POLITEKNIK SULTAN SALAHUDDIN ABDUL AZIZ SHAH

THE STUDY OF ROAD SAFETY AT KUALA KUBU BHARU,SELANGOR

AYU QHAIRUNNISA BINTI YAHYA

(08DKA20F1081)

JABATAN KEJURUTERAAN AWAM

1:2022/2023

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This report was submitted to the Civil Engineering Department as a partial fulfillment of the award requirements for the Diploma Civil Engineering

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AKUAN KEASLIAN DAN HAK MILIK

THE STUDY OF ROAD SAFETY AT KUALA KUBU BHARU, SELANGOR.

1. Saya, **AYU QHAIRUNNISA BINTI YAHYA (020826030862)** adalah pelajar **Diploma Kejuruteraan Awam, Politeknik Sultan Salahuddin Abdul Aziz Shah**, yang beralamat di **Persiaran Usahawan, Seksyen U1 40150 Shah Alam Selangor.**

2. Saya mengaku bahawa 'Projek tersebut di atas' dan harta intelek yang ada di dalamnya adalah hasil karya/reka cipta asli saya tanppa mengambil atau meniru mana-mana harta intelek daripada pihak-pihak lain.

3. Saya bersetuju melepaskan pemilikan harta intelek 'Projek tersebut' kepada 'Politeknik tersebut' bagi memenuhi keperluan untuk penganugerahan **Diploma Kujuruteraan Awam** kepada saya.

Diperbuat dan dengan sebenar benarnya diakui

oleh yang tersebut;

    AYU QHAIRUNNISA BINTI YAHYA

    (020826-03-0862)

…………………….

(AYU QHAIRUNNISA

BINTI YAHYA)

Di hadapan saya,

    RABEAH ADAWIYAH BINTI HASHIM

…………………….

sebagai Penyelia Projek pada tarikh:

(RABEAH ADAWIYAH

BINTI HASHIM)

PENGHARGAAN

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ABSTRAK

Kajian ini bertujuan untuk menyiasat statistik kadar kemalangan bagi Jalan Kuala Lumpur ke Ipoh yang merupakan laluan utama menuju ke Tanjung Malim. Orang ramai mengurangkan tahap keselamatan mereka dan melaksanakan langkah keselamatan lalu lintas yang tidak mencukupi, yang merupakan trend yang membawa kepada kemalangan. Akibatnya, adalah penting untuk meningkatkan langkah keselamatan untuk mengurangkan kecederaan dan kemalangan jalan raya. Objektif kajian adalah untuk mengenal pasti beberapa perkara seperti faktor kemalangan jalan raya di Jalan Kuala Lumpur ke Ipoh, Kuala Kubu Bahru. Persepsi pengguna jalan raya, khususnya dalam beberapa aspek keselamatan jalan raya, seperti memandu laju dan agresif. Kaedah kajian yang ditetapkan untuk mencapai objektif di atas adalah dengan melaksanakan kajian kes yang mengaplikasikan pendekatan kuantitatif dan kualitatif. Data sekunder ialah maklumat kemalangan yang dikumpul dalam tempoh dua tahun dari 2020 hingga 2021 daripada dua organisasi, Jabatan Pengangkutan Jalan (JPJ) dan Ibupejabat Polis Diraja Malaysia Bukit Aman (IPD). Metodologi pengkaji menggunakan Audit Keselamatan Jalan Raya, Kajian Volume Lalu Lintas dan Soal Selidik semasa menjalankan analisis menggunakan pendekatan kualitatif bagi melihat jenis perancangan fizikal jalan raya dan ciri-ciri fizikal jalan raya yang wujud di kawasan kajian. Dapatan kajian menunjukkan bahawa kerosakan fizikal jalan raya adalah yang paling kerap dan meluas dan ketiadaan papan tanda bahu jalan telah menyebabkan kemalangan jalan raya. Walau bagaimanapun, fokus esei ini akan tertumpu kepada pelbagai elemen penting dalam keselamatan jalan raya, seperti membaiki jalan yang rosak, memasang lampu jalan dan papan tanda, kamera AES, perabot tepi jalan dan keperluan menyelenggara kenderaan untuk mengurangkan jumlah kemalangan jalan raya.

ABSTRACT

This study intends to investigate accident rate statistics for Jalan Kuala Lumpur to Ipoh which is the main route leading to Tanjung Malim. People are reducing their level of safety and implementing inadequate traffic safety measures, which is a trend that leads to accidents. As a result, it is important to enhance safety measures in order to lower injuries and traffic accidents. The objective of the study is to identify several things such as road accident factors on Jalan Kuala Lumpur to Ipoh, Kuala Kubu Bahru. The perception of road users, particularly in regard to several areas of road safety, such as speeding and aggressive driving. The research method set to achieve the above objectives is by performing a case study that applies a quantitative and qualitative approach. The secondary data is the accident information gathered during a two-year period from 2020 to 2021 from two organizations, the Jabatan Pengangkutan Jalan (JPJ) and Ibupejabat Polis Diraja Malaysia Bukit Aman (IPD). The researcher methodologies used Road Safety Audit, Traffic Volume Study and Questionnaires while carrying out analysis using a qualitative approach in order to see the kind of road physical planning and the physical characteristics of roads that exist in the study region. The findings study indicate that physical road damage is the most frequent and widespread and the absence of road shoulder signs has caused road accidents. However, the focus of this essay will be on a variety of crucial elements of road safety, such as mending broken roads, installing street lights and signs, cameras AES, roadside furniture and the necessity of maintaining vehicles to reduce the number of traffic accidents.

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LIST OF ABBREVIATIONS

JPJ   Jabatan Pengakutan Jalan

JKR   Jabatan Kerja Raya

IPD Bukit Aman   Ibupejabat Daerah Bukit Aman

RSA   Road Safety Audit

CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

In Malaysia, one of the biggest societal issues is traffic accidents. Accidents are generally uncommon, unexpected, and sometimes hard to directly see. In a growing nation, the number of traffic accidents has gone up over time. This may be caused by a rise in vehicle occupancy over time, or, to be more precise, by the fact that some sorts of accidents are substantially more frequent now than they were ten years ago. Traffic accidents have increased on road networks that were never built for the quantities and types of traffic that they are now obliged to handle as a result of growing urbanisation and the number of cars in many developing nations.

One of the government of Malaysia's social duties has been deemed to be road safety. Since the nation's independence, a variety of groups dedicated to improving road safety have been established within government institutions, nonprofits, and the business sector. However, after a Karak Highway tragedy in 1990, the concern for traffic safety became more apparent. Following the collision, the government established the Cabinet Committee on Road Safety, whose chairman was the prime minister. By the end of the year, the group wanted to reduce deaths by 30%. A comprehensive national road safety plan was created in 1991 with a focus on medical care, safety administration, road engineering, behaviour change of drivers, and safety research programmes. (Umar Radin Radin, Sohadi, 1998).

According to their purpose or governing bodies, Malaysian roads can be divided into categories. Roads can be categorised as major, secondary, or minor roads based on their purpose. Roads can be categorised as Tolled Expressway and Highway, Federal, State, or Municipal roads according to jurisdiction. Roads may also be divided into rural and urban areas. Roads that are five kilometres or more from the municipal borders are considered rural roads. The term "urban roads" is also used to refer to all roadways that are located inside a municipality's designated limits or in a township with a population of at least 10,000 people.
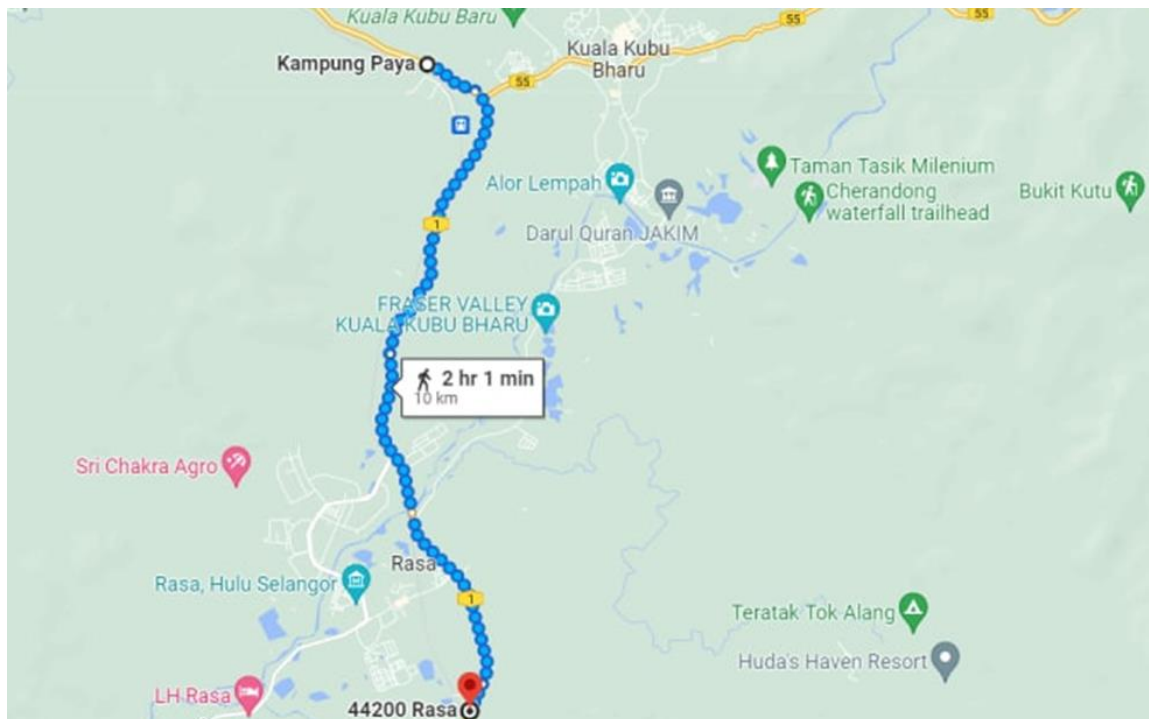

