ANALYSIS OF MOTORCYCLISTS' RISKY BEHAVIOR WHILE PERFORMING SAFETY TRAINING WITH SAFETY RIDING TRAINING (SRT) SIMULATION.

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SCHOOL OF CIVIL ENGINEERING
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I hereby declare that all corrections and comments made by the supervisor(s)and examiner have been taken into consideration and rectified accordingly.

Signature:

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ABSTRAK

Motosikal adalah pengangkutan yang sering terlibat dalam kemalangan jalan raya. Tingkah laku berisiko dikenali sebagai salah satu punca utama kemalangan tersebut. Kajian ini bertujuan untuk memahami latihan yang digunakan dalam simulasi keselamatan penunggangan dan bagaimana simulasi keselamatan penunggangan mempengaruhi tingkah laku penunggang motosikal serta meningkatkan persepsi risiko dengan memberi tumpuan kepada objektif berikut iaitu menentukan parameter dalam simulasi keselamatan penunggangan, menyiasat tingkah laku berisiko penunggang motosikal berdasarkan peristiwa yang muncul dalam simulasi keselamatan penunggangan dan menganalisis hubungan antara tingkah laku berisiko penunggang motosikal dengan peristiwa dalam simulasi keselamatan penunggangan. Jumlah keseluruhan peserta bagi projek ini ialah sebanyak 90 responden. Projek ini menggunakan kaedah analisis statistik. Parameter yang digunakan untuk menilai responden adalah peristiwa. Justeru, Kursus 1 dikategorikan sebagai kursus paling mudah, sementara Kursus 6 dikategorikan sebagai kursus yang paling sukar berdasarkan jenis halangan dan kesukaran yang terdapat dalam peristiwa tersebut. Sementara itu, dapatan ini menunjukkan bahawa kewujudan peristiwa dapat mempengaruhi kehadiran tingkah laku berisiko. Oleh itu, apabila nilai tingkah laku berisiko menurun, skor keseluruhan akan meningkat. Kesimpulannya, simulasi keselamatan penunggangan dapat memberi manfaat kepada penunggang motosikal. Hal ini kerana, ianya dapat dijadikan sebagai panduan kepada mereka untuk lebih peka dan berhati-hati terhadap situasi-situasi bahaya yang berlaku di jalan raya agar tingkah laku berisiko dapat dielakkan serta kemalangan jalan raya dapat dikurang. Melalui pendekatan ini juga, persepsi risiko dikalangan penunggang motosikal dapat ditingkatkan.

ABSTRACT

Motorcycles are transportation that is often involved in road accidents. Risky behavior was identified as one of the main causes of such accidents. This study aimed to understand the training used in Safety Riding Training (SRT) simulation and how safety riding training simulation affecting the motorcyclists' behavior as well as increasing the risk perception by focusing on the following objectives which are to determine the parameter in the safety riding training simulation, to investigate the motorcyclists' risky behavior based on the emerging events in the safety riding training simulation and to analyze the relationship between the motorcyclists' risky behavior and the events in the safety riding training simulation. There were total of 90 respondents in this study. This project used statistical data analysis. In safety riding training simulation, the parameter used to evaluate the respondents is the events. As a result, Course 1 is categorized as the simplest course, while Course 6 is categorized as the most difficult course due to the types of intervention and difficulties in the events. Meanwhile, this finding demonstrates that the existence of events can influence the presence of risky behavior. As a consequence, the relationship between risky behavior and events is inversely propositional. Therefore, when the value of risky behaviors decrease, the total score of events will increase. In conclusion, safety riding training simulation is useful for motorcyclists. This is because it can be used as guidance for them to be more alert and careful to dangerous situations that occur on the road so that risky behavior can be avoided and road accidents can be reduced. Through this approach as well, risk perception among motorcyclists can be improved.

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CHAPTER 1

INTRODUCTION

1.1 Background of Study

Motorcycles are a popular means of transport worldwide, although they can serve different purposes in different world regions. Motorcycles are widely used for transportation of people in low and middle-income countries also at the same time it used for leisure or recreation in high-income countries (Shen et al., 2015). This seems to have significant safety consequences because motorcyclists suffer from the largest severe injuries than non-motorcyclists (Chang & Yeh, 2006). Fatalities involving motorcyclists continue to increase in Malaysia. After Thailand, Malaysia was the second-highest number of fatalities caused by traffic accidents in Southeast Asia (WHO, 2015)**.**

In 1979, the Indiana University Institute for Research in Public Safety discovered that human factors were liable for 70% of traffic fatalities, which included all potential human errors (Treat et al., 1979). Risk-taking behavior, also defined as risky riding behavior, is one example of a human factor that can influence the probability of a traffic accident (Petridou & Moustaki, 2000). Therefore, an understanding of risky riding behaviors among motorcycle riders is essential to shaping interventions and has been explored in previous research. According to Harith and Mahmud, (2018), Malaysian motorcyclists are frequently involved in traffic violations or dangerous riding behaviors such as speeding, tailgating, red light spinning, substance-impaired riding, and distracted riding. To date, there is little evidence that initiatives such as targeted education campaigns or law enforcement programs aimed at reducing risky riding behaviors in Malaysia have been efficient (Oxley et al., 2018).

Motorcycle accidents have been associated with a lack of experience amongst other riders (Mullin et al., 2000). Motorcycle rider training however has been highlighted as an important safeguard for reducing both the number of collisions and the severity of harm (Kardamanidis et al., 2010). The majority of motorcyclists begin riding at a young age, with minimal supervision. Hence, motorcycle accidents are most often caused by immature and risky behavior (Wong et al., 2010). Awareness and riding practice may be effective strategies in mitigating this issue (Woratanarat et al., 2013).

