28,037 pada tahun 2014. Justeru itu, objektif kajian ini adalah untuk mengetahui adakah faktor persekitaran memberi kesan terhadap kemalangan sewaktu perjalanan. Antara faktor yang disenaraikan ialah masa kemalangan, cuaca, keadaan jalan raya, bentuk jalan raya, lorong jalan raya dan infrastruktur jalan raya. Oleh itu, borang kaji selidik telah diedarkan kepada staff di UMP untuk diisi oleh mereka yang pernah terlibat dalam kemalangan jalan raya sepanjang tahun 2013-2017. Data yang diperoleh daripada borang kaji selidik tersebut dianalisa menggunakan Statistical Package for the Social Sciences (SPSS) dan kaedah Spearman's Rho telah digunakan bagi mendapatkan hubung kait antara faktor persekitaran dan faktor fizikal dengan kemalangan sewaktu perjalanan. Hasil kajian mendapati masa kemalangan menunjukkan hubung kait paling kukuh iaitu nilai-p (0.006). Justeru itu, pelbagai langkah keselamatan yang perlu diambil oleh pihak kerajaan dan majikan bagi mencegah kejadian kemalangan sewaktu perjalanan ini terus meningkat

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LIST OF ABBREVIATIONS

UMP	Universiti Malaysia Pahang
SOCSO	Social Society Organization
PERKESO	Pertubuhan Keselamatan Sosial
MIROS	Malaysian Institute of Road Safety Research
RMP	Royal Malaysia Police
WHO	World Health Organisation
ILO	International Labour Organisation
MUTCD	Manual on Uniform Visitors Control Devices

CHAPTER 1

INTRODUCTION

1.1   INTRODUCTION

Commuting accident is a serious situation that hit the newspaper recently. The trend of accident victims due to commuting accident attracts the attention of various parties. Traffic accidents in which workers are involved during working hours and which occur in the course of paid work are considered as occupational accidents International Labour Office (1994). In 2002, the International Labour Organisation (ILO) reported that commuting accidents are only notifiable in Belgium, Brazil, Bulgaria, China, Germany and Malaysia. Most of the researchers are focusing on the occupational and industrial accidents as there are many safety programmes and safety campaign being done to diminish the number of industrial accident. In fact, the number of accidents because of industrial accident is decreasing while total deaths of commuting accident suddenly rise up. News from The Star Online (2013) stated that on average, in 2011, there were three work-related deaths every day and two of the three were due to commuting accidents. The study was designed to explore related factors that caused the occurrence of commuting accident among staff in Universiti Malaysia Pahang (UMP). Parameter including under environmental factors are travel time, weather, condition, road surface, road lane and infrastructure. Therefore, government and various parties can plan preventive measure and mitigate the problems to reduce the number of fatality of commuting accident.

1.2   BACKGROUND OF STUDY

The number of road accidents continues to grow rapidly every year in Malaysia. Based on statistics retrieved from Malaysian Institute Of Road Safety Research (2016), fatalities due to road accidents in 2016 was 7,152 which increases slightly compared to 6,706 in 2015 and 6,674 in 2014. However, the fact that we do not see is the number of road victims mentioned is come from the commuting accident. According to the statistic from SOCSO (2015), number of industrial accidents is diminishing from 35,898 in 2013 and 35,294 in 2014 meanwhile the number of commuting accident rise up from 27,659 in 2013 and 28,037 in 2014. As to find solution, awareness on why an accident happens is the first step in prevention. In this study, staffs of Universiti Malaysia Pahang (UMP) are the variables in order to identify what are the risk factors that affect the occurrence of commuting accidents. Most of the topic covered by previous researchers is more focusing on behaviour, however in this study, environmental aspect is the main topic discussed. Main objective of this study is to find the correlation between several factors including time of day, weather, road condition, road lanes, road design and infrastructure towards commuting accidents.

1.3   PROBLEM STATEMENT

Commuting accidents has been controversial as reported in The Star (2013) that two out of the three deaths were due to commuting accidents. This issue is creating fear, anxiety and a serious situation in the country. Many people think that the number of industrial accidents is increasing yearly however Tan Sri Lee Lam Thye, chairman of National Institute of Occupational Safety and Health (NIOSH) said the SOCSO statistics show that the number had dropped from 35,898 cases in 2013 to 35,294 in 2014 and 34,258 in 2015, The Star (2017). If we continue to believe the industrial accidents is on top of the discussion, we will never have the solution to commuting accidents. Most of the previous study mainly focusing on the human factor, thus this study will go deeper on environmental factor. Control risk is proposed in order to reduce the likelihood and severity of commuting accident. This qualitative case study will explore the accident experienced by staff from Universiti Malaysia Pahang about the environmental factor that influenced commuting accident as a strategy to reduce the numbers of road accident victims in public university. The data to be gathered in this study may provide government, non-government and developers with information

relating to how they may address or mitigate factors contributing to the current commuting accidents.

1.4   RESEARCH OBJECTIVES

Main

To study the risk factors influence the commuting accident among staff in Universiti Malaysia Pahang.

Specific

1.4.1 To identify the contributing factors that may cause the occurrence of commuting accident.

1.4.2 To analyse environmental factors contributing the occurrence of commuting accident.

1.4.3 To evaluate the relationship between environmental factors towards commuting accident.

1.5   RESEARCH QUESTION

1.5.1   What are the factors that may cause commuting accident?

1.5.2   What are the most significant factors causing commuting accident occurrence based on environmental factors?

1.5.3   Is there any correlation between environmental factors towards commuting accidents?

1.6   RESEARCH HYPOTHESIS

Ho: There is significant effects of several factors contributing to commuting accidents.

H1: There is no significant effects that several factors contributing to commuting accidents.

1.7   SCOPE OF STUDY

The focus of the study is to identify the risk factors influence the accident among staff in Universiti Malaysia Pahang which a white-collar occupational group. More specifically, factors that will be discussed in this paper are on environmental factors as the results from Nurulhuda Binti Jamaluddin *et al.* (2015) study mentioned that there are substantial effects from the surrounding environment on the accident travel risk. Main concerned in this study is to evaluate whether there is relationship between environmental factors towards commuting accidents. The results of factors contribution towards commuting accidents will be expanded upon the questionnaire distribute among UMP staffs and the correlation will be analysed by using Statistical Package for the Social Sciences (SPSS).

1.8   SIGNIFICANCE OF STUDY

The findings of this study will redound to the benefit of society considering that human productivity performance can be increasing when commuting accident risk factors is known. SOCSO's collaboration with various multi- agency activities resulted in decreasing number of industrial accidents. However, commuting accidents still show increased each year Social Security Organisation (2015). Number of commuting accidents show upward trend is very alarming. This indicates a serious situation in Malaysia that needs to be addressed. The Royal Society for the Prevention of Accidents (2012) urged employers to play their roles in conducting suitable risk assessments and set in place measures to ensure that commuting journeys are safe, drivers are fit and are competent to drive safely and that vehicles are fit-for-purpose and in a safe condition. Nurulhuda Binti Jamaluddin *et al.* (2015) in their studies on Exposure Work Commuting: Case Study among Commuting Accidents in Klang Valley, Malaysia emphasised that factors such as road environment, type of road travelled and traffic condition may also influence risk of accident. Thus, this paper will study on the accident risks based on environmental factors to help employer, government sector and developers to implement effective preventive measure by referring to recommended risk control.