Figure 1.1 : The way Kualan Kubu Bharu from KM 50 to KM 59

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1.2 PROBLEM STATEMENT

The Malaysian government has long been viewed as having a social responsibility to promote road safety. Since the nation gained independence, several organisations focused on improving road safety have been established inside government departments, private sector businesses, and nonprofit groups. By the year 2000, the group wanted to reduce mortality by 30%. (Federal Highway Administration). Malaysia is positioned about in the middle of the developed and developing countries, according to a comparison of its statistics with those of numerous other developed and developing nations (Transport Research Laboratory, 1995). Even yet, Malaysia's accident mortality rate is still a cause for worry because it is far higher per 10,000 cars than in the rest of the industrialised world. The route chosen from Jalan Kuala Lumpur to Ipoh is because they lead to Tanjung Malim, the research location. Due to the frequent traffic accidents on this road, its safety level has historically been investigated. According to data from The Road Transport Department (JPJ), there were more accidents on that segment of the road from 2020 to 2021.

Road users, cars, and the environment can all play a role in causing traffic accidents. Accidents occasionally occur as a result of one of these causes or a combination of these causes. One of the main causes of traffic accidents is the behaviour of other road users. These elements include poor driving skills, carelessness, negligence, and impatience. Consumer variables account for 95% of road accidents, according to Sabey and Staughton [1], whereas user-related factors, such as the environment and the roads, contribute for 25% of road accidents. Winding roads, broken and potholed roads, inadequate design and road geometry, a lack of signboards, crossing intersections, and dim street lights at crossroads at night are examples of environments that are unsuitable for users.

The type of roadside barriers that commonly cause automobile crashes were also the subject of this study. Road furniture is one feature that could improve the safety of both pedestrians and vehicles in an area, whether it is urban or country. This improves the route's aesthetics and security (Rasool, 2016). Signs, street lights, road humps, AES cameras, road pegs, and delineator posts are a few examples of the several sorts of road furniture that require special attention.

Therefore, this research must be completed in order to assess the degree of road safety on this route before any recommendations for improvement projects can be made.

1.3 OBJECTIVE OF STUDY

The objective research is crucial as a guide, according to Othman Mohamed (2001), in his book "Thesis Writing in the Field of Applied Social Sciences," so that researchers are not enthralled by the direction of other concerns that will hide the brightness of the actual issue in the study undertaken. The following items are to be identified in this study:

i.   To identify the factors of road accident on Jalan Kuala Lumpur to Ipoh, Kuala Kubu Bahru.

ii. To investigate the perception of the road user especially on various aspects of road safety.

1.4 SCOPE OF STUDY

The scope of the study is to ascertain how closely road accident causes and the attitudes of other road users are related. The study looks at the psychological traits of drivers who are more likely to be in an accident, taking into consideration things like time constraints, a desire for driving satisfaction, a desire to appreciate challenges, and driving attitudes. When evaluating the causes of traffic accidents, other aspects are taken into consideration, such as the vehicle and road conditions. The goal of these requirements is to reduce the number of traffic accidents. The results of this study are expected to provide important data and information about consumer perceptions and the factors that contribute to traffic accidents.

This case study was conducted along the 10-kilometer Jalan Kuala Lumpur to Ipoh route. Driving experience, driving style, road environment, and road conditions are just a few of the geographical features and traffic flow systems on the Jalan Kuala Lumpur to Ipoh route that represent a diversity of lifestyles and cultures. This makes it possible to make comparisons and gain a better knowledge of the attitudes and elements influencing road safety in the study region. With this knowledge, comparisons may be made, and the attitudes and elements influencing road safety in the study region can be better understood.

The scope of this investigation is to determine the cause of the accident on Jalan Kuala Lumpur to Ipoh in Kuala Kubu Bahru. The main topic of this study is roadside safety indicators for drivers. Accidents can also occur when there are insufficient road safety signs. The main task of road users is to avoid accidents when driving, whether it includes humans or animals. The Road Transport Department (JPJ) is one of the agencies whose respondents will be interviewed as part of the scope of the study. Appointments will be set for these interviews, and data will be analyzed using scheduled content analysis.

1.5 IMPORTANCE OF STUDY

The purpose of this research is to raise awareness among all stakeholders concerned in creating a dependable and safe environment for both normal road users and users of the trunk route. When a traffic accident happens, people in our culture often blame the drivers or other road users, even when the negligence of the driver may really have been caused by other causes that diverted the driver's attention.

The Public Works Department (JKR) of the Ministry of Works Malaysia and the Local Authority may find this research to be helpful in reducing the issue in the road design and construction. This research will enable for an explicit study on the accident rates on the trunk road.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

Engineering must have a component for safety. Numerous elements affect road safety, including the ability of the driver, the features of the road, the state of the roads, and the weather. The road collision is regarded as one of the most important contributing factors.

One system In connected sectors including journals, papers, books, and newspaper studies, research on road safety has been done based on actual beliefs. The notion of road safety is discussed in this chapter, along with its development. This section gives background information on the idea and the methods employed or put into practise for an existent road, with a focus on the road aspect.

A review of the literature on road safety, the environment, accident risk areas, accident participation, road accidents, and human component is also done.

2.2 ROAD SAFETY

Road safety is characterized by the absence of accidents, for example collisions between road users (Browm, 1994). The safety is traditionally measured by the number of collisions or rather its expected number at a given time. Traffic safety diagnosis has been traditionally undertaken using historical collision data. However, there are well recognized problems of availability and quality associated with collision data. Additionally, the use of collision records for safety analysis is a reactive approach a significant number of collisions have to be recorded before action is taken (Browm, 1994).

Therefore there has been considerable interest in research dealing with surrogate safety measures (Gettman and Head, 2003). The observation of traffic conflicts has been advocated as an alternative or complementary approach to analyse traffic safety from a broader perspective than collision statistics alone (Browm, 1994).

Traffic conflicts are intersections with very similar processes to collisions, but without collision. A conflict is defines as an observational situation in which two or more road users approach each other in space and time to such an extent that a collision is imminent is their movements remain unchanged. The concept of collision course is derived from this widely accepted definition of traffic conflicts. Based on Svensson (1998), defined that user can be on a collision course when, "speed and/or the direction of the road user changes". Deciding if two road users are on a collision course thus depends on extrapolation hypotheses.

2.3 ENVIRONMENT FACTOR

Environmental factors can be divided into weather and time when the accidents are prone to occur. In terms of weather, seven studies reported that accident usually occurs during rainy weather (Aron et al., 2015; Asefa et al.,2015; Black, Villarini, & Mote, 2017; Jaroszweski & McNamara, 2014; Mitchell, Driscoll, & Healey, 2004; Mondal et al., 2011; Saha, Schramm, Nolan, & Hess, 2016). Most of the researchers reported that rainy weather has significantly reduced the drivers' visibility and increased accident involvement (Jaroszweski & McNamara, 2014; Mondal et al., 2011; Saha et al., 2016) . Moreover , three studies conducted in the US reported that driving during inclement weather (wet and cold) can more likely cause accident (Chen, Chen, & Ma, 2018; Das, Brimley, Lindheimer, & Zupancich, 2017; Legree, Heffner, Psotka,

Martin, & Medsker, 2003) . Nine studies reported that accident is also prone to occur during snowy, cloudy, windy and foggy weathers (Chen & Zhang, 2016; Edwards, 1998; Eisenberg & Warner, 2005; Híjar, Carrillo, Flores, Anaya, & Lopez, 2000; Li, Yamamoto, & Zhang, 2018; Perrels, Votsis, Nurmi, & Pilli-Sihvola, 2015; Ponnaluri, 2016; Wang et al., 2011; Xi et al., 2014).