The expectation of an unfavorable outcome, such as a traffic accident is characterized as safety perception, also known as perceived risk (Hamed & Al Rousan, 1998). According to Falco et al., (2013) risk perception was a cognitive factor that was consistently found to be linked to riders' decisions to engage in risky riding behavior. Maulina et al., (2018) stated that riders with a high-risk perception ride more cautiously, follow traffic rules, and have a more optimistic attitude toward road safety. Riders with a lower risk perception are more likely to engage in risky riding behavior (Machin & Sankey, 2008). Therefore, safety perception can be increase by providing training for motorcycle riders.

1.2 Problem Statement

Nowadays, there are a lot of road safety campaigns rather than engineering solutions such as the application of safety riding training simulation. The campaign without any practicality will waste money and time.

The safety riding training simulation was developed to focus training attention on hazard awareness (which is a high-level cognitive function) rather than on specific riding motor skills as the researcher has pointed out, the simulator's efficacy has been demonstrated, to some extent, when the simulator trains hazard perception as well as higher-order cognitive skill (Goode et al., 2013). According to Di Stasi et al., (2010) the simulation scenarios were generated to teach dynamic and complex time-critical driving skills, including awareness, risk evaluation, and hazard perception. Vidotto et al., (2015) stated that the participants' score on the simulation was related to their ability to ride a moped on the track.

However, the simulation is less been used in Malaysia as well as less understanding among motorcyclists about the simulation can assist them to reduce motorcycle accidents. The development of technology is wasted if simulation is not fully optimized and utilized. Therefore, this study aims to understand the training used in safety riding training simulation and how the simulation affecting the motorcyclists' behavior as well as increasing the risk perception.

1.3 Objectives of Study

This study aimed to understand the training used in Safety Riding Training (SRT) simulation and how the simulation affecting the motorcyclists' behavior as well as increasing the risk perception by focusing on the following objectives:

i. To determine the parameter in the Safety Riding Training (SRT) simulation.

ii. To investigate the motorcyclists' risky behavior based on the emerging events in the Safety Riding Training (SRT) simulation.

iii. To analyze the relationship between the motorcyclists' risky behavior and the events in the Safety Riding Training (SRT) simulation.

1.4 Scope of Work

The respondents were volunteers to participate in this study. The choice of the course depends on the trainer. The trainer chooses the course for the participants randomly. The result of this study did not consider the background of the respondent but only based on the training itself.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

In the congested metropolitan and rural roads of many cities in Malaysia, two-wheeled vehicles are now frequently used not only for leisure but also to improve flexibility. The fast growth of two-wheeled vehicles is attributed to their small size and ease of maneuverability in the congested region (Ospina-Mateus et al., 2019). It is quite due to traffic patterns, which make riding a motorcycle considerably easier and faster, especially in densely populated areas. Law et al., (2015) stated that when the level of affluence in an Advanced Economic Country (AEC) rises, individuals begin to convert their mode of transportation from motorbike to passenger automobile. Figure 2.1 shows that Malaysia was the second-highest number of motorcycles per 1000 population.

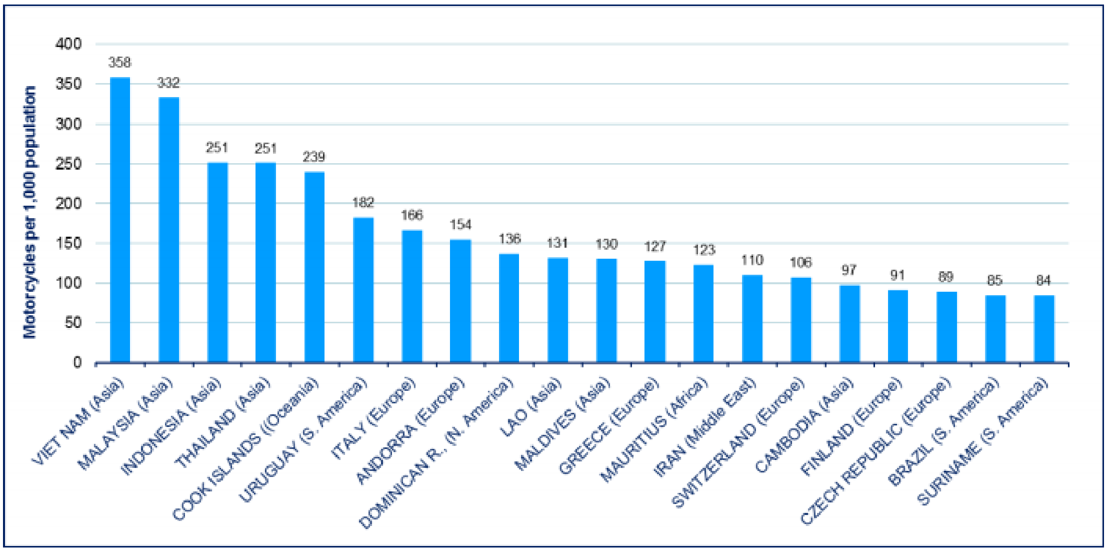

Figure 2.1: The number of motorcycles per 1000 population of 20 countries.

(Source: Laksanakit, 2018)

In the year 2016, over 1.4 million people died in traffic accidents, with more than 50 million suffering catastrophic injuries (WHO, 2018). It also stated that motorcycles are involved in more than 380,000 deaths per year around the world. The increase in the number of motorcycles on the road, the inadequate condition of the roads, and the increase in mobility displacements are mostly major factors in motorcycle accidents (WHO, 2017). Figure 2.2 shows that the death in traffic accidents by type of road user between the years 2013 and 2016. The death rates were three times greater in low-income countries compared to high-income countries. More than half of all vulnerable actors engaged in traffic deaths are motorcyclists, cyclists, and pedestrians.