1.9 CONCEPTUAL FRAMEWORK

Environmental Factor
- Time
  - Commute to work
  - Break/Lunch
  - Returning from work
- Weather
  - Fine
  - Rainy

Physical Factor
- Road Condition
  - Wet
  - Dry
- Road Design
  - T-Junction
  - 4-Junction
  - Curve
  - Straight
- Road Lane
  - 2-Lane
  - 4-Lane
- Infrastructure
  - Traffic Light
  - Divided

Crashes and Injuries due to Commuting Accident

Staff UMP
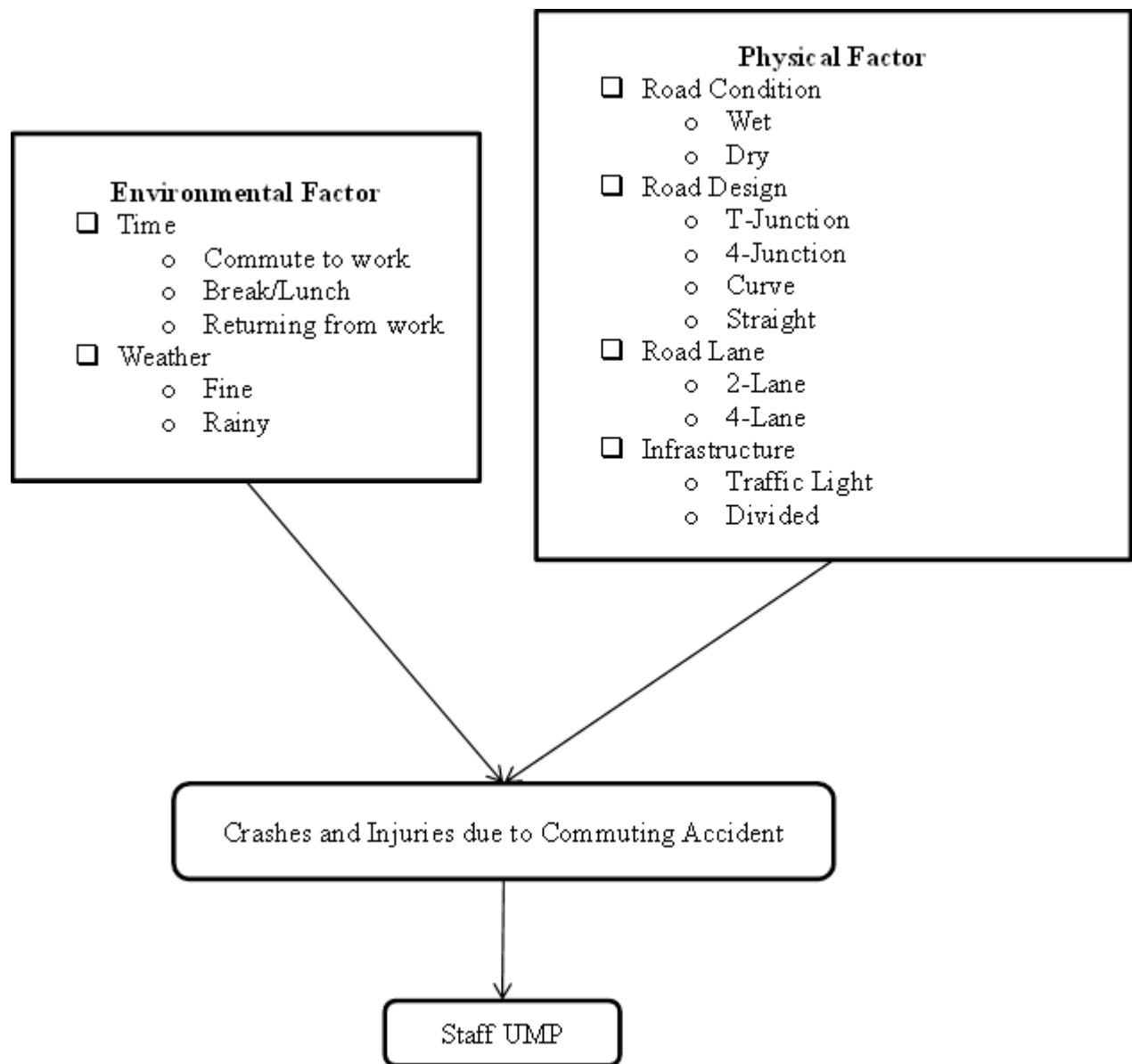
Figure 1.1 Conceptual framework

1.10   OPERATIONAL DEFINITION

1.10.1 Commuting accident

An accident occurring on the direct way between the place of work and (a) the worker's principal or secondary residence; (b) the place where the worker usually takes his/her meals; or (c) the place where the worker usually receives his/her remuneration, which results in death or personal injury involving loss of working time. Traffic accidents in which workers are involved during working hours and which occur in the course of paid work are considered as occupational accidents.

1.10.2 Environmental factor

Roadway environmental factors included weather, time of day, road condition, road lane, road surface and infrastructure.

1.10.3 T-Junction

A highway intersects with another at right angles (or close to a right angle) which is less complicated than crossroads.

1.10.4 4-Junction

When the two joining roads intersect each other perpendicularly, it is termed as a regular Intersection whereas the two roads cross at a different angle the junction is called a Skewed Intersection.

1.10.5 Traffic light

Ought to only be considered in which the intersection meets warrants inside the Manual on Uniform Visitors Control Devices (MUTCD).

CHAPTER 2

LITERATURE REVIEW

2.1   INTRODUCTION

Commuting accidents as defined by The International Labour Organisation (ILO) in the Codes of Practice of Recording and Notification of Occupational Accidents and Diseases is an accident occurring on the habitual route, in either direction, between the place of work or work-related training and: (1) the worker's principal or secondary residence; (2) the place where the worker usually takes his or her meals; or (3) the place where he or she usually receives his or her remuneration; which results in death or personal injury involving loss of working time (International Labour Office Geneva, 1994). It is essential to know the factor that causes the number of victim of commuting accidents that is increasing yearly. More than a million people are died on the world's highway every year. Accidents at the highway are due to inadequate regard for combination of highway function with verdict about speed limits, street layout and design (World Health Organization, 2009). The enhancement of occupational safety and health awareness and enforcement of laws and regulations over the past 10 years has been significantly reduced overall accident rate at the work place by 37% from 95,006 accidents in the year 2000 to 59,897 accidents in 2011. Tan Sri Lee Lam Thye. Lee, Chairman of the National Institute for Occupational Safety and Health (NIOSH), said the high number of road fatalities in Malaysia involving workers commuting to and from work as the working world has changed dramatically as a result of globalisation, demographic changes, migration and evolving family structures (BorneoPost Online, 2012).

2.2 COMMUTING ACCIDENT

Figure 2.1 was retrieved from (SOCSO, 2015) website shows the increasing number of commuting accident since 2010 to 2014. The intention of this study is to identify commuting accident among UMP staffs' and the factors that have been concerned in this study are environmental factors.
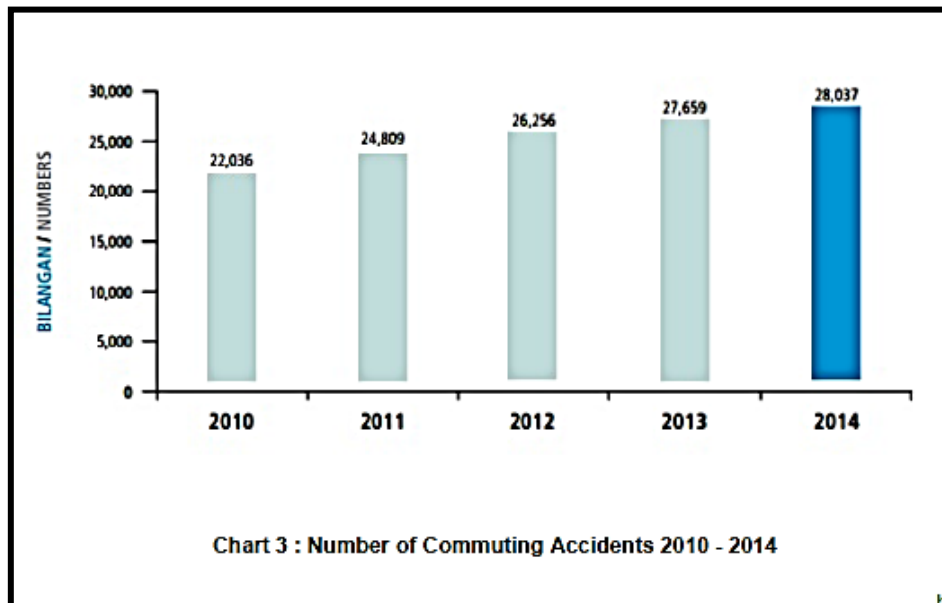
Figure 2.1 Number of Commuting Accidents 2010-2014
Source: Social Security Organisation