Similarly, accidents are prone to occur during these weathers due to the decline in drivers' visibility. Two studies conducted in Iran reported that accidents occur in the country because of dust storm, which not only drastically reduce drivers' visibility, but also cause respiratory problems including asthma (Lankarani et al., 2014; Tezangi, 2016. Apart from adverse and bad weather, accident is also highly occurs during good weather. Seven studies reported that most of the accidents occurred during fine weather (Haynes et al., 2008; Ismail et al., 2011; Lardelli-Claret et al., 2002; McGwin & Brown, 1999; Mohamed, Mohamed, & Al-Harthi, 2017; Radun & Radun, 2006; Tanishita & van Wee, 2017). Majority of the accidents occurred during fine and clear weather because the drivers were reported to drive at higher speed and being less caution compared to that during adverse or bad weather (Haynes et al., 2008; McGwin & Brown, 1999; Mohamed et al., 2017; Tanishita & van Wee, 2017). Young drivers have been reported to commit speeding violation when driving during fine weather because they are perceived to be risk takers despite their lack of driving skills, whereas older drivers are mainly involved in road accident during fine weather because of several driving errors while changing lane and the failure to foresee unseen objects on the road (McGwin & Brown, 1999). Moreover, drivers have been also reported to fall asleep when driving at fine and clear weather, which subsequently increased accident risk (Radun & Radun, 2006).

2.4 ACCIDENT PRONE AREA

Road accident proneness can be defined as some drivers have greater tendency to involve in road accidents as they are exposed to equal risk while driving on the road. Drivers are exposed to the same risk but carries different perception and behaviour while driving. For example, a driver might perceive road accident proneness from the perspective of near misses such as damage on sidemirror, front bumper , little scratch on the car whereas, other driver might define road accident proneness only from the road accidents perspective such as injury, ill health, loss or damage to the vehicle, fatality or any combination of all these.

Since a driver's behavioural factors have linkage towards a driver's involvement in road accidents, this study will integrate several driver's behavioural factors such as personality traits, anger, aggressive driving and risky driving in order to provide further understanding on the effects of these factors on drivers' road accident proneness.

2.5 ACCIDENT INVOLVEMENT

Road accident is defined as the collision or crash involving one or more vehicles that takes place in either highway or other public roads, thus causing light injury, permanent injury, vehicle breakdown or even death (Olusina & Ajanakum, 2017). Review on literature has shown that traffic crash involving young drivers within the age 17 to 25 years old was significantly higher than that of the mature and older drivers in western countries (Rowe et al., 2016). In Malaysia, the similar findings have also been emphasized by scholars as 46% of the fatal and non fatal accidents are caused by the young drivers aged between 16 to 25 years old (Ramli et al., 2014). The young and novice drivers commit more traffic violations such as speeding, use of mobile phone

while driving, tailgating, dangerous overtake, failure to follow traffic signage and drink – drive. These drivers perceived a higher level of risks when driving due to their lack of driving skills and experience. Moreover, they also seem to be "unnecessarily" confident on the road, which caused them to break numerous traffic offences.

2.6 ROAD ACCIDENT

Road accident is one of the major causes of death and injuries in Malaysia. In the year 2001, the total number of road accidents was 265,175 with fatalities of 5230, seriously injured 6942, and slightly injured 30,684 . It is a shocking fact that road accidents kill more people in other developing countries too, every year, than war and disease. In Asia alone, 400,000 people are killed on the roads annually and more than four million injured. According to WHO, every year, nearly one million people are killed, three millions are severely disabled for life and thirty millions are injured in road traffic accidents. The social and economic, economical cost of these accidents is also so high that it would he sufficient to buy the world total production of cereals each year. Furthermore, the number of accidents is in constant increase throughout the world. In 1990, death on road accidents remained in 9th rank and by 2020 road accidents will be the third leading cause of death worldwide.

2.7 HUMAN FACTOR

The most significant cause of road accidents is the attitude of the driver himself. This is because drivers are selfish, impatient when on the road and do not obey the rules of the road. For example, a motorist drives a car at high speed without complying with the permitted speed limit. Indirectly, drivers are not only risking their own lives but the lives of other road users.

2.8 QUESTIONNAIRE

A questionnaire is a research instrument consisting of a series of questions for the purpose of gathering information from respondents. Questionnaires can be thought of as a kind of written interview. It can be carried out face to face, by telephone, computer or post, quick and efficient way of obtaining large amounts of information from a large sample of people. Data can be collected relatively quickly because the researcher would not need to be present when the questionnaires were completed. This is useful for large populations when interviews would be impractical. However, a problem with questionnaire is that respondents may lie due to social desirability. Most people want to present a positive image of them and so may lie or bend the truth to look good; example pupils would exaggerate revision duration.

Questionnaires can be an effective means of measuring the behaviour, attitudes, preferences, opinions and, intentions of relatively large numbers of subjects more cheaply and quickly than other methods. An important distinction is between open-ended and closed questions. Often a questionnaire uses both open and closed questions to collect data. This is beneficial as it means both quantitative and qualitative data can be obtained.

Questionnaires can be classified as both quantitative and qualitative method depending on the nature of questions. Specifically, answers obtained through closed-ended questions with multiple choice answer options are analysed using quantitative methods and they may involve pie charts, bar-charts and percentages. Answers obtained to open-ended questionnaire questions are analysed using qualitative methods and they involve discussions and critical analyses without use of numbers and calculations. For a standard 15,000-20,000 word business dissertation, including 25-40 questions in questionnaires will usually suffice. Questions need be formulated in an unambiguous and straightforward manner and they should be presented in a logical order.

Advantages of questionnaires include increased speed of data collection, low or no cost requirements, and higher levels of objectivity compared to many alternative methods of primary data collection. However, questionnaires have certain disadvantages such as selection of random answer choices by respondents without properly reading the question. Moreover, there is usually no possibility for respondents to express their additional thoughts about the matter due to the absence of a relevant question.

i. **Computer questionnaire.** Respondents are asked to answer the questionnaire which is sent by mail. The advantages of the computer questionnaires include their inexpensive price, time-efficiency, and respondents do not feel pressured, therefore can answer during the time, giving more accurate answers. However, the main shortcoming of the mail questionnaires is that sometimes respondents do not bother answering and cannot just ignore the questionnaire. *(Appendix 2.1)*

ii. **Telephone questionnaire.** Researcher may choose to call potential respondents with the aim of getting them to answer the questionnaire. The advantage of the telephone questionnaire is that, it can be completed during the short amount of time. The main disadvantage of the phone questionnaire is that it is expensive most of the time. Moreover, most people do not feel comfortable to answer many questions asked through the phone and it is difficult to get sample group to answer questionnaire over the phone. *(Appendix 2.2)*

iii.

iv. **Mail Questionnaire.** This sort of questionnaires involves the researcher to send the questionnaire list to respondents through post, often attaching pre-paid envelope. Mail questionnaires have an advantage of providing more accurate answer, because respondents can answer the questionnaire in their spare time. The disadvantages associated with mail questionnaires include them being expensive, time consuming and sometimes they end up in the bin put by respondents. Questionnaires can include the following types of questions. *(Appendix 2.3)*

v. **Open question questionnaire.** Open questions differ from other types of questions used in questionnaires in a way that open questions may produce unexpected results, which can make the research more original and valuable. However, it is difficult to analyze the results of the findings when the data is obtained through the questionnaire with open questions. *(Appendix 2.4)*

vi. **Multiple choice questions.** Respondents are offered a set of answers they have to choose from. The downsize of questionnaire with multiple choice questions is that, if there are too many answers to choose from, it makes the questionnaire, confusing and boring, and discourages the respondent to answer the questionnaire. *(Appendix 2.5)*

vii.   **Scaling Questions**. Also referred to as ranking questions, present an option for respondents to rank the available answers to the questions on the scale of given range of values (for example from 1 to 10). *(Appendix 2.6)*

viii.   **Dichotomous Questions**. This type of questions gives two options to respondents – yes or no, to choose from. It is the easiest form of questionnaire for the respondent in terms of responding it. *(Appendix 2.7)*

2.9 GOOGLE FORM

The various choices of the way questionnaire is presented to the respondent are giving a lot of method to gain data from every aspect. It is not limited to one method since it is obtaining information without limit. Questionnaire is also the main collecting data and convenience way. The criteria of chosen questionnaire must be highly reliable and valid based on the scope. The basic guidelines and method of constructing a questionnaire must be followed in order to get a better data collecting.

Google Forms is a survey administration software included as part of the free, web- based. Google Docs Editors suite offered by Google. The service also includes Google Docs, Google Sheets, Google Slides, Google Drawings, Google Sites, and Google Keep. Google Forms is only available as a web application. The app allows users to create and edit surveys online while collaborating with other users in real-time. The collected information can be automatically entered into a spreadsheet.

The Google Forms service has undergone several updates over the years. Features include, but are not limited to, menu search, shuffle of questions for randomized order, limiting responses to once per person, shorter URLs, custom themes, automatically generating answer suggestions when creating forms, and an "Upload file" option for users answering questions that require them to share content or files from their computer or Google Drive.