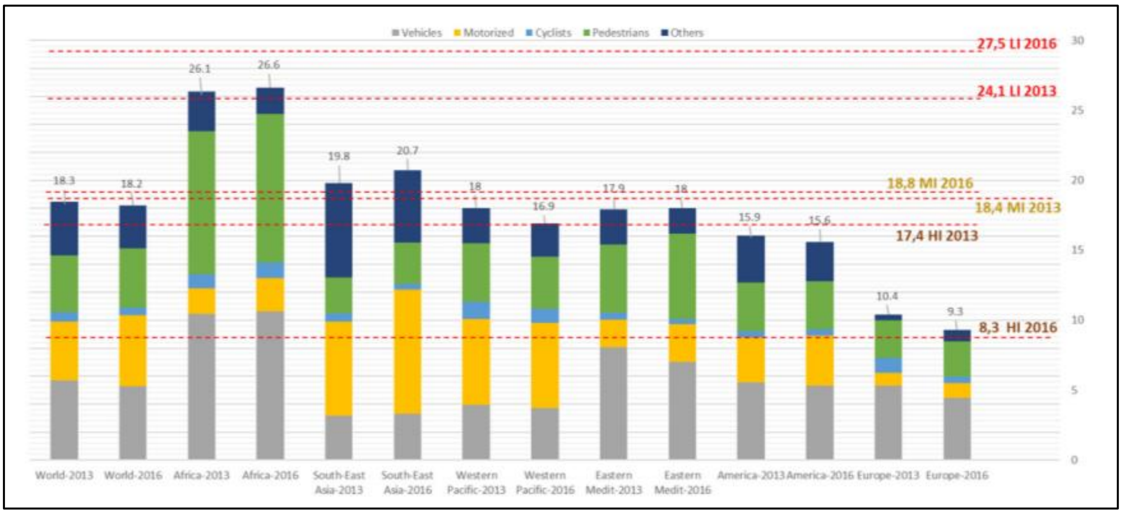

Figure 2.2: The death in traffic accidents by type of road user in between the year 2013 and 2016.

(Source: World Health Organization (WHO), 2018)

In Malaysia, the number of motorcycle users is greater in less developed states like Kelantan and Perlis compared to Selangor and Wilayah Persekutuan, which are more active in economical development (Manan & Várhelyi, 2012). Since motorcycles are high demand transportation, motorcyclists are found to be more prevalent in crash forecasts. According to the Road Transport Department (RTD) Malaysia, (2017), the number of traffic accidents rises every year in tandem with the increase in the number of registered vehicles. Figure 2.3 shows the statistics of the registered vehicle versus the nos of accidents from the year 2006 to 2016 in Malaysia.

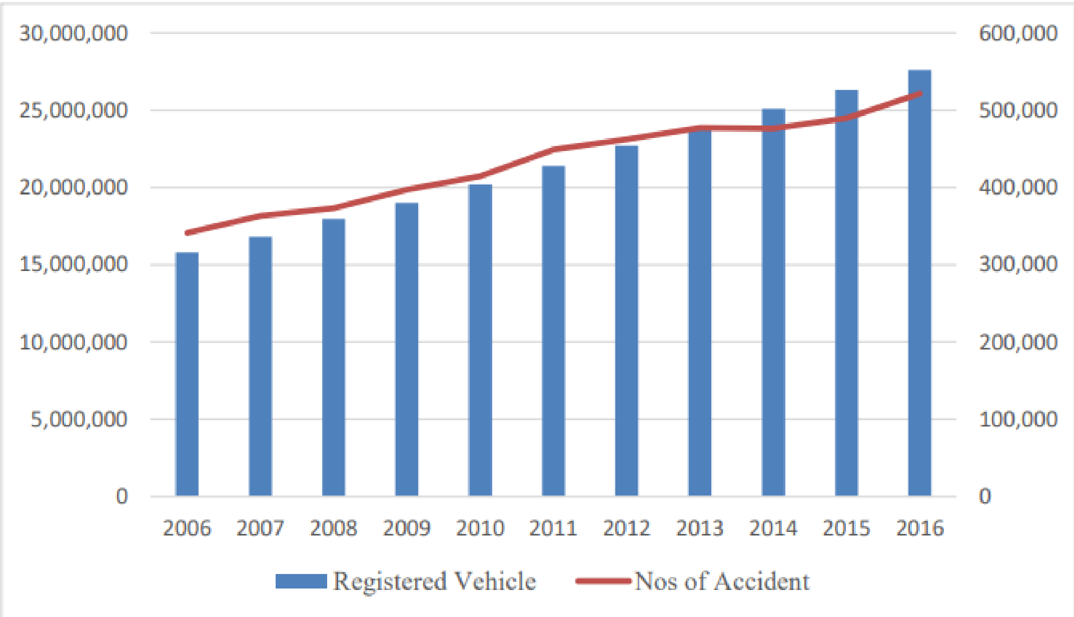

Figure 2.3: The statistics of the registered vehicles versus the nos of accidents from the year 2006 to 2016 in Malaysia.