Choosing UMP staffs as the sample of this study is because lately commuting accident involving health personnel gained the attention of many. Health director-general Datuk Dr Noor Hisham Abdullah said 69 accident cases were recorded while returning home from work after working outside office hours and among health personnel (Bernama, 2017). Thus, in this study, the sample comes from white collar occupational groups of workers, which are professional and high level management. UMP offers a wide range of skills-based tertiary education programmes and practical-based tertiary education in engineering and technology to produce competent engineers. As for research, UMP focuses on applied research and industrial projects to enrich the teaching and learning processes as well as to promote the commercialization of research products, thus exposing students to the latest research and development activities in the industries.

Hence, this study will determine whether there is correlation or not between environment factors towards commuting accident according to parameter such as time of day, weather, road condition, road surface, road lane and infrastructures.

2.3   FACTORS ASSOCIATED WITH COMMUTING ACCIDENT OCCURRENCE

2.3.1   Time of day- day vs night

The first parameter in this study of environmental factor is time of day: to see if the cause of accident is associated with am peak, pm peak or off-peak traffic and manoeuvres. The night time crashes is used to indicate the need for special night time protection.

Based on the Police Road Accident Statistics Report 2000- 2009, it was found that the number of motorcycle accidents occurring during daytime (6 am – 6pm) was slightly higher compared to night time (after 6 pm). The sample data analysed in 2009 concluded that 50 % of road deaths and serious injuries in accidents involving cars and motorcycles occurred during the 7-hour working period (8am- noon and 2pm-5pm). The remaining 50% occurred during the peak hours (6am- 8am, noon-2pm, 5pm-7pm) (Malaysian Institute Of Road Safety Research, 2011).

According to Munteanu *et al.* (2014) road accidents are often caused by an accumulation of elements which belong largely to four major classes of conditions: the human factor, infrastructure, vehicles and weather conditions. The strong association between dark and inadequate speed suggesting an increased risk in circumstances where there is this combination. Crash is likely to occur at night compared to driving during midday (Drucker et al., 2013). In Traffic Engineering Road Safety: A Practitioner's Guide, Ogden (1994) stated that the possible conditions that lead to crash are predominantly off-peak, since queue is usually required to form before the right turn lane thus, it is not because of much use of the road as it has been controlled by the queue.

The following factors collectively led to a higher probability of being fatal for pedestrians; pedestrian aged more than 25 years old; suffers head injury (location of body injury); being involved in a crash with a road speed limit of more than 50 km/h; being

involved in crash occurred at straight road and being involved in a crash that happens at location with dark-unlit condition (Ariffin *et al.*, 2017).

Darkness is highly associated with hit-and-run behaviors compared to sufficient lighting. Among different scenarios, darkness combined with disregarding road marking produces the largest odds ratio (Zhou, Roshandeh, Zhang, & Ma, 2016). The odds of injury and death in scene were higher at night, sun rise and sun set than daytime (Lankarani et al., 2014). This is due to the lesser number of vehicles during night compared to the morning thus carelessness and ignorance are the cause of accident happen as they can drive at high speed.

2.3.2   Weather- rainy vs fine

On the whole, the climate of Malaysia is equatorial with slight disparity in rainfall, temperature and wind depending on local topography. Malaysian Meteorological Department (2015) categorize general attributes of Malaysian climate – uniform temperature, high humidity and copious rainfall. Malaysia experience tropical atmosphere with warm and humid climate lasting through the year. The temperatures range is from 21°C to 32°C. Annual rainfall varies from 2000 mm to 2500 mm (JKR, 2009). Based on the statistic by MIROS Review Report; the highest average annual rainfall is 4 128 mm, recorded at Kuching, Sarawak whereas the lowest average annual rainfall is 1 746 mm which recorded at Chuping, Perlis (Jawi, Sarani, Voon, Farhan, & Sadullah, 2009).

As stated in the Road Traffic Injury Prevention: Training Manual by World Health Organization (2009), drivers' speed decision is affected by various elements that can be considered as driver-related elements, age, sex, alcohol level, number of individuals in the vehicle; road and vehicles relating factors, road layout, surface quality, vehicle power, maximum speed; traffic-related and environment-related factors including traffic density and composition, prevailing speed, weather conditions.

Lankarani *et al.* (2014) concluded that the chances of injuries and death in scene were higher in dusty, foggy, snowy, rainy and stormy climate than the clear weather. In the study, crash is said to be more unsafe in dusty climate and were most prevalent on clear weather conditions as the results of climate in Iran is typically clear and sunny in many days.

Data analysed by Jiang *et al.* (2016) shows that crash that occurred on a rainy day is more likely to stay on the scene than if the crash occurred on a sunny day, with all other factors held constant because that rainfall can reduce the friction between the ground and tires that com- promises the maneuverability of his vehicle.

Results of the environmental factors in Lee, Chung and Son (2008) study emphasised that poor weather and wet road surface contribute to decrease accident size, however this result contradicts to the other studies.

2.3.3   Road condition- wet vs dry

Wet condition is referring to the condition of raining or snowing while dry is paradoxically referred to as "normal". The effect of road factor on accident size is highest among three exogenous latent variables which are road, environment and driver factors. In order to decrease the traffic accident size, it is effective to handling the road factor (Lee et al., 2008). Wet and sand road surface are less likely to be hit-and-run crash compared to crashes on dry road surface (Bardal & Jørgensen, 2017).

A study conducted by Hjelkrem and Ryeng (2016) concluded higher risk for highway accident during daylight with fine road surface and no precipitation as the driving conditions worsen during normal situation. Wet surface conditions tend to reduce driver injury severities since drivers are more cautious on wet roadways and drive at relatively low speeds (Chen et al., 2016).

Accidents on wet and sand road condition are less likely to be hit-and-run accident compared to accidents on dry road surface. Among various situations, wet road surface joined with following too closely to leading vehicle created biggest chances of accidents to occur (Zhou et al., 2016).

Results demonstrate that dry road surface lead to increase accident size. driver's carelessness on a clear day encourage them to put higher operating speed as the journey seems smooth without any indefinite view and tend to slower operating speed in bad weather to be more careful can explain the result (Lee et al., 2008).

2.3.4   Road design- T-Junction, 4-Junction, straight, curve

T-junctions and junctions of four-points or more are place that have higher tendency for accidents to occur compared no intersection road (Drucker et al., 2013). Accidents on two roadway geometrics which are flat straight and winding uphill/downhill road representing the highest and lowest proportions (Lankarani *et al.*, 2014).

Accident rates increased in road segments such as curves, unpaved shoulders, narrow lanes, and low skid-resistance pavements were shown to have been associated with increased accident rates (Ogden, 1997). Based on the statistic from Anastasopoulos *et al.* (2012) study found the effect on the roadway segments is varies in the random-parameters model, all of these variables produced statistically significant random parameters. When horizontal curves were present, the random-parameters model estimation results indicate that accident rates decreased on 98.97% of the roadway segments and increased on the other 1.03%.