In October 2014, Google introduced add-ons for Google Forms that enable third-party developers to add new features to surveys, while in July 2017, Google updated Forms to add several new features. "Intelligent response validation" is capable of detecting text input in form fields to identify what is written and ask the user to correct the information if wrongly input. Depending on file-sharing settings in Google Drive, users can request file uploads from individuals outside multi-option answers in a table. In Settings, users can make changes that affect all new forms, such as always collecting email addresses. Google Forms features all of the collaboration and sharing features found in Docs, Sheets, Slides, Drawings, and Sites.

3.0 ROAD SAFETY AUDIT

This section literature review different methodologies taken in research work done by different researchers. Some researchers (Sanjay Kumar Singh 2017), (Murat Gunduz 2018), (Rahul Goel 2018), (Hitesh Kumar 2017), (Shalini Kanuganti 2017) (Abdul Rahoof 2017) have investigated accident injury severity suggest measures. (Athanasios Galanis 2017), (Dinesh Mohan 2017), (Francis John Gichaga 2017), (Luca Persia 2016) have studied types of roads and asses the road safety management and schemes for road improvement. (Lorenzo Domenichini 2018) studied the urban road safety on vehicle speed reduction. Most of the studies are based on methods of assessment of road accidents. Their study includes accident data as main element of the research. Generally, Road safety Audit's methods improve the understanding of the safety performance of roads, they all require accident data. But there is a lack of data like Pothole data collection of roads. Road traffic accidents increases due to potholes on the road cause the traumatic spinal injuries, bones injuries, etc. After studying various review paper, we have found that the main aim of road safety audit is to assure that all new road schemes operate as safely as practicable. This means that safety should be considered whole cycle of design, construction and preopening of any project facility and also during operation and maintenance of the highway.

3.1 TRAFFIC VOLUME STUDY

Specifically, the literature on the impact of traffic volume, speed-flow relationships, passenger car equivalents, peak hour factor, flow fluctuations, traffic capacity, and level of serviceability is discussed in the present study (LOS). But several investigations have contributed to the development and modification of the current study. A few of them are briefly discussed below. Using the traffic-flow simulation model HETEROSIM, Arkatkar (2011) investigated the impact of changes in traffic volume, road width, the extent of an upgrade, and the length of the upgrade on PCU value.

The simulation model's calibration and validation are based on field data on traffic flow characteristics. The validated simulation model is then used to calculate PCU values for various vehicle kinds, and the results show that the model is capable of accurately simulating the heterogeneous traffic flow on mid-block sections of intercity routes under various road conditions.

3.2 SUMMARY

From the extensive review of the literatures, this study intends to explore the influence of driver's personality traits, driving anger and risky driving along with aggressive driving on road accident proneness to reduce the road accident among car drivers. It is recommended that the driver which portrays good driving behaviours will exhibits low aggressive driving which then results to low road accident proneness. Therefore, this proposed framework is needed to be examined for further understanding. The proposed framework will be tested in research program conducted by first author in Malaysia. The result of the particular research is expected to provide further understanding of road accident proneness and aid the development of effective intervention in road safety.

CHAPTER 3

METHODOLGY

3.1 INTRODUCTION

The aim of road safety is to spot dangers or safety flaws in traffic signs, roadside equipment, or accidents. The office review, the field review, and the final report are the three stages of the road safety evaluation process.

The office assessment generally consists of a thorough site description and a thorough investigation of the crash data. The field evaluation entails a road survey, carried out with the use of suggested manuals and given checklists, as well as the gathering and analysis of accident data. The outcomes of both the office review and the field review are included in the final report. The report should be brief and to the point, with clear descriptions of the issues and suggested solutions.

Road safety regulations are applicable to all types of current roads and to all phases of their construction. The method used in this article, however, is focused on small country roads found in urban and suburban settings.

Road safety should be handled by a group of professionals, such as the Malaysia Public Works Department, Police Station, and others, who have experience and current skills in road safety engineering, collision investigation, and prevention, coupled to an understanding of road management. When appropriate, the team should include representatives from additional disciplines, such as road user behaviour, enforcement, and maintenance (Austroads, 2002).

3.2 METHODOLGY OF STUDY

According to the goals and parameters of the study, a variety of methodologies were employed to complete it. A flowchart shows what happens when the study is being conducted. The flow charts show the progress of the researcher as the study is being conducted. Nine steps are included in it. In Figure 3.1, you can see the methodology's flowchart.
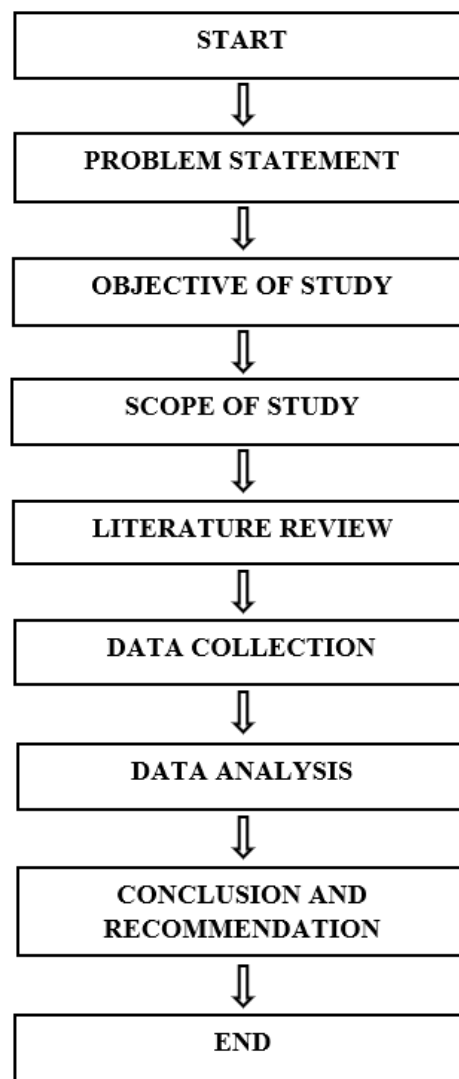
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┌─────────────────────────────────┐
│            START                │
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│       PROBLEM STATEMENT         │
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Figure 3.1 : Flow Chart in Methodology of Study

3.2.1 DATA COLLECTION

Data will be gathered for this study, of course. The information is firstly related to incidents that have happened in the research region. The information, which may be obtained from the Bukit Aman Head Office and the Public Transport Department (JPJ), is referred to as secondary data (IPD Bukit Aman). This information must be gathered in order to identify the key components that contribute to highway accidents.

Second, the data relates to damage to the road's pavement. This information will display the ongoing upkeep of the roads as well as the permanent ones. The information is used to assess if upgrading the highway's road conditions is necessary.

Third, the data relates to a study of traffic volume. The manual method of calculation with direct counting and the recording of the given sheet data that is helpful in recording categorised cars are shown in this data.

Last but not least, information on road users is obtained by asking them in interviews and surveys how safe the roads are.

3.2.2 DATA ANALYSIS

Both descriptive statistics and qualitative statistical methods were used to analyse the data. Thus, the structured data were interpreted using descriptive techniques in the form of tables, charts, and graphs using statistical quality control tools to the trends and the conditions of the road accidents on the road on the study routes. Accident density and accident rate are to be evaluated in order to pinpoint dangerous areas along the Jalan Kuala Lumpur to Ipoh route. The result from the questionnaires will be calculated using Google Form.

The following data analysis will be conducted using information regarding road pavement damage that was obtained from PDRM. These two data will be analysed by connecting the data. Data will be analysed to determine whether the main cause of an accident on that highway was damaged pavement.

The physical state of the road will be the key factor that might cause an accident on the highway if accident data indicates that many accidents occur due to damaged road surface. However, if the statistics indicated that the accident that had occurred on that roadway was not caused by the deterioration of the road's surface, then there would have been another reason.

The analysis of data for this study will use software of Google Form to analysis the data from questionnaire .Google Form is software designed specifically to compute data from various angles. After the data has been calculated and processed, analysis may be done.

Data acquired through in-person interviews was analysed using content analysis. the process of collecting data and categorising it into themes and subthemes in order to make comparisons. The ability to reduce and simplify data while still delivering findings that can be quantified using quantitative methods is one of the key benefits of content analysis. Additionally, content analysis enables researchers to organise the qualitative data they have gathered in a way that supports the achievement of their study goals. However, since there is a chance that researchers would interpret the data incorrectly and draw erroneous and inaccurate conclusions as a result, human error is heavily engaged in content analysis.

3.3 SUMMARY

In conclusion, the safety of the driver is crucial, especially on highways where a lot of traffic is present. The regulations for road illumination are no longer followed. Numerous reports concerning the road lights have already been made based on the article. Therefore, the responsible party must take steps to make driving on the roadway safer. And maybe the planned course of action will reduce the number of accidents that occur on that roadway.