(Source: Road Transport Department (RTD) Malaysia, 2017)

Motorcyclists suffer a significant risk of injuries and in the worst-case fatalities when involved in a road accident due to their smaller size and fewer safety features than other types of vehicles. Particularly compared to other modes of transportation, the number of fatalities involving motorcyclists or passengers is relatively high. Road Transport Department (RTD) Malaysia, (2017) also reported that starting from the year 2008 to September 2017, the percentage of fatality cases involving motorcyclists and pillion passengers was the highest compared to other categories, followed by vehicle and bus fatality cases. Figure 2.4 shows that the percentage of fatalities based on the types of vehicles in Malaysia.

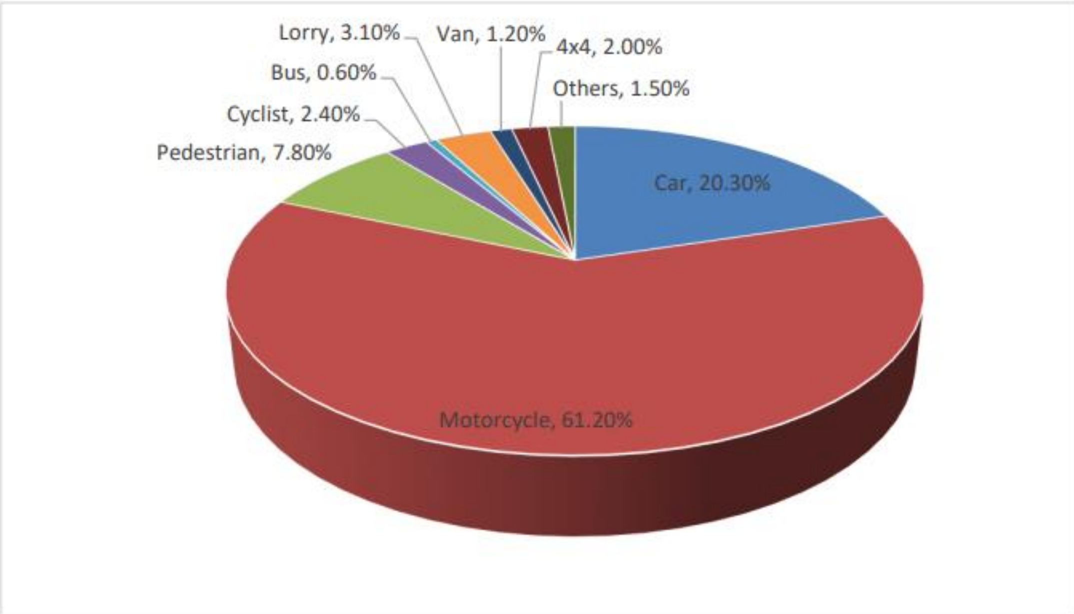

Figure 2.4: The percentage of fatalities based on the types of vehicles in Malaysia.

(Source: Road Transport Department (RTD) Malaysia, 2017)

Knowledge and riding practice could be valuable factors in preventing this issue (French et al., 2009). As a result, various countries have implemented safety riding programs in practices for a decade (Braver et al., 2007). The outcome of riding and training programs, on the other hand, has ranged from a successful reduction in road traffic injuries to an increase in such injuries (Kardamanidis et al., 2010). The high number of fatalities is frightening and all parties must work together with effective measures to reduce the number of road accidents, particularly those involving motorcycles, and therefore reduce overall road fatalities. Understanding risky riding behaviors among motorcycle riders is crucial for developing solutions, and previous research has focused on this.

2.2 Risky Riding Behavior as Factor for Motorcycle Accidents.

The issue of road traffic safety is a big concern on the world stage. Among other approaches to solve this problem and the funds invested in changes by some nations, there is still a great deal of hazard and threat in the traffic. Motorcyclists are widely acknowledged as a group of road users who face a particularly high risk of accidents (Bjørnskau et al., 2012). Wong et al., (2010) demonstrated that sensation seeking, amiability, and impatience are all personality traits that may impact risky driving behaviors. The prevalence of the motorcycle is apparent in Malaysia, at the expense of an incredibly high number of accidents that cause injuries and fatalities.

Risky riding behavior was defined as any action that increases the likelihood of a traffic accident resulting in significant injury or death to the rider, passenger, or other road users (Seibokaite & Endriulaitiene, 2012). Risky riding behavior means that not only sensitive and aggressive driving, but also uneasy and distracted riding. Harith and Mahmud, (2018) stated that speeding, tailgating, red-light running, substance-impaired riding, inattentive riding, and other risky riding behaviors are prevalent among Malaysian motorcycle riders. Currently, there is little indication that initiatives like targeted education campaigns or law enforcement programs aimed at reducing risky riding behaviors in Malaysia have been effective (Oxley et al., 2018). Hence, more research is needed to determine the scope of risky riding behaviors and their consequences.

Types of risky riding behaviors such as inappropriate riding behavior, aggression, and distraction increase the likelihood of being engaged in a motor vehicle accident, which can have serious implications for those involved. There are two categories of risk riding behavior which are error and violations. Errors are defined as behaviors induced by a rider's incompetence or blunders, whereas violations are defined as offenses performed as a result of a violation of traffic regulations (Useche et al., 2017). Riding a motorcycle with one hand and separating lanes would be an indication of an error, while a violation would involve riding without a license and driving through traffic lights.

There are a few factors affecting decisions by either the rider or other parties to contribute to risky riding behavior. Risk perception was a cognitive factor that was consistently found to be related to riders' decisions to indulge in risky riding behavior (Falco et al., 2013). It also affected the perception of danger by a rider and either they wanted to be involved in risky riding behaviors like lane splitting. Depending on each case, the vulnerability that was perceived differed. According to Maulina et al., (2018) it is possible to divide dangerous conditions into two categories, which are pro-risk and anti-risk. Pro-risk and anti-risk situations are separate situations that elicit different risky riding behaviors with different probabilities. Pro-risk situations increase the possibility of risky riding activities, whereas anti-risk situations discourage involvement in those behaviors. Some examples of anti-risk circumstances are a narrow distance between cars, muddy road conditions, traveling at nighttime, and carrying a female pillion passenger.