According to Lee, Chung and Son (2008), the size of accident tends to increase when factors of road have higher values. Pavements of concrete, straight and level/downward slope are the elements of road factors increase in case of accidents. The consistent results with the previous researches are the operating speed is slower in curve section of roads. Decisions of hit-and-run affect by road alignment and median type. Accidents on curve road are less likely to be hit-and-run crashes compared to straight road, (Zhou et al., 2016).

2.3.5   Road lane-2 lanes, 4 lanes, 6 lanes

Inside lanes should continue to be designed at the minimum possible width. Wider lane widths through urban areas may require the use of major truck or transit routes (National Association of City Transportation Offcials, 2017).

Comparing roads accidents in number of lane, hit-and-run crashes are more likely to happen on roads with 1 or 2 lanes more than 3 lanes. This is because more lanes mean more movement and more observers, and additionally more prone to be gotten caught after

escaping, thus it is understandable (Zhou et al., 2016). Two-lane per direction approach gave a higher mean speed compared to one-lane or three-lane approaches (MIROS, 2013).

The level of safety on a four-lane divided rural highway in India that is influenced by geometric design characteristics and traffic characteristics operated under heterogeneous traffic condition was studied. For developing accident models, count data modelling approach was used because the crash events are uncommon and random in nature (Vayalamkuzhi & Amirthalingam, 2016).

Ahmed, Abdel-Aty and Park (2015) mentioned that conversion to a four-lane divided roadway creates a higher reduction in total and property damage only crashes in urban areas than it did in rural areas. Lower possible injury accident rate and lower probability, respectively, of having injury accident rate above zero are found in segments with more than 5 lanes (in both directions) and segments with no interchanges (Anastasopoulos, Shankar, Haddock, & Mannering, 2012).

Study by Shepherd (1996) shows that the lower average crash rates on facilities with 4 through traffic lanes may be partially explained by the lower average traffic volumes on the 4-lane divided facilities make the average total crash rates as well as injury and fatal crash rates lower.

2.3.6 Infrastructure-Traffic signal vs divided

2.3.6.1 Traffic signal

Traffic signals that are properly located and operated are likely to provide orderly movement of traffic, increase traffic capacity of the intersection, reduce the frequency of certain types of crashes for instance right-angle crashes, accommodate for continuous or nearly continuous movement of traffic along a given route, interrupt heavy traffic to permit other traffic, vehicular or pedestrian, to cross (US Department of Transportation, 2007).

Similarly critical to the designation of space, in the form of road cross-sections and geometry, is the allocation of time, performed by traffic signals. Space and time in combination govern how streets operate and how well they provide mobility, safety, and

public space. Signal timing is an essential tool, not just for the movement of traffic, but also for a safer environment that supports walking, bicycling, public transportation, and economic vitality (National Association of City Transportation Offcials, 2017).

Running through red traffic lights is a major road safety concern. Based on the 2009 police road accident data, there were 397,330 accidents in Malaysia and 1,038 accidents happened at intersections with traffic lights. There were 80 deaths and 908 serious injuries sustained (Malaysian Institute Of Road Safety Research, 2011).

Zhang, Tan and Jou (2016) said that factors in the cause of accidents is noncompliance with traffic signals and stop signs at intersections and the risk is even higher than other types of accidents after violating traffic signal. Investigation of effectiveness of existing ways to calculation of the traffic lights control process duration allows development of a mathematical model for justification of algorithms for traffic lights control, widely varying characteristics of traffic flows is taking into account.

One of the main causes of origin of a clear transportation problem in numerous cities is that their transport infrastructure has been formed in conditions that are not ready for such motorization level. Specific features of these cities are high delays of moving cars, low speed of communication and considerable queues at intersection entries, affecting indirect indicators, such as reduction of traffic capacity, excessive fuel consumption and psycho-emotional state of road users (Novikov, Novikov, Katunin, & Shevtsova, 2017).

One of the important factors in the cause of accidents is because noncompliance with traffic signals and stop signs at intersections. Violating traffic signal will increase risk of causing injuries even higher than other types of crashes (Zhang et al., 2016).

2.3.6.2 Divided

Most of the reported studies were carried out on lane with divided highways and lane with undivided highways. Only a few discussed about the crashes based on the divided existence. An extremely well designed and executed study by Zhou *et al.* (2016) emphasised that the likelihood of hit-and-run crashes on divided roadways is lower compared to non-

divided roadways. Research has shown that safety problems can be overcome with the effective function of left turn acceleration lanes at divided highway intersections (US Department of Transportation, 2014).

From the study on The Relationship Between Congestion Levels and Accidents, Chang and Xiang (2003) found that divided roadway links generally exhibit higher accident frequencies than undivided roadway links at the same volume levels. This may be attributed to relatively high speeds on the divided roadway links or limitations of the selected sample datasets.

2.4   SELECTED ACCIDENT CASES

2.4.1   Accident Involved NST Reporter on Duty

Figure 2.2 shows an accident happened in happened near the Sunway toll plaza at the New Pantai Expressway when he had just exited the motorcycle lane. In the 3pm incident, New Straits Times journalist Fernando Fong Kee Soon was injured when a police patrol car in hot pursuit of another car accidentally rammed into his motorcycle (New Straits Times, 2017).

Figure 2.2 Accident Involved NST Reporter on Duty
Source: New Straits Times

2.4.2 Accident among Government Hospital Employee

Figure 2.3 shows news on the top the list of those involved in commuting accidents among government hospital employees. According to Health Ministry data, out of the 554 hospital staff members who were involved in such accidents from 2014 to 2016, more than half, or 295, were nurses. Among the causes of commuting accidents were sleep deprivation, road conditions and weather (The Star, 2017).

Figure 2.3 Accident among Government Hospital Employee
Source: The Star

2.4.3 Accident at Jalan Padang Kerbau, Miri, Sarawak

Figure 2.4 shows an incident occurred on October 16, 2016, two women, including a Bruneian, were killed and three other people were injured when the Toyota Harrier they were travelling in skidded and smashed into a tree reported by (Utusan Online, 2016). Five of them were travelling in a Toyota Harrier, at a high speed, from Pujut Roundabout when the driver lost control at a sharp bend and hit a tree.

Figure 2.4 Accident at Jalan Padang Kerbau, Miri, Sarawak

Source: New Straits Times

2.4.4 Accident at Jalan Gemas-Tampin, Seremban, Negeri Sembilan

Figure 2.5 shows an incident happened on 13 September 2016 at KM7, Jalan Gemas-Tampin, Seremban, Negeri Sembilan. From the investigation at the scene, the road condition where the incidents take place is a curve road from Gemas direction with two-way street system and the center line divider detached. The situation of the roadway is good however the light of the way crash site is too vague (Utusan Online, 2016).
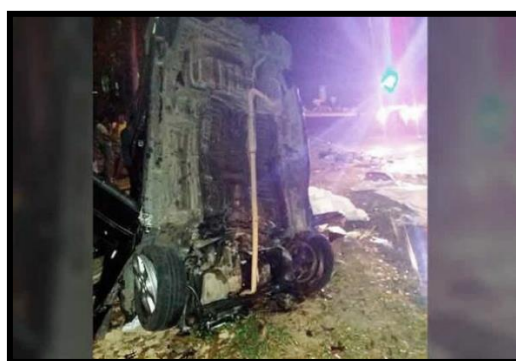
Figure 2.5 Accident at Jalan Gemas-Tampin, Seremban, Negeri Sembilan

Source: Utusan Online

CHAPTER 3

METHODOLOGY

3.1 INTRODUCTION

This study attempts to assess the cause of commuting accident based on the environmental factors by quantifying the influence of time of day, weather, road condition, road design, road lane and infrastructure. To examine the influence of the parameters collected, interview, designing a questionnaire, SPSS and Spearman's Rho method is used to analyse the factors that may cause commuting accidents.