CHAPTER 4

RESEARCH FINDINGS AND DISCUSSION

4.1 INTRODUCTION

The outcomes of the data gathering process will be discussed in this chapter. This information was gathered through interviews and the distribution of questionnaires to drivers that travel along the Jalan Kuala Lumpur to Ipoh in Kuala Kubu Bharu. To achieve the goals of the study, the data collected will be analysed.

Accident data, or secondary data, provided from the Road Transport Department constitutes the initial set of information gathered. A two-year period of accident data collection (2020 - 2021).

The questionnaire was then produced in Malay and was composed of 4 sections. Three questions are included in Part A to probe the respondent's past. Then, in Part B, seven questions examine whether the driver's attitude contributed to the collision. Six questions in Section C enquire on the state of the roads after that. Six questions in Part D also inquire about the state of the car that caused the collision.

The same analysis also refers to analysing the collected raw data and then drawing conclusions and suggestions from it after presenting it in an intelligible format. Other users who wish to know more about the scientific research that were included in the questionnaire may only understand the final findings and results from the description.

This chapter analyses and presents the information gleaned from the questionnaire replies. The choices made are entirely dependent on how the data processing findings from the survey replies were interpreted. From the disseminated survey, 80 respondents in total provided input. This indicates that all respondents answered the survey cooperatively. To aid in the study, the data is also average-analyzed.

4.2 SECONDARY DATA (PUBLIC TRANSPORT DEPARTMENT-JPJ)

Table 4.2: Accident Data Year 2020 to 2021

Year	Fatal Accident	Major Accident	Minor Accident	Collision Only	Total Accident
2020	0	0	0	30	30
2021	1	1	0	48	50

The accident data are collected from two agency which is Jabatan Pengangkutan Jalan (JPJ) and IPD Bukit Aman. The range for the data collected are for 2 years. In year 2020 there are no fatal accident occurred and 1 fatal accident cases happen in year 2021. As it can be shown that the fatal accidents are increasing year by year. And also, from the total of the accident that had been recorded in year 2020 had 30 cases and in year 2021 there are 50 accident that happen.

4.3 THE ROAD SAFETY AUDIT

Road Safety Audit (RSA) is defined as a sysmetic process for checking the road safety implications of highway improvement and new schemes. The sole objective of the process is to minimise future road accidents accurrence and severity once the scheme has been built and the road comes into use. Having identified potential road safety problems. Then makes recommendations for improvement. Road Safety Audit ((RSA) fulfil a vital role in checking that roads have been designed and build to the highest safety standards.

Table 4.3: Type of Road Safety Audit

There are 6 major road infrastructure elements which are audited as follow:

Type of road	Picture	Observation
Pavement Marking		- Road marking plays an important role in transmitting road information and requirements to road user. Several aspects must be considered when auditing like colours and dimension. - The colour on the yellow square become faded.
		- The colour on the zebra crossing faded.

Types of road	Picture	Observation
Road Barriers		- Generally, road barriers are specified in three categories, which are permanents barriers, semi-permanent barriers, and flexible barriers. The road barrier should be designed with its optimum height based on its oproper functioning. - No road barriers along the way.
		- No road barriers along the way.

Types of road	Pictures	Observation
Traffic Signal		- Traffic Signal is a device used to facilitate the movement of road vahicles and pedestrian traffic. Several criteria to be considered in traffic signal design to ensure oeration effiency are signal phasing, signal faces, appropriate signal installation and signal hardware.
		- The traffic light not function and broken.

Types od road	Pictures	Observation
		- The traffic light not function and broken.
Street Lighting		- The purpose of the street light installation is to enchance the safety of road users at night. Several audit aspects for the street lights are light pole location, rate of lighting and design of the lighting system.

Types of road	Pictures	Observation
	No street lighting	- No street lights all the way.
Traffic Sign	No traffic sign	- The existence of traffic signs intended to ensure road safety and to inform road operation to every road user. There are 3 categories of traffic signs, consists of guide signs, warning signs, and regulatory signs. General design considerations on traffic signs are colours, lettering and borders, symbols, post and mounting and material used.

Types of road	Pictures	Observation
Road Damage	 Road Patch	- Geometry of road shall include access control, horizontol and vertical alignment, visibility, cross-section and intersection. The design standart of the road geometry shall be following the requirements of traffic based on specific standards recommended by JKR.

This is the minor road damage that happen in Kuala Kubu Bharu.

4.4 THE TRAFFIC VOLUME STUDY

I) Location : Traffic Light Kuala Kubu Bharu

Date : 15/10/2022 (Saturday)

Phase : Peak Hours

Table 4.4 : Total of Traffic Volume Study

Time	Car	Heavy vehicle	Bus	Motorcycle	Bicycle	Total Vehicle
11:00 – 12:00	1816	132	23	177	18	**2166**
17:00 – 18:00	1301	78	14	207	0	**1600**
18:00 – 19:00	1296	54	5	201	1	**1557**
TOTAL	**4413**	**264**	**42**	**585**	**19**	**5323**
PERCENTAGE %	**82.9**	**4.95**	**0.79**	**11.0**	**0.36**	**100**

II) Location : Traffic Light Kuala Kubu Bharu

Date : 11/11/2022 (Friday)

Phase : Peak Hours

Table 4.5 : Total of Traffic Volume Study

Time	Car	Heavy vehicle	Bus	Motorcycle	Bicycle	Total Vehicle
10:00 – 11:00	3501	215	39	348	5	**4108**
13:00 – 14:00	2550	137	16	291	0	**2994**
17:00 – 18:00	2783	111	10	352	1	**3257**
TOTAL	**8834**	**463**	**65**	**991**	**6**	**10359**
PERCENTAGE %	**85.3**	**4.47**	**0.6**	**9.57**	**0.06**	**100**

Table 4.4.1 and table 4.4.2 has shown the percentage of traffic volume studies. Data analysis shows the number of cars of 4413 and a percentage rate of 82.9% on Saturday, it increased on Friday by 8832 and a percentage rate of 85.3%. In addition, on Saturday the number of heavy vehicles was 264 and the percentage rate was 4.95%, it further decreased by 463 and the percentage rate was 4.47%. Next, the number of buses on Saturday is 42 and the percentage rate is 0.79%, it is also increasing on Friday by 65 and the percentage rate is 0.6%. In addition, on Saturday the number of motorcycles was 585 and the percentage rate was 11.0%, it increased by 991 and the percentage rate was 9.57% on Friday. Finally, the number of bicycles on Saturday was 19 and the percentage rate was 0.36%, it further decreased by 6 and the percentage rate was 0.06% on Friday.
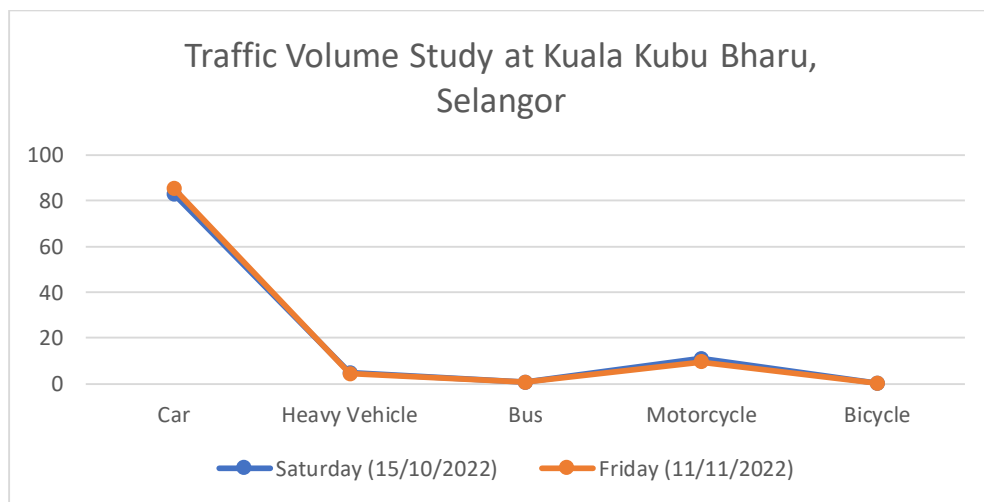

Figure 4.4 : Total of Traffic Volume

Table 4.4.3 : Conversion factors to P.C.U
(Source Arahan Teknik (Jalan) 8/86)

Type of vehicle	Equivalent Value in P.C.U's
	Traffic Signal
Passenger Car	1.00
Heavy Vehicles	1.75
Buses	2.25
Motorcycle	0.33
Bicycle	0.20

Traffic Volume (q)

- The number of vehicles (**n**) passing some designated roadway point in a given time interval (**t**)

$$q = \frac{n}{t}$$

- The count can be directional or all directions
- Units are typically **veh/hour , veh/day, veh/year**

Solution:

Saturday (Peak Hours):

= (0.829x1.00 + 0.0495x1.75 + 0.079x2.25 + 0.11x0.33 + 0.036x0.20) x 222

= 1.14 x 222

= 253 pcu/h

Friday (Peak Hours):

= (0.853x1.00 + 0.0447x1.75 + 0.06x2.25 + 0.0957x0.33 + 0.0006x0.20) x 432

= 1.10 x 432

= 475 pcu/h

~ This shows that the weekdays peak hour traffic is busiest compare to the weekend traffic.