On the other hand, the behavior of road users is known to be one of the most critical elements in the causation of collisions. Although the community has been knowledgeable, this issue of motorcyclist behavior will be more dangerous if an action has not to be taken. For the implementation of motorcycle safety awareness interventions, researching the risk behaviors of motorcyclists and analyzing risky riding behaviors are important. It should be taken into account that motorcycle riders represent a particular specific population of vehicle users with different reasons for the use of motorcycles other than mobility, to examine motorcycle riding behavior.

2.2.1 Human Behavior

According to Ahmed, (2013), the vector created by Dr. William Haddon declared that three aspects relate to a road accident which are human behavior, environmental, vehicles, and equipment factor. Yaacob et al., (2018) revealed that human behavior includes drug or alcohol consumption, excessive speed, steering perception, and the use of a mobile phone, among other things. The environment includes seasonal changes, road design, altitude impact, inappropriate road intersections, and so on. A vehicle, on the other hand, is made up of its prototype, type of vehicle, traffic congestion, and traffic patterns on the road.

Theory of Planned Behavior (TPB) is commonly used in numerous human behavior research. TPB has identified three major indicators of individual behavioral intention which are attitude toward the behavior, subjective norm, and perceived behavioral control (Conner, 2020). According to Ajzen, (1991) an individual's desire is an indicator of their behavior. Personality, social influence, and self-efficacy are all influenced actions. Because behavior can be purposeful and organized, the TPB is a theory that predicts conscious behavior. As a result, the TPB theory is a guideline that can be used as an underlying theory.

Ishak & Syed Md Rahim, (2020) expressed that the Malaysia Institute of Road Safety Research (MIROS) analyzed road accident data in 2011 and discovered that human behavior, road infrastructure, surrounding area, and vehicle condition are the main causes of accidents. Road Transport Department (RTD), Malaysia (2017) affirmed that human behavior is the most crucial factor that contributing to road accidents compared to road infrastructure, surrounding area, and vehicle factors.

Precautionary riding is essential for preserving safety and avoiding accidents while driving on the road, and the problem is associated with human behavior. Sukor et al., 2017) stated that human behavior is one of the factors that contribute to road accidents, and the competent authority must take appropriate enforcement action to produce a psychological impact on road users, which will enable train them and minimize the number of accidents. Figure 2.5 shows that the percentage of the cause of an accident in Malaysia.

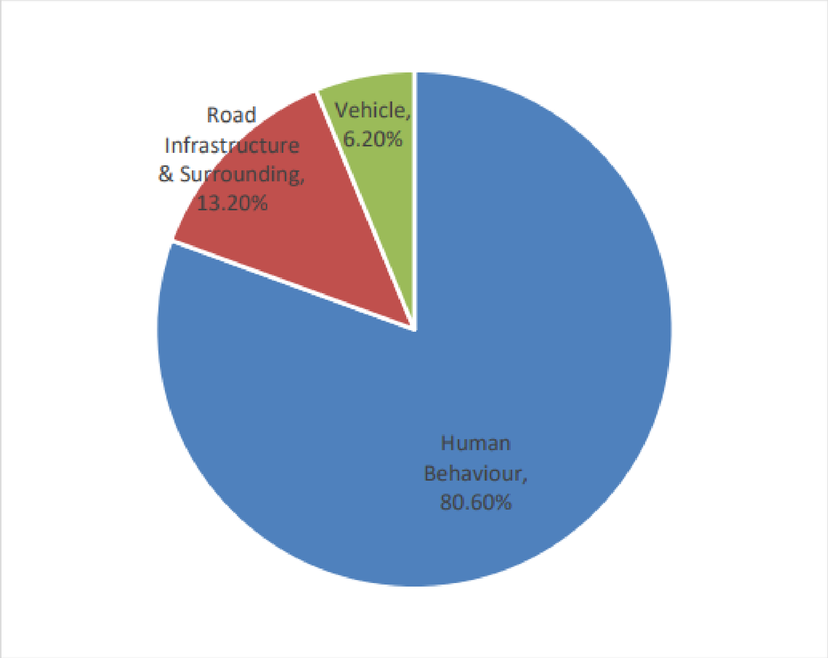

Figure 2.5 shows that the percentage of the cause of an accident in Malaysia.

(Source: Malaysia Institute of Road Safety Research (MIROS), 2019)

2.2.2 Improper Way of Wearing Safety Riding Equipment

The majority of fatalities among motorcycle riders ensue on the head. Therefore, helmets are an important feature of safety equipment for motorcyclists since it help to lessen the severity of crashes. Kim et al., (2015) reported that the use of helmets among motorcyclists can minimize the severity of road crashes and reduce the costs of health care. In comparison to the type of helmets used, such as the full face, half head, or open head kind of helmets, wearing helmets properly is very fundamental to provide better protection to the biker (R. Ramli & Oxley, 2016). Manan & Várhelyi, (2012) presented that 20% of fatalities involving motorcyclists occurred as a result of the rider failing to wear a helmet, while another 4% occurred as a result of the rider wearing the helmet incorrectly. Figure 2.6 shows that the motorcycle fatalities according to the type of helmet worn.