3.2 STUDY LOCATION

On February 16, 2002, Government of Malaysia established Universiti Malaysia Pahang (UMP) and was set up as a competency based technical university which specialises in the fields of engineering and technology. UMP is located on the east coast state of Pahang, the biggest state in Peninsular Malaysia with vast areas of rainforest endowed with a wide range of biodiversities and natural resources. The university's have two campuses which located in Pekan and Gambang are fully equipped with the latest information and communication technology (ICT) systems, including wireless broadband internet connections to facilitate the university's electronic based e-Learning and e-Management activities. This study is conducted in UMP in order to examine the white-collar occupational group's who has a potential of exposing to commuting accident from 2013-2017.

3.3 STUDY DESIGN

To answer the objectives of this study, the method used to suit the needs to obtain data are interview, questionnaire, descriptive analysis and SPSS. Thus, Gantt Chart is constructed to ensure the study is on track in Appendix A.

3.3.1 Interview

In qualitative research, interviewing is the most common method or tool of data collection. Unstructured interview is collecting the data through observation and record field notes. Unstructured interview resembles a conversation more than an interview and is always thought to be a "controlled conversation," which is skewed towards the interests of the interviewer (Jamshed, 2014). In order to answer objective (i), Sarjan Kamaruddin bin Dollah, Head of Police Traffic Station Kuantan has been interviewed in order to gain data from police traffic Kuantan regarding on accident statistic and common factors of accident.

3.3.2 Questionnaire

The questionnaire was designed to provide a sample from the staffs that have been experienced accident and the environmental factors during the accident. Respondents were selected from those who have been survived in traffic accidents. The population are staffs in Universiti Malaysia Pahang. Questions including time of accident, weather, road condition, road lane, road surface, infrastructure, either do a police report and claim insurance or not. The questionnaire is distributed through media electronic such as e-mail and *Whatsapp* as the alternative to spread the questions widely. This method used to answer objective (ii). This study is based on data collected from thirty-three respondents who survived in traffic accidents and completely answer the questionnaire. Please refer Appendix B for sample questionnaire.

3.3.3 Descriptive analysis

Descriptive research is the transformation of raw data into a form that will make reader easy to understand and interpret; rearranging, ordering, and manipulating data to generate descriptive information (Walliman, 2005). Descriptive research involves gathering data that describe events and then organizes, tabulates, depicts, and describes the data

collection (The Association for Educational Communications and Technology, 2001). It often uses visual aids such as graphs and charts to aid the reader in understanding the data distribution. Descriptive statistics are very important in reducing the data to manageable form because the human mind cannot extract the full import of a large mass of raw data. When in-depth, narrative descriptions of small numbers of cases are involved, the research uses description as a tool to organize data into patterns that emerge during analysis. Those patterns aid the mind in comprehending a qualitative study and its implications. Three main purposes of research are to describe, explain, and validate findings. Description emerges following creative exploration, and serves to organize the findings in order to fit them with explanations, and then test or validate those explanations. On the other hand, descriptive research might simply report the percentage summary on a single variable. Based on the samples collected for this study, all the data is presented in chart and table with the description of the data which are, time of day, travel purpose, weather, road surface, road condition, road lane, the existence of traffic light, divided existence, did they do police report and claim vehicle insurance and gender of the person who had experienced accident. The data will be analysed by using descriptive analysis.

3.3.4 SPSS

SPSS means Statistical Package for the Social Sciences and was first launched in 1968.It is officially known as IBM SPSS Statistics since SPSS was acquired by IBM in 2009but most users still just refer to it as "SPSS". SPSS is software for editing and analysing all sorts of data. Data may come from basically any source: scientific research, a customer database, Google Analytics or even the server log files of a website (Geert, 2017).. SPSS displays them in a spreadsheet-like fashion. This sheet -called data view- always displays our data values. An SPSS data file always has a second sheet called variable view. It shows the metadata associated with the data. SPSS can open all sorts of data and display them -and their metadata- in two sheets in its Data Editor window. This study use SPSS to find the correlation between environmental factors towards commuting accident.

3.3.4.1 Spearman's Rho

Spearman Rank Correlation test is part of the non-parametric statistics aims to examine the relationship between two variables data ordinal. It is used to test the association between two ranked variables, or one ranked variable and one measurement variable.

The null hypothesis is that the Spearman correlation coefficient, ρ ("rho"), is 0. A ρ of 0 means that the ranks of one variable do not covary with the ranks of the other variable; in other words, as the ranks of one variable increase, the ranks of the other variable do not increase or decrease (John H. McDonald, 2014).

Basic Decision Making in Spearman Rank Correlation:

Coefficient Test

1. If the value of Sig. <0.05, then there is a relationship between variables

2. If the value of Sig. > 0.05, there is no correlation between variables

The results from this method of the correlation in order to find whether there is a significant value of environmental factors towards commuting accident or not which answer objective (iii).

CHAPTER 4

RESULT AND DISCUSSION

4.1   INTRODUCTION

In order to examine which environmental factors would have a higher explanatory to explain commuting accident experienced by Universiti Malaysia Pahang staffs', several correlation and regression analyses were performed. The correlations between the dependent variables and commuting accident are reported. Results are presented in form of charts and tables.

4.2   DESCRIPTIVE ANALYSIS

4.2.1   Travel Purpose

Figure 4.1 explained the travel purpose of respondents when they experienced accident. According to the definition of commuting accident by The Royal Society for the Prevention of Accidents (2012), commuting and returning, break and official duties are fall under the definition of commuting accidents.
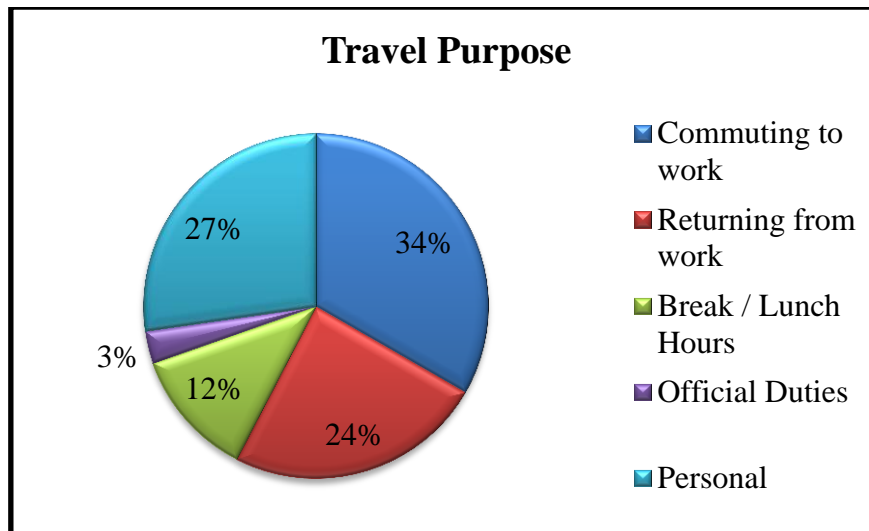
Figure 4.1 Travel Purpose that Commuting Accident Occur

Figure 4.1 shows that almost 73% of respondents experienced commuting accident while 27% of them involved in traffic accident due to personal reason. As the working hours for staffs in UMP are between 8am-5pm, most of the commuting accidents occur between 6am-9am (commuting to work) and 4pm to 7pm (returning from work). This proved that commuting accidents among staffs in UMP is not odd as the high number of road fatalities in Malaysia involving workers commuting to and from work mentioned by SOCSO and statement from the chairman of the National Institute for Occupational Safety and Health (NIOSH), Tan Sri Lee Lam Thye that commuting accident is alarming happen in public university too.