A total of 80 questionnaires were distributed to obtain information to achieve the objectives of the study. Selection of study respondents based on drivers who pass along the Jalan Kuala Lumpur to Ipoh.

4.5 QUESTIONNAIRE

4.5.1 Section A : Background of Respondent

Table 4.5.1: Total of Respondent

Background	Respondents	Percentage (%)
Gender:		
Male	42	52.5%
Female	38	47.5%
Age:		
18-25	29	36.3%
26-40	25	31.3%
41-55	15	18.8%
56 and above	11	13.7%
Race:		
Malay	48	60%
Chinese	14	17.5%
Indian	13	16.2%
Others	5	6.3%

Of the 80 respondents, only 38 were female respondents compared to 42 other male respondents. This shows that more men drive than women. This means that the probability of male drivers being involved in an accident is higher than that of females. Table 4.5.1 Shows the number of study respondents by gender. The table 4.5.1 shows that most respondents in this study are between 18 to 25 years old, that is 29 respondents (36.3%), (31.3%) percent are aged between 26 to 40 years that is 25 respondents, (18.8%) percent are 41 years old to 55 years old which is a total of 15 respondents, and (13.7%) percent 11 respondents for those aged 56 years and above. The table 4.5.1 shows that the majority of respondents in this study is made up of Malays, namely a total of 48 people (60%) percent. While those of Chinese descent are as many as 14 people or (17.5%) percent of the total respondents, followed by Indians as many as 13 people (16.2%) and others as many as 5 people or (6.3%) percent.

4.5.2 Section B : Driver's Attitude

Table 4.5.2: Total of Driver's Attitude

Statement	Frequency	Percentage (%)
The driver cut the road in a dangerous way		
• Strongly agree	63	41.3%
• Agree	16	20%
• Disagree	1	1.3%
• Strongly disagree	0	0%
The driver follows too closely with other vehicles		
• Strongly agree	55	68.8%
• Agree	23	28.7%
• Disagree	2	2.5%
• Strongly disagree	0	0%
The drivers changing lanes without giving signs of traffic lights		
• Strongly agree	58	72.5%
• Agree	22	27.5%
• Disagree	0	0%
• Strongly Disagree	0	0%
The driver is driving while intoxicated		
• Strongly agree	68	85%
• Agree	12	15%
• Disagree	0	0%
• Strongly disagree	0	0%
The driver violating the traffic lights		
• Strongly agree	63	78.8%
• Agree	16	20%
• Disagree	1	1.3%
• Strongly disagree	0	0%

The drivers using cell phones while driving

- Strongly agree 59 73.8%
- Agree 20 25%
- Disagree 1 1.3%
- Strongly disagree 0 0%

The table above show about the statement of drivers cutting in a dangerous way is the cause of road accidents. The majority of 16 respondents, 20% agreed with the statement. Next, a total of 63 people or 78.8% strongly agreed with the statement. On the other hand, 1 people, namely 1.3% did not agree with the statement given. While there is no person that is 0% strongly disagree with the statement.

The table above show that the driver's statement that following too closely with other vehicles is the cause of road accidents. A majority of 23 people or 28.7% agreed with the statement because they thought drivers following too closely with other vehicles was one of the causes of road accidents. Next, a total of 55 people or 68.8% strongly agreed with the statement. On the other hand, 2 person, 2.5% did not agree with the statement given. While there is no person that is 0% strongly disagree with the statement.

The table above show the statement of drivers changing lanes without giving signs traffic lights is the cause of road accidents. The majority of respondents as many as 58 people that is 72.5% strongly agree with the statement. Next for the respondents who agree with the statement is 22 people that is 27.5%. On the other hand person that is 0% do not agree with the statement given. While there is 0 person that is 0% strongly disagree with the statement.

The table above show the statement of a driver driving while intoxicated is the cause of road accidents. More than 85% of respondents, namely 68 people strongly agree with the statement. Next, for the respondents who agreed with the statement, there were 12 people, which is 15%. On the other hand, no person, 0% disagreed and strongly disagreed, 0 person, 0%, with the statement given, they thought that it was not the main cause of road accidents.

The table above show that the driver's statement that violating traffic lights is the cause of road accidents. The majority of 63 respondents or 78.8% strongly agree with the statement. Next, for the respondents who agreed with the statement, there were 16 people, which is 20%. On the other hand, 1 people or 1.3% did not agree with the statement given. While there is 0 person that is 0% strongly disagree with the statement.

The table above show the statement of drivers using mobile phones while driving is the cause of road accidents. The majority of the 59 respondents, 73.8% strongly agreed with the statement because they felt that using a mobile phone while driving was one of the causes of road accidents. Next, for the respondents who agreed with the statement, there were 20 people, which is 25%. In fact, 0% of respondents disagreed with the statement and almost 0% strongly disagreed with the statement given.

4.5.3 Section C : Road Condition

Table 4.5.3: Total of Road Condition

Statement	Frequency	Percentage (%)
Slippery road conditions during rain		
• Strongly agree	40	50%
• Agree	39	48.8%
• Disagree	1	1.3%
• Strongly disagree	0	0%
The absence of street lights along the road		
• Strongly agree	41	51.2%
• Agree	38	47.5%
• Disagree	1	1.3%
• Strongly disagree	0	0%
Potholed and uneven road conditions		
• Strongly agree	46	57.5%
• Agree	34	42.5%
• Disagree	0	0%
• Strongly Disagree	0	0%

Road infrastructure is in unsatisfactory

• Strongly agree	43	53.8%
• Agree	37	46.3%
• Disagree	0	0%
• Strongly disagree	0	0%

Planting trees and oil palm by the roadside cause road accidents

• Strongly agree	3	3.7%
• Agree	10	12.5%
• Disagree	45	56.3%
• Strongly disagree	22	27.5%

The table above show the distribution of frequency and percentage of respondents according to the statement that slippery road conditions during rain are the cause of road accidents. A majority of 48.8% or 39 people agreed with the statement. Next, for the respondents who strongly agree with the statement is 40 people which is 50%. While for disagreeing with the statement given is 1.3% which is 1 people only and only 0 people strongly disagree which is 0%.

The table above show about the statement that the absence of street lights along the road is the cause of road accidents. A majority of 38 people or 47.5% agreed with the statement. Next, for respondents or drivers who strongly agree with the statement is a total of 41 people out of 80 respondents which is 51.2%. While for the status do not agree with the statement is a total of 1 people which is 1.3% and a total of 0 people which is 0% for the status strongly disagree with the statement.

The table above show about the statement that potholes and uneven roads are the cause of road accidents. A majority of 46 people or 57.5% strongly agreed with the statement. Next, for respondents or drivers who agreed with the statement, there were 34 people out of 80 respondents, which is 42.5%. While for the status of disagree with the statement is as many as 0 person which is 0% and those who strongly disagree is 0%.

The table above show the statement that road infrastructure that is in unsatisfactory condition is the cause of road accidents. A majority of 43 people or 53.8% agreed with the statement. Next, for respondents or drivers who strongly agree with the statement is a total of 37 people out of 80 respondents which is 46.3%. While for the status of disagree with the statement is a total of 0 people which is 0% and those who strongly disagree is 0%.

The table above show the distribution of frequency and percentage of respondents according to the statement planting trees and oil palm by the roadside cause road accidents. A majority of 56.3% or 45 people disagreed with the statement. Next, for the respondents who strongly agree with the statement is 3 people which is 3.7%. While for agreed with the statement given is 12.5% which is 10 people only and only 22 people strongly disagree which is 27.5%.

4.5.4 Section D : Vehicle Condition

Table 4.5.4: Table of Vehicle Condition

Statement	Frequency	Percentage (%)
Heavy vehicle cause road damage		
• Strongly agree	54	67.5%%
• Agree	23	28.7%
• Disagree	2	2.5%
• Strongly disagree	1	1.3%
Poorly maintained vehicles		
• Strongly agree	49	61.3%
• Agree	28	35%
• Disagree	1	1.3%
• Strongly disagree	2	2.5%
Brake lights not working properly		
• Strongly agree	53	65.4%
• Agree	26	32.1%
• Disagree	1	1.2%
• Strongly Disagree	1	1.2%
Foot or hand brakes not working properly		
• Strongly agree	58	72.5%
• Agree	20	25%
• Disagree	0	0%
• Strongly disagree	2	2.5%
Wipers do not work properly when rain		
• Strongly agree	34	42%
• Agree	44	55%
• Disagree	1	1.2%
• Strongly disagree	1	1.2%

The table above show that the statement that heavy vehicle cause of road damage. The majority of 23 respondents or 28.7% agreed with the statement. Next, for the respondents who strongly agreed with the statement, there were 54 people, which is 67.5%. On the other hand, 2 people or 2.5% did not agree with the statement given. While there is 1 person that is 1.3% strongly disagreed with the statement.