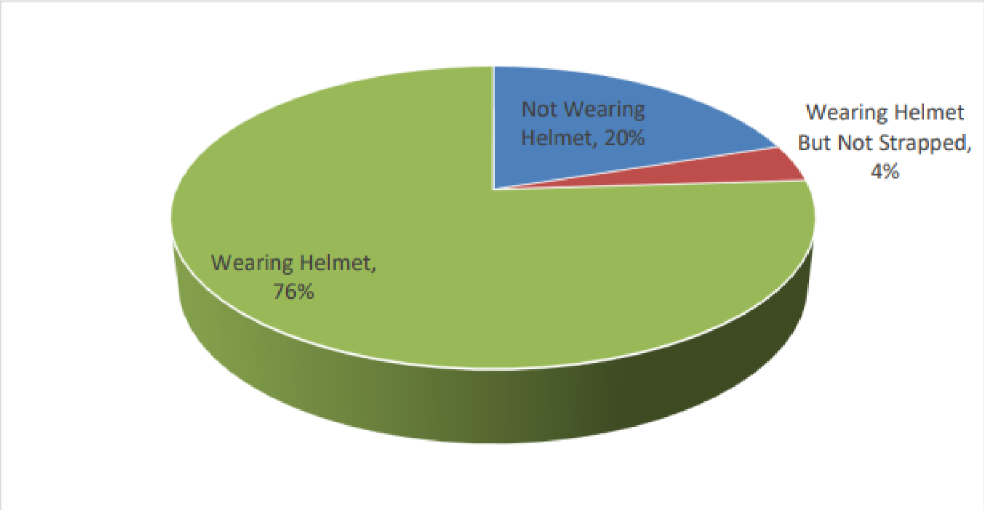

Figure 2.6: The motorcycle fatalities according to the type of helmet worn.

(Source: Manan & Várhelyi, 2012)

Other than that, the motorcycle rider's garments are one of the variables that lead to the rider's visibility to other road users. A research performed in New Zealand found that wearing a white helmet instead of a black helmet reduced the risk of a motorcyclist being involved in an accident by 24%, and wearing any reflective or fluorescent clothing reduced the risk by 37% (Wells, 2004). Hence, wearing bright clothing and adding a reflector to the helmet are examples of low-cost solutions that could reduce the risk of motorcyclists on the road (Solah et al., 2013).

According to Alias et al., (2020) safety riding gear corresponds to riding Personal Protective Equipment (PPE) such as jackets, vests, boots, and helmets that motorcyclists wear while riding. Many studies show that the head, legs, and arms of a rider are the most likely to be injured in a collision, so safety riding gear is an important item for the motorcyclist to protect themselves when a crash occurs. The lack of applying of PPE during collisions resulted in more severe injury results and extended hospital admission (Morgado et al., 2017). Thus, taking the initiative to use the PPE will tend to avoid serious injuries while accidents.

However, this is associated with human behavior, in which people do not take road safety seriously, even though safety programs have been conducted to educate the public on the significance of wearing a helmet properly while riding. It is necessary to raise public awareness and correct attitudes about injuries caused by motorcycle accidents, as well as the need for safety equipment such as helmets in preventing such injuries. When safety equipment, such as helmets, is required to be worn, and the traffic environment is boosted, such as signalized intersections and health services to accidents and fatalities, then traffic safety will strengthen and collisions will be reduced (Xiong et al., 2016).

2.2.3 Speeding

Speeding is a dangerous behavior that increases the chances of being involved in a road accident. Manan et al., (2017) observed that over half of all motorcycles ride faster than the posted speed limit on all roads, and some even go faster than other vehicles. The rider can quickly maneuverable and overtake other vehicles due to the motorcycle's small size. Speeding puts motorcyclists and their passengers at risk, as higher speeds result in a larger risk of injury or impact in the event of a road collision. Thus, the large proportion of informants from Makassar City, Indonesia agree that the potency for injury and death as a result of exceeding the speed limit of a vehicle is dangerous and harmful (M. I. Ramli et al., 2019).

The National Highway Traffic Safety Administration (NHTSA, 2018) considers a collision to be speeding-related if the driver was prosecuted with a speeding-related violation or if a reporting police officer demonstrated that racing, driving too fast for circumstances, or exceeding the legal speed limit were influences in the collision.

According to the National Center for Statistics and Analysis (NCSA, 2018), 33 % of all motorcycle riders were killed in accidents due to speeding in 2016, compared to 19 % of passenger vehicles in 2016. Speeding is quite prevalent, and it is well recognized that it affects the risk and severity outcomes of traffic crashes (Perez et al., 2021).

Consequently, motorcyclists will lose control of their motorcycle after a certain speed according to human ability and increasing the probability of a road collision (Sukor et al., 2017). To solve this issue, Manan et al., (2017) suggested a presence of a road shoulder may be valuable and assist in overcoming the occurrence of riding over the speed limit. It is also essential to understand the mechanisms that influence driver speeding behavior to develop effective speeding interventions (Etika et al., 2021).

2.3 Motorcycle Safety Program (MSP)

The main factors that cause motorized accidents include underage, low knowledge, and attitude of motorists who do not have a driving license and do not use helmets, and low driving experience (Tumwesigye et al., 2016). Another research to mention states that behavior when driving is unsafe which includes the behavior of breaking traffic lights in yellow, calling, texting, and smoking while driving, and driving more than 2 people is a factor in traffic accidents on students (Navianti et al., 2019). The lack of experience of many motorcycle riders has been declared as one possible cause of motorcycle accidents (Skorga & Young, 2011). Motorcycle rider training has resultantly been considered as a crucial protective measure for lessening both the rate of accidents and fatality.