4.2.2 Time of Day

Figure 4.2 shows the travel time of accident occurred by thirty-three respondents. Based on time from 6am-9am, 10am-1pm, 2pm-5pm, 6pm-9pm, 10pm-1am and 2am-5am, when is the most frequent time for accident to occur.

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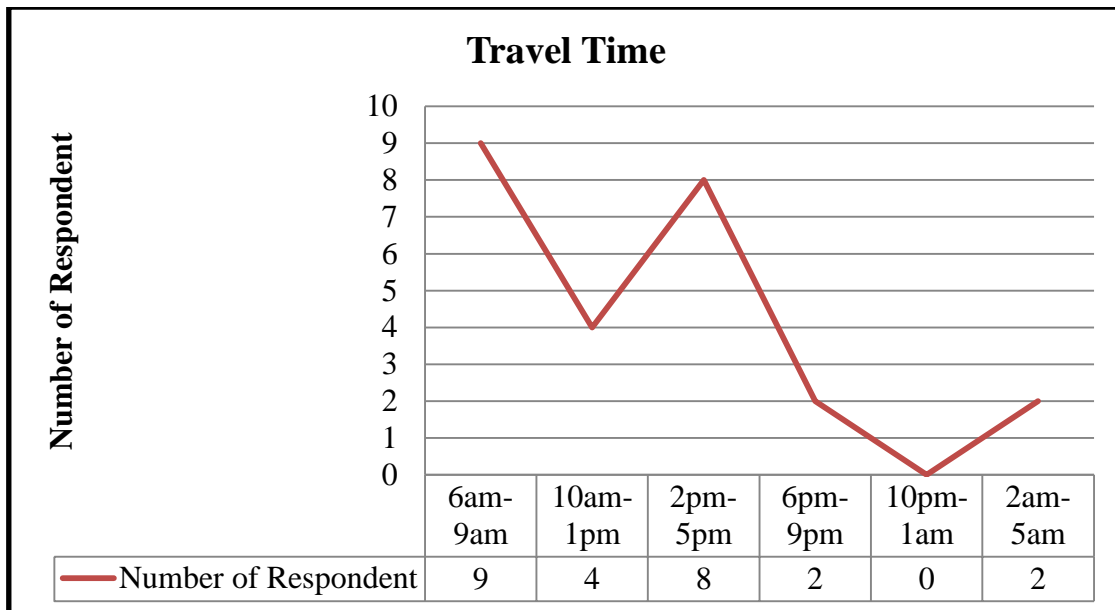
Figure 4.2 Travel Time when Commuting Accident Occur

Figure 4.2 above shows that the most frequent time of commuting accident to happen is between 6am to 9am. This may due to the traffic condition which many cars will be on the road at the same time to send children to school and because workers rush to work. In a German study of chemical company workers by Zepf *et al.* (2010), the peak hours for commuting accidents were in the morning between 6.00 a.m. and 8.00 a.m. and in the late afternoon 5.00 p.m. and 7.00 p.m. These differences in accident proneness to and from work are perhaps due to poor weather conditions, or darkness, and traffic manoeuvres.

4.2.3   Weather

Figure 4.3 shows that about weather when UMP's staffs who had been in commuting accident in terms of fine and rainy.
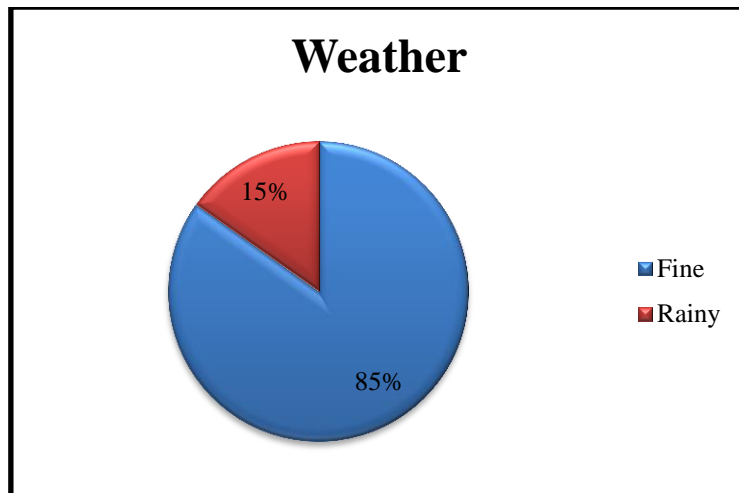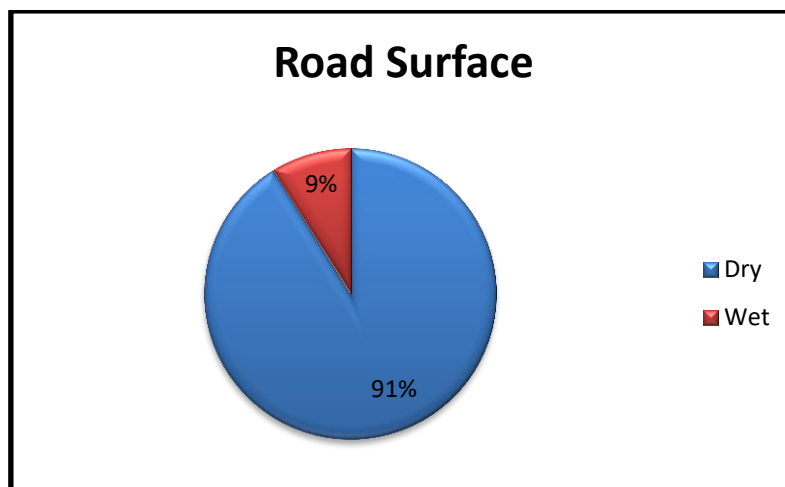
Figure 4.3 Weather when Commuting Accident Occur

From the data, 85% of the weather when accidents occur is fine. This may due to many cars on the road in rush hours either going to work, send children to school or returning from work and pick children from school. Results from study conducted from Lee, Chung and Son (2008) shows that clear weather, dry road surface lead to increase accident size. The higher operating speed due to driver's carelessness on a clear day and slower operating speed in bad weather can explain the result.

4.2.4 Road Surface

Figure 4.4 shows the percentage of type of surface when accident occur whether it is dry or wet.
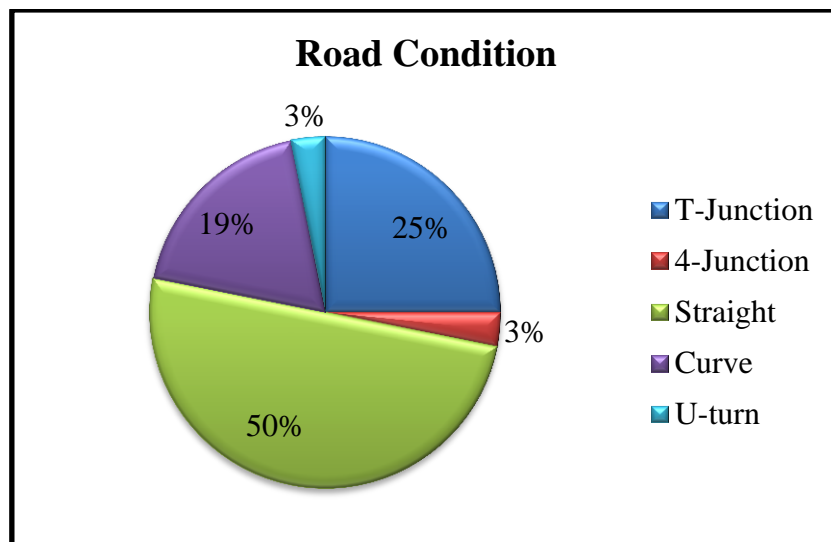

Figure 4.4 Road Surface when Commuting Accident Occur

The graph from Figure 4.4 shows that almost 91% of commuting accidents happened on dry road surface while nine percent happen because of the road surface is wet. This proof that when the road is wet, driver will tend to slower their speed as they aware the road is slippery. This result similar with Lee, Chung and Son (2008) study which stated that poor weather and wet road surface contribute to decrease accident size. It has also issued in Chen *et al.* (2016) study, wet surface conditions tend to reduce driver injury severities since drivers are more cautious on wet roadways and drive at relatively low speeds.