The table above show the distribution of frequency and percentage of respondents according to the statement that poorly maintained vehicles can cause of road accidents. A majority of 35% or 28 people agreed with the statement. Next, for the respondents who strongly agree with the statement is 49 people which is 61.3%. While for disagreeing with the statement given is 1.3% which is 1 people only and only 2 people strongly disagreed which is 2.5%.

The table above show that the statement that the brake lights not working properly causing a road accident. The majority of 26 respondents or 32.1% agreed with the statement. Next, for the respondents who strongly agreed with the statement, there were 53 people, which is 65.4%. On the other hand, 1 people or 1.2% did not agree with the statement given. While there is 1 person that is 1.2% strongly disagreed with the statement.

The table above show the statement of foot or hand brakes not working properly due to a road accident. The majority of the 20 respondents, 25% agreed with the statement because they felt that brakes are main causes of road accidents. Next, for the respondents who strongly agreed with the statement, there were 58 people, which is 72.5%. In fact, 0% of respondents disagreed with the statement and almost 2.5% strongly disagreed with the statement given.

The table above show that the statement that wipers do not work properly when it is raining can cause road accidents. The majority of 44 respondents or 55% agreed with the statement. Next, for the respondents who strongly agreed with the statement, there were 34 people, which is 42%. On the other hand, 1 people or 1.2% did not agree with the statement given. While there is 1 person that is 1.2% strongly disagreed with the statement.

4.6 Summary

In conclusion, The purpose of this survey is to predicting user habits,increase the level of awareness and willingness of buyers to accept new products, know the type of fish you like, receive suggestions or comments from buyers, promote the brand, an initial step in exploring the market. Method: A total of 80 questionnaires were revealed randomly at the study site. In this form we have used the scale "Strongly Agree", "Agree", "Natural", "Disagree" and "Strongly Disagree" to measure the level of awareness and willingness of buyers to accept new products. We have classified "Strongly Agree" and "Agree" as existing market indicators. As for "Natural", we classify it as a market that can be explored. The classification of "Disagree" and "Strongly Disagree" is a market that needs time to be explored. In order to predict buyer habits, respondents are free to choose more than one option or express themselves the most accurate statement with them. A questionnaire is a set of questions or items in written form. It is a tool specifically designed to collect information for analysis purposes that can answer research questions. The field of business and the field of education are two fields that frequently use this questionnaire. So this questionnaire method is one of the methods to help us to make this study a success because the public helps to ask road-related questions at the study site.

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

5.1 INTRODUCTION

Applying these factors in safety analysis could be crucial in lowering the accident frequency rate and preventing the growth in the number of fatalities and injuries on rural roads, given that roadway and development factors are known as the most effective parameters contributing to road traffic accidents on roads. In order to create a rural road safety risk index, this study assessed the relationship between the frequency of accidents and the quality of road safety. The study's key conclusions and assessment of the rural accident risk index among roadways, as well as clustering and risk assessments, are determined based on the data collected and the findings of the research.

This study also makes an effort to add to the body of information on road safety, which is one of objective 2's goals. It is thought that doing so will motivate and enable more collaboration, creativity, and dedication to reducing traffic accidents all across the world. Road traffic accidents are predictable, and may thus be avoided. However, to effectively address the issue, there must be strong coordination and collaboration across several sectors and disciplines, as well as the use of a comprehensive and integrated strategy.

Furthermore, despite the fact that there are several interventions that can save lives and limbs, political will and dedication are crucial, and nothing can be accomplished without them. Acting is best done right away. Every road user deserves improved and safer driving conditions. The obligation for road illumination is no longer followed. Nowadays, the road lighting requirement are ignored. Therefore, the responsible party must take steps to increase the safety of the motorist on the road.

In a nutshell, road safety management aims to maintain and enhance the current level of safety of a road network by lowering collision rates and supplying a safe driving environment for its users to support the network's continuous safe and effective usage. It relates to the administration, planning, and organisation of the authorities in charge of reducing traffic accidents and fatalities.

5.2 Recommendation

This study is one way to gauge how safe the roads are, especially along the Kuala Kubu Bharu route. Everyone present may be influenced to maintain the area around the location safe for vehicle traffic, avoiding any fatalities that may occur. Each and every safety precaution must be taken carefully.

To supply road furnishings, Jabatan Kerja Raya (JKR) may increase its budget. Roadside furniture is crucial because it can lower the chance of accidents; all road users, especially the elderly, must feel safe. To prevent any harm to the road, the condition of the roadside furnishings must also be good.

Several comments from respondents can be put up as recommendations based on research, surveys, and observations made to lessen the frequency of accidents on the Jalan Kuala Lumpur to Ipoh, Kuala Kubu Bharu.

5.2.1 Damaged roads need to be repaired.

Roads that are damaged along the route, whether they have cracks, potholes caused by heavy cars, or uneven paving, need to be maintained, repaired, and repaved since these conditions increase the risk of traffic accidents. To make the road condition consistent with the plan, uneven road conditions require cutting or reclamation.

5.2.2 Increase the number of street lights.

The observation technique revealed that there are no street lights erected on Jalan Kuala Lumpur to Ipoh between KM50 and KM59. Since users who cross the road at night only rely on car lights, this may also add to the likelihood of accidents. Those in charge need to be more sensitive to the condition of the road and take the initiative to increase the number of street lights along the route.

5.2.3 Installation of signage.

Signage should be installed in a way that makes it easy for drivers to read it from a distance. Installation of warning signs in areas at high risk of being involved in accidents can reduce the number of road accidents.

5.2.4 Camera mounting (AES)

To deter excessive speeding, AES cameras should be placed along the road. When drivers follow the established restrictions, placing an AES camera has numerous advantages, one of which is a decrease in the frequency of traffic accidents. This is the outcome of government attempts to reduce the number of traffic accidents, which is rising year.

5.2.5 The vehicles needs to be maintained

It's important to check that the car is in excellent shape and is not damaged before setting out on a lengthy journey. In order to guarantee that the car is in good enough condition for lengthy excursions or the opposite, it is also important to take into account the distance to be travelled. Additionally, the car's brakes, engine, and other components are all in good shape and working well.

5.2.6 Road furniture needs to be added

They play a crucial role in enhancing traffic flow along directed travel lanes and promoting road safety on urban roadways and crossings. Accidents may result from this since drivers may be cautious while using a road that has delineators and a traffic barrier at the side of the road. The people in charge need to pay more attention to the state of the road and take the initiative to place more roadside amenities along the route.

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APPENDIX

APPENDIX A   **Example of Questionnaire**

APPENDIX B   **Questionnaire APPENDIX A**

                                   EXAMPLE OF QUESTIONNAIRES

APPENDIX 2.1   **Example of Computer Questionnaire**

APPENDIX 2.2   **Example of Telephone Questionnaire**

APPENDIX 2.3   **Example of Mail Questionnaire**

APPENDIX 2.4   **Example of Open Questionnaire**

APPENDIX 2.5   **Example of Multiple Choices**

APPENDIX 2.6   **Example of Scaling Questionnaire**

APPENDIX 2.7   **Example of Dichotomous Questionnaires**

Questionnaire/Survey Example

Questionnaire for library users

We are carrying out an evaluation of some of the library's services, to see if we can improve facilities and make them more relevant for our customers. Thank you for taking the time to fill in this questionnaire; it should only take 10 minutes. Please return your completed questionnaire to any member of library staff, or put it in the box provided. [delete as appropriate] Your answers will be treated with complete confidentiality, and unless you choose to provide an e-mail address, will be entirely anonymous. If you have any questions about this questionnaire, please contact [insert contact name].

Section A

1. Do you use the library, on average: (please tick one)

   less than once a month ☐
   once a month ☐
   once every two weeks ☐
   once a week ☐
   two or three times a week ☐
   daily ☐

2. Which library facilities do you use? (please tick all that apply)

   books (lending) ☐
   audio cassettes & music CDs ☐
   video cassettes ☐
   CD-Roms (lending) ☐
   talking books ☐
   reference books/information (e.g. newspapers) ☐
   computer facilities ☐
   other (please say what) ☐

3. What is your main use of the library?

   If you DO NOT use any of the computer facilities in the library (other than the library catalogue), please go to question 12 (Section B.)
   If you DO use the computer facilities, please continue with question 4 below.

Appendix 2.1: Example of Computer Questionnaire

: Survey :

Topic : To know of GSRTC BUS CUSTOMER's SETISFACTION LEVEL..

Objective :
- To know which facility satisfy the customer
- To know the routes covered by the buses.