Radin Umar, (2006) stated that in 1997, a Motorcycle Safety Program (MSP) was introduced to address motorcycle-related accidents, which incorporated the efforts mentioned above and the program was officially launched by the Prime Minister of Malaysia. The MSP was specifically targeted at motorcyclists. This long-term program was aimed at modifying road user attitudes and behavior on identified motorcycle safety issues), such as proper use of helmets, lack of conspicuity, and excessive speeding, in addition to earlier interventions, which introduced more exclusive motorcycle lanes road safety auditing, and selective enforcement. According to Sivasankar et al., (2014) Malaysian government established the National Motorcycle Safety Program as a tactical measure to mitigate traffic accident rates, and researchers used the Box-Jenkins time series modeling technique to examine the effects of safety programs in Malaysia. Population, registered vehicles, gross domestic (GDP), and traffic safety programs were among the variables considered. Therefore, it can be concluded that MSP has been beneficial in compensating fatal crash trends to some significant degree.

On the other hand, other countries are also applying MSP to reduce accidents in their countries as well. For instance, in Thailand, traffic accidents continue to be a major cause of mortality with motorcyclists accounting for the highest percentage of casualties. To mitigate these issues, the Motorcycle Safety Program introduces with associated with the uses of helmets among motorcyclists (Phimha et al., 2020). The objective of their research was to recognize if community engagement in road safety meetings was attributed to helmet use, as well as to identify other factors related to self-reported helmet use. The correlation between self-reported participation in community conferences about road safety and other variables and self-reported helmet use behaviors among 2,474 motorcyclists in Prachaksinlapakhom District, Udon Thani Province, Thailand was analyzed using multivariable logistic regression. After controlling for other variables, the outcomes of their research revealed that regular community participation was associated with increased self-reported helmet usage.

Female gender, age over 60, and smoking were also found to be associated with lower reported helmet use.

The application of audiovisual in a learning process has a positive influence on student learning outcomes (Nasrullah et al., 2018). The significant effect in improving student learning outcomes is by applying learning through audiovisual media (Aprilia, 2015). Yusuf Sukman, (2017) found that adolescents' knowledge accelerated after receiving health education via video. Therefore, to ensure that programs targeted at enhancing motorcycle safety are effective, the approach that must be taken into account is to adopt aspects of technology and visualize to the motorcyclists.

2.4 Safety Riding Training Simulation

Safety riding training simulation is the technology that contributes to a motorcycle-riding simulator and relates more precisely to a motorcycle-riding simulator that has enhanced means of ride support and motion control (Benedetto et al., 2014). The ultimate function of a motorcycle-riding simulator is to provide potential motorcycle riders with experience before actually riding the motorcycle in the starting, stopping, steering, braking, gear shifting, and road feel of a motorcycle in a secure stationary condition (Naweed, 2017). The prospective motorcycle rider can know himself with the operations of a motorcycle by the appropriate use of a simulator as a training system through situations where the uncertain application of motorcycle controls will not lead to accidents to the rider or others.

Fortunately, as higher levels of traffic represent an increased risk to motorcyclists and significant weaknesses in the conduct of road testing, simulators provide a way of researching many of the motorcycle riding problems without exposing riders to the real hazards of riding (Crundall et al., 2013). One of motorcycles company have developed a full-size motorcycle simulator for rider research back in the late 1980s (Barbagli et al., 2001). While compared to the supply of car driving simulators for training, the number of manufacturers and suppliers of motorcycle simulators for training is still small in the international market.

Because of its prescience, the Japanese market has a greater variety of models, with the use of these tools already enforced (Vieira & Steidle, 2014). Motorcycle simulators are divided into two classes which are kinesthetic simulators and commercial simulators. The kinesthetic simulator provides some level of motion and has been classified as a first-class of motorcycle simulator. The commercial simulator provides a fixed base and has been classified as a second-class motorcycle simulator. Table 2.1 shows the details of the kinesthetic simulator while Table 2.2 shows the details of the commercial simulator.

Table 2.1: The details of the kinesthetic simulator (Vieira & Steidle, 2014).

Manufacturer/Model	**Features**	**Figure**
ECA-FAROS Cruise Bike (France)	- 2 DoF + steering with force feedback. - 3 screens 42”, 120 degrees FOV. - Commands/ ergonomics/ body of motorcycle. - Real instrument panel.	
Honda Riding Simulator (Japan)	- 2 DoF + steering with force feedback. - 1 screen 52” + 1 instructor’s screen. - Commands/ ergonomics/ body of motorcycle. - Flexible seat configuration. - Real instrument panel.	
Mitsubishi RS-6000 (Japan)	- 2 DoF + steering with force feedback. - 1 screen 50” + 1 instructor’s screen. - Commands/ ergonomics/ body of motorcycle. - Flexible seat configuration (motorcycles/ scooter). - Real panel.	

Table 2.2: The details of the commercial simulator (Vieira & Steidle, 2014).

Manufacturer/Model	Features	Figure
Safety Riding Training (SRT) (Japan)	- 1 monitor 17”. - Tubular chassis. - PC + USB handlebar. - Software.	
ECA Faros EF-SCOOT (France)	- Portable chassis (2 pieces) – USM steering handlebar (steering with force feedback). - Software. - Not supplied with PC/ display.	
Mitsubishi DS-30 (Japan)	- Seat and based table. - USB handlebar. - Software.	
Shanghai Infrared (China)	- Chassis/ seat (scooter type). - Instrument panel. - Monitor 22”. - Software.	