4.2.5   Road Condition

This study is also identified whether road condition give impact on commuting accident or not by comparison, commuting accident with type of road condition T-Junction, 4-Junction, straight, curve and U-turn.


Figure 4.5 Road Condition when Commuting Accident Occur

From Figure 4.5 shows that above all, 50% of the accidents experienced by respondents occur on straight road design followed by 25% on T-Junction and 19% on curve road. This may be happened due to driver exceed speeding limit as the challenge of a straight road is lesser compared to T-Junction and 4-Junction that have a traffic light as a barrier and

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curve road that need driver to slower the speed or else they will skid. They are also more likely to commit other driving violations, such as red-light running and driving too close, (The Royal Society for the Prevention of Accidents, 2012). The comparison from Lee, Chung and Son (2008) shows that the accident size increases as the road design is straight.

4.2.6 Road Lanes

Figure 4.6 shows the factor of road lane, where in the questionnaire, respondent being asked on how many lanes there at the accident location.
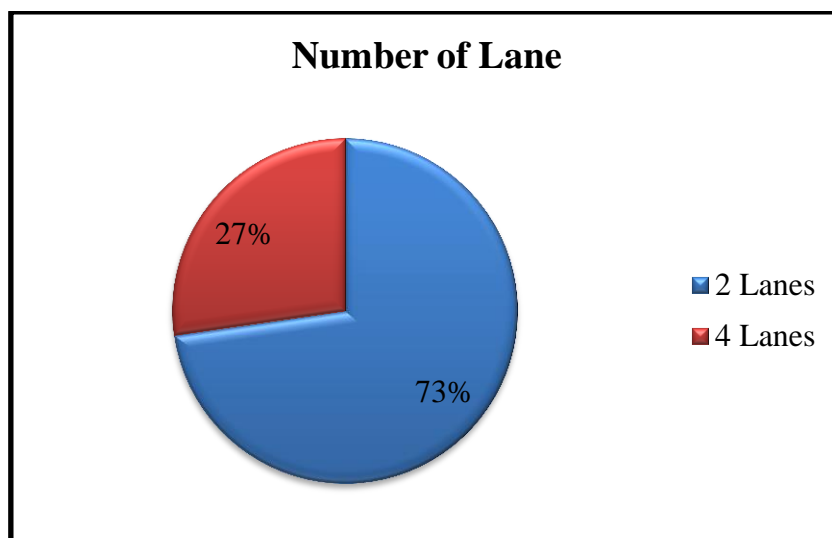

Figure 4.6 Number of Lanes when Commuting Accident Occur

In fact, 73% of accidents occur on two lanes of road whereas 27% happened on 4 lanes. This is because the road used to commute to work and back from works by the staffs to their housing area are mostly two lanes and four lanes. According to the studies by Zhou *et al.* (2016), comparing roads accidents in number of lane, traffic accidents are more likely to happen on roads with 1 or 2 lanes. This is because more lanes mean more movement and fewer lanes mean more cars.

4.2.7 Road Divided

Figure 4.7 shows the percentage of accident occurred either the road divided exist or not.
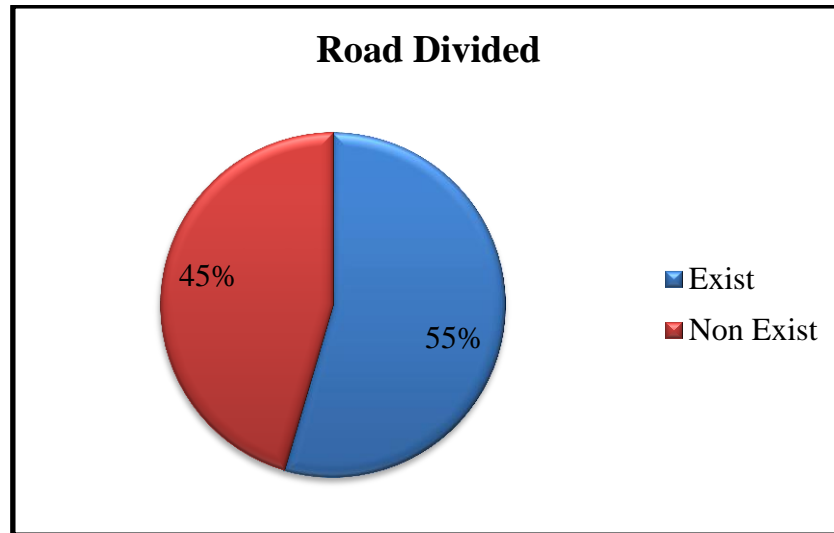

Figure 4.7 The existence of Road Divided when Commuting Accident Occur

Figure 4.7 shows that the difference between percentages of existence of divided during accident are not so wide. The divided exists (55%) during the accident, and 45% of the respondents answer that the divided is not exist. This is due to the accidents happened mostly at straight road designs which along the way to the housing area near to UMP mostly are divided road.

4.2.8 Gender

Figure 4.8 shows the percentage of gender difference between male and female staffs' from the respondents. It was identifies that female drivers have more interacting factors to increase the likelihood of injuries and deaths comparing to male drivers (Chen *et al.*, 2016, cited in Islam and Mannering 2006, pg. 267–276).
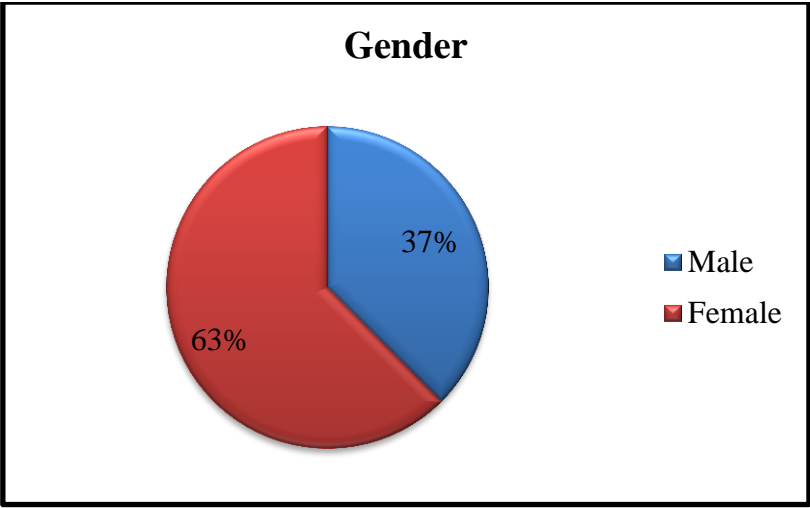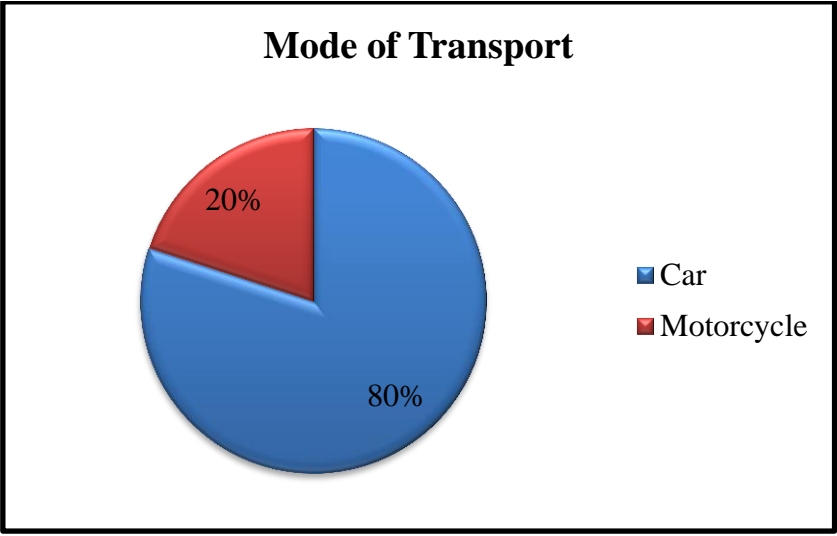
Figure 4.8 Gender of Respondent Who Had Been in Commuting Accident

Figure 4.8 shows that 63% of the person who had been in an accident is female while 37% of them is male.