QUESTIONNAIRE

1) Name: _____

2) Gender:
   (i) Male   (ii) Female

3) Age Group (in years):
   (i) 12-18   (ii) 19-30
   (iii) 31-40   (iv) more than 40

4) Mobile No: _____

5) Do you agree that internal space and siting arramgement of buses are comfortable?
   (i) Strongly agree   (ii) Agree
   (iii) Nutral   (iv) Disagree
   (v) Strongly disagree

6) Are you satisfied with sleeping berth and internal space in sleeper buses?
   (i) Strongly satisfied   (ii) satisfied
   (iii) Neutral   (iv) Dissatisfied
   (v) Strongly dissatisfied

7) What do you feel about the price charged by GSRTC for its service?
   (i) Strongly satisfied   (ii) satisfied
   (iii) Neutral   (iv) Dissatisfied
   (v) Strongly dissatisfied

8) Do you think that location of surat bus station at the right location?
   (i) Yes   (ii) No

9) Rate the facilities provide on bus station

1	2	3	4	5

Appendix 2.2: Example of Telephone Questionnaire

Original Research Article

Road safety and the community: an awareness survey among the coastal population of Karnataka

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ABSTRACT

Background: Road traffic accidents (RTAs) pose a significant burden on the health care system in India with high out of pocket medical expenditure. Awareness about this public health problem is necessary to combat it and this study was carried out to assess knowledge and practice towards road safety among the adult population in the coastal region of Udupi taluk in Karnataka.
Methods: A cross-sectional survey was carried out among 381 adults aged 18 years and above residing in the region for more than one year. A semi-structured questionnaire was used to assess their knowledge and practice towards road safety measures.
Results: Most of the participants were in the age bracket of 18-44 years (61.4%), were females (65.1 %) and had up to 10 years of schooling. Overall knowledge was found to be low with only 30% reporting good knowledge. As regards practice, drivers fared better with a good majority (87%) reporting desirable practice. Younger age (OR=0.57, 95% CI, 0.36-0.92), male gender (OR=0.14, 95% CI, 0.08-0.23), higher level of schooling (OR=0.32, 95% CI, 0.20 - 0.50) and knowing to drive (OR=0.04, 95% CI, 0.02-0.07) were found to be significantly associated with a greater level of knowledge regarding road safety measures.
Conclusions: The study showed inadequate knowledge and poor road safety practices among good number of participants. This emphasises the need for a customized community based awareness campaign on road safety measures coupled with stringent legislation measures to bring about the desired change.

Keywords: Road safety, Awareness, Practice, Pedestrians, Drivers

INTRODUCTION

Road traffic accidents (RTA), an emerging public health problem causes millions of deaths per year. As per the Global status report on road safety 2015, 1.25 million road traffic deaths occur every year. Although low- and middle-income countries have only half of the world's vehicles, they contribute to 90% of the world's road traffic deaths, majority of which involves those aged 15-29 years, men, pedestrians, cyclists and motorcyclists.[1]

The report from the Government of India on road traffic accidents (2015) estimates that 10-30% of hospital registrations and 1,46,133 deaths are due to RTAs. They are the most common cause of head injuries (64%) resulting in varying levels of disabilities and death of the victims before reaching a hospital.[2-6] RTAs are a significant burden on the health care system in India and the estimated out of pocket medical and related expenditure is reported to range between 10,518 to 10,905 INR.[7]

Appendix 2.3: Example of Mail Questionnaire

Q1A How satisfied are you with your membership of the ____ overall?

○ Completely dissatisfied ○ ○ Neutral ✓ ○ Completely satisfied

Q1B Please tell us why you have given this satisfaction rating for ____ membership.

Q1C What should the ____ do to improve?

Appendix 2.4: Example of Open Questionnaire

What is your favorite pizza topping?

○ Pepperoni
○ Mushrooms
○ Anchovies
○ Sausage
○ Artichoke hearts

Other (please specify)

Appendix 2.5: Example of Multiple Choices

Circle the correct numeric response to each question

#	Question	Survey Scale: 1=Strongly Disagree 2=Disagree 3=Neutral 4=Agree 5=Strongly Agree					
1	I have easy access to the supplies and equipment I need to do my work on this unit.	1	2	3	4	5	
2	The support services to this unit respond in a timely way.	1	2	3	4	5	
3	I can discuss challenging issues with care team members on this unit.	1	2	3	4	5	
4	My ideas really seem to count on this unit.	1	2	3	4	5	
5	I speak up if I have a patient safety concern.	1	2	3	4	5	
6	Care team members on this unit feel free to question the decisions or actions of those with more authority.	1	2	3	4	5	
7	Important patient care information is exchanged during shift changes.	1	2	3	4	5	
8	If I have an idea about how to make things better on this unit, the manager and other staff are willing to try it.	1	2	3	4	5	
9	Care professionals communicate complete patient information during hand-offs.	1	2	3	4	5	

Appendix 2.6: Example of Scaling Questionnaire

Do you believe that the death penalty is ever justified?

_____Yes

_____No

Please enter your gender:

☐ Male   ☐ Female

Appendix 2.7: Example of Dichotomous Questionnaires

QUESTIONNAIRE

**THE STUDY OF ROAD SAFETY AT KUALA KUBU BHARU ,
SELANGOR FOR FINAL YEAR PROJECT**

**DIPLOMA CIVIL ENGINEERING PROGRAM (DKA), POLYTECHNIC
SULTAN SALAHUDDIN ABDUL AZIZ SHAH, SHAH ALAM, SELANGOR. (
SESI 1/2022/2033)**

Assalamualaikum and peace be upon you ,

To users of Kuala Lumpur to Ipoh Road, Kuala Kubu Bharu,

We are pleased to have you participate in answering this questionnaire. This study is an assessment of the road safety in Kuala Lumpur to Ipoh, Kuala Kubu Bharu to ensure that the highway is safe to use and reduce accidents on Jalan Kuala Lumpur to Ipoh, Kuala Kubu Bharu. Accordingly, the findings of this study can be used to improve the quality of the Kuala Lumpur to Ipoh Road, Kuala Kubu Bharu. We desperately need your support, insight and valuable feedback. The information provided will be used to help reduce accidents on Jalan Kuala Lumpur to Ipoh, Kuala Kubu Bharu. We request your kindness to fill out this questionnaire and send it to us.

We greatly appreciate your support and concern.

Thank you for cooperation!

GUIDE TO RESPONDENTS:

1. This questionnaire contains 4 parts:
   - i) Part A – Questions regarding the respondent's background.
   - ii) Part B – Questions regarding the driver's attitude.
   - iii) Part C - Questions regarding road conditions.
   - iv) Part D – Questions regarding the condition of the vehicle.

2. Fill in the answer field that has been prepared. You are required to answer honestly and sincerely.
3. All information is obtained only for this study only.
4. All your personal information is confidential.

SECTION A

Instructions: Please fill in all the information below

Section 2 of 5

BAHAGIAN A : MAKLUMAT LATAR BELAKANG RESPONDENT

SILA ISI SEMUA MAKLUMAT DI BAWAH

UMUR *
- ○ 18-25
- ○ 26-40
- ○ 41-55
- ○ 56-Keatas

JANTINA *
- ○ Lelaki
- ○ Wanita

BANGSA *
- ○ Melayu
- ○ Cina
- ○ India
- ○ Lain-lain

SECTION B

Instructions: Please fill in all the information below

SECTION C

Instructions: Please fill in all the information below

Section 4 of 5

BAHAGIAN C : KEADAAN JALAN RAYA

SILA ISI SEMUA MAKLUMAT DI BAWAH

ADAKAH KEADAAN JALAN RAYA YANG LICIN SEMASA HUJAN MENYEBABKAN KEMALANGAN JALAN RAYA ?

○ Sangat tidak setuju

○ Tidak setuju

○ Setuju

○ Sangat setuju

ADAKAH KETIADAAN LAMPU JALAN DI SEPANJANG JALAN RAYA BERPUNCA KEMALANGAN JALAN RAYA ?

○ Sangat tidak setuju

○ Tidak setuju

○ Setuju

○ Sangat setuju

ADAKAH KEADAAN JALAN RAYA YANG BERLUBANG DAN TIDAK RATA MENYEBABKAN KEMALANGAN JALAN RAYA?

○ Sangat tidak setuju

○ Tidak setuju

○ Setuju

○ Sangat setuju

ADAKAH PRASARANA JALAN RAYA BERADA DALAM KEADAAN YANG KURANG MEMUASKAN BERPUNCA KEMALANGAN JALAN RAYA ?

○ Sangat tidak setuju

○ Tidak setuju

○ Setuju

○ Sangat setuju

ADAKAH PENANAMAN POKOK DAN KELAPA SAWIT DITEPI JALAN BOLEH MENGUNDANG KEMALANGAN JALAN RAYA ?

○ Tidak sangat setuju

○ Tidak setuju

○ Setuju

○ Sangat setuju

Instructions: Please fill in all the information below

THANK YOU FOR YOUR COOPERATION