2.5 Summary

Overall, this research project represents the analysis of motorcyclist behavior based on safety training simulation. This research is focusing more on safety perception for motorcyclists and the reduction of road traffic accidents. The results of this project will be used to develop a safety measure for motorcyclists to minimize road accidents. This project will develop knowledge of road safety awareness by applying a riding simulation of safety training. By providing information, experience sharing, safety, and defensive riding education to society, this proposed project helps motorcyclists to avoid road accidents. Preventing motorcycle road traffic accidents, including commuting accidents, is the main goal of the establishment of a safety training simulation. This action would minimize the occurrence of motorcycle accidents and enhance the transport system in Malaysia.

CHAPTER 3

METHODOLOGY

3.1 Introduction

Motorcyclists are the transportation that causes a major rate of road traffic accidents. One of the factors that cause the collision is the riding behavior of the motorcyclists themselves. This proposed research project is to analyze the motorcyclists' risky behavior while performing safety training using the Safety Riding Training (SRT) simulation. This chapter presented the design procedure, data collecting, tool and equipment utilization, and analysis methods applied throughout the project. In a study, the methodology is essential because it defines the important methods and processes used to conduct the research, enables it to be implemented and adapted by others in the future.

3.2 Flow Chart of Methodology

The first step to conduct the research is by identifying the research gap. Next is performing the literature review with a related journal. Besides, the respondent of this study is a volunteer from Batu Kawan Industrial Park (BKIP). As a result, a total of 90 simulation results have been generated. Microsoft Excel software and Statistical Product and Service Solution (SPSS) are used as tools to analyze the data in this study. The results were analyzed based on descriptive analysis and statistical analysis methods. The final stage of the methodology flow chart is the conclusion which is to conclude the obtained discussion and findings and also include several recommendations for further study.

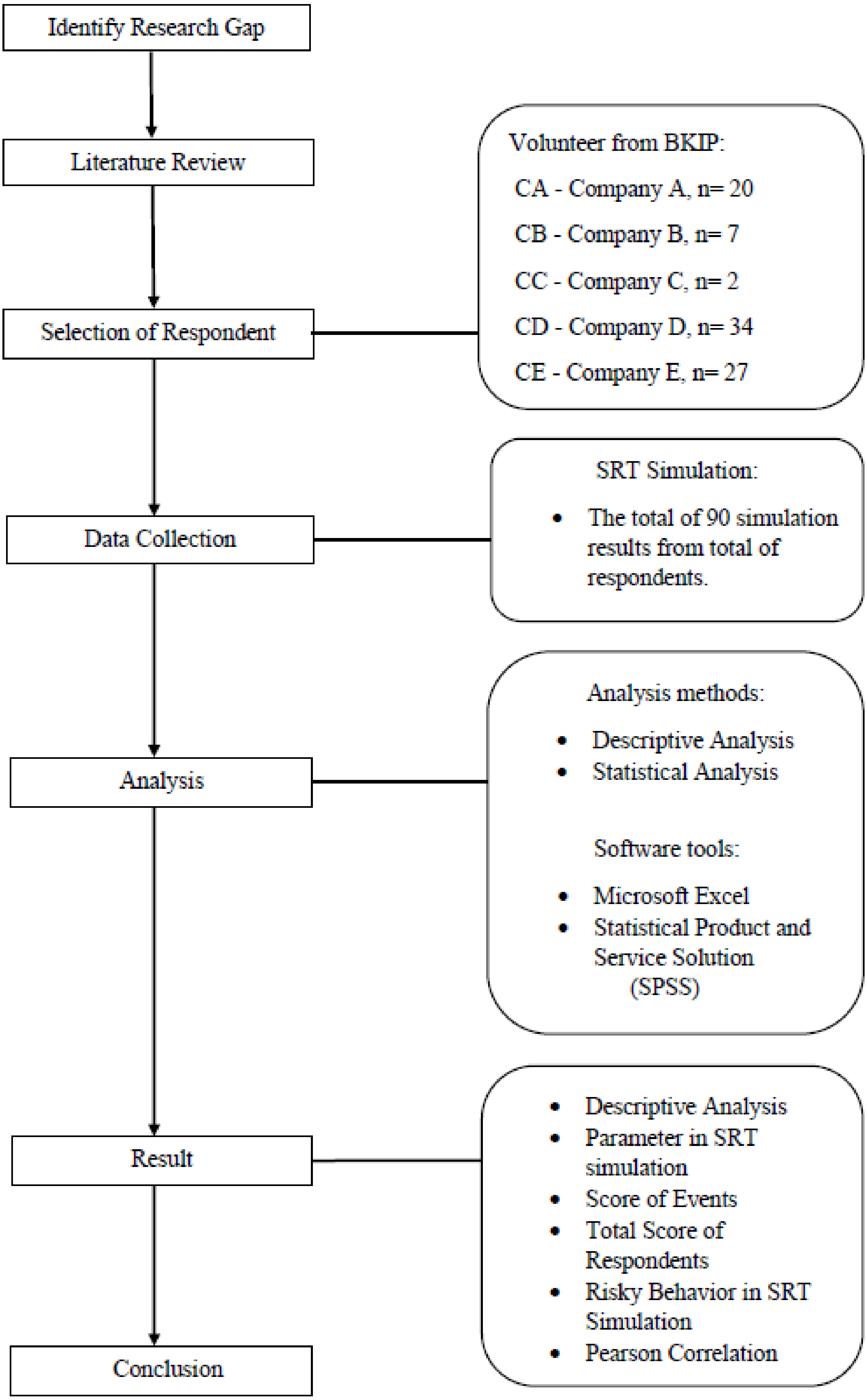

Figure 3.1: The flow chart of the methodology for this study.