4.2.9 *Mode of Transport*

Figure 4.9 shows the main modes of transport of UMP staffs used when the accident occurred which are car and motorcycle.


Figure 4.9 Mode of Transport Used when Commuting Accident Occur

Figure 4.9 shows that main modes of transport of UMP staffs are car and motorcycle. This is because staffs are economically affordable to have car as their mode of transport to work as they are comes from professional and high level management group of working group. From the graph above, 80% of the staff who experienced accident most likely using car while only 20% of them riding motorcycle. The research of Zepf *et al.* (2010) have shown that the most common types of vehicles used by commuters in German who had an accident are car and bicycle.

4.2.10 Police Report and Claim Vehicle Insurance

Figure 4.10 shows the percentage of respondents who lodge police report and claim vehicle insurance after the accident.
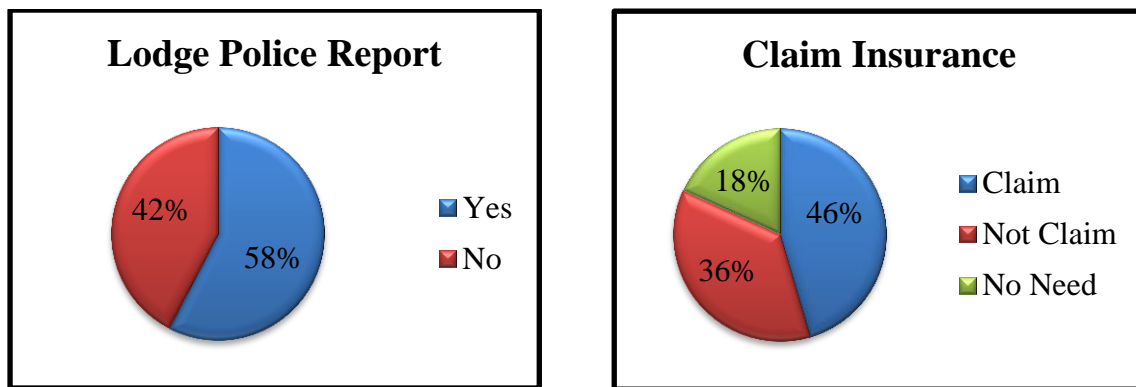
Figure 4.10 Respondents Who Lodge a Police Report and Claim Vehicle Insurance

In addition, questions about police report and vehicle insurance is asked in the questionnaire as they are survived in the accidents. Based on the Figure 4.10 above, 58% of lodge a police are reported after the accident occurred. However only 46% of them can claim the vehicle insurance as the remaining might have a minor injuries or the accident cases is not being covered by the insurance agreement.

4.3   CORRELATION BETWEEN FACTORS AND COMMUTING ACCIDENT

Table 4.1 Correlation between Factors and Commuting Accident

Table 4.1 shows that there is relationship on environmental factors which is time of day or travel time of respondents who have been in commuting accident.

Factors	Correlation coefficient	p-value
Environmental		
Time of Day	0.467	0.006**
Weather	-0.042	0.817
Road Surface	-0.083	0.645
Road Condition	-0.52	0.774
Road Lane	-1.88	0.296
Traffic Light	-0.283	0.110
Road Divided	0.052	0.775
Mode of Transport	-0.42	0.817

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

The p-value of time of day is 0.006 which is <0.05, thus there is a relationship between time of day and commuting accident. This result is same with the study conducted by Nordin (2014) shows that studies by the Social Security Organization (SOCSO) in collaboration with local universities showed that 88% of accidents occurred while commuting to and from work.

CHAPTER 5

CONCLUSION

5.1 INTRODUCTION

Accident while commuting to or from work has become a major occupational safety and health concern. There are many studies tried to find the factors contributing to it. Commuting accidents are preventable and safety measures could help reduce the number of fatality. The sample size for this study was based on the respondents from Universiti Malaysia Pahang staffs', thus; it was a study in a small circle of professional group of people. This study also aimed to find the correlation of environmental factors towards commuting accidents.

5.2 CONCLUSION

The results from this study shows that environmental factor for parameter time of day, p-value (0.006) is significant for commuting accident to happen especially when workers commute to and back from work. Other parameter lies under environmental factors are not giving the impact much as compared to time of day. Effort in decreasing the risk of commuting accident requires actions from all parties namely workers, employers and the government.

5.3   RECOMMENDATION

It is undeniable that a combination of rules from the government, attitudes from the workers and good practices initiated by the employers will create positive safety culture at workplace.

Improvement in occupational safety and health can be prevented by the cooperation of employer which they can play their roles in providing training and knowledge to their workers to increase awareness and concern among them.

Knowledge, experience sharing, safety and defensive riding education to society are examples of recommendation to diminishing the number of commuting accident. The employer, employees and DOSH must combine forces and try to prevent future commuting accidents by addressing the root cause of accidents.

5.4   FUTURE WORK

In the future study of commuting accident, hopefully the number of respondents can be increased so that the data can be more reliable and strong. Moreover, for those who want to further this study in the future, they should equip themselves with knowledge related to the commuting accident. They also can ask the reason how can the accident occur in the questionnaire constructed, their driving experiences, traffic condition, awareness on commuting accident, and level of working pressure when the accident occur. Lastly, they can relate the commuting accident with the any factors mentioned above.

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GANTT CHART OF FINAL YEAR PROJECT I AND II

MONTH / TASK	FYP I					FYP II			
	FEB	MAR	APR	MAY	JUN	SEP	OCT	NOV	DEC
BRAINSTORMING	■								
INFORMATION GATHERING	■								
INTRODUCTION	■	■	■						
LITERATURE REVIEW	■	■	■	■					
METHODOLOGY			■	■					
PROPOSAL SUBMISSION				■					
PRESENTATION				■	■				
DATA COLLECTION						■	■		
RESULT AND DISCUSSION							■	■	
CONCLUSION AND RECOMMENDATION							■	■	
PRESENTATION									■
THESIS BINDING AND SUBMISSION									■

APPENDIX B

QUESTIONNAIRE SAMPLE

Weather and road conditions

Description (optional)

Lane *

◯ 2 lanes

◯ 4 lanes

◯ 6 lanes

◯ 8 lanes

Road condition *

◯ T-Junction

◯ 4-Junction

◯ Straight

◯ Curve

◯ U-Turn

Road surface *

○ Dry

○ Wet

Weather *

○ Fine

○ Rainy

Traffic light *

○ Exist

○ Not exist

Road divided *

○ Exist

○ Not exist

After section 3   Continue to next section   ▾

Section 4 of 4   ⌄   ⋮

Insurance

Description (optional)

○ Yes

○ No

○ No need due to minor accident

Finish

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