AN INTERVENTION FOR MOTORCYCLE HELMET USAGE BASED ON TECHNOLOGY ACCEPTANCE MODEL

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Motorcycle is a major personal transport mode in Malaysia. However, majority of road accidents fatalities involve motorcyclist. Royal Malaysian Police reported that head is the most part of body casualties and fatalities in year 2014. One of the strategies to mitigate this problem is through proper usage of safety helmet. Thus, this study was introduce a new approach on motorcyclist safety using Technology Acceptance Model (TAM) with additional variables. TAM is a theory model used by researcher to examine the factor of acceptance of new technologies among users. To test the hypothesized model, 319 of respondents among motorcyclist was chosen as a sample size. The Structural Equation Modelling (SEM) approach was performed to test full structural model. The result shows that the goodness of fit indices are excellent fit and all variables (perceived usefulness, perceived ease of use, descriptive norm, subjective norm and perceived safety) were statistically significant towards behavioral intention to use Safety Helmet Reminder System (SHR). It demonstrates that SHR is significantly improve the helmet use among motorcyclist. R² value of .77 shows that 77% change in the criterion variables is caused due to the change taking place by a combination five predictor variables. Perceived Safety was found the most dominant variables towards behavioral intention to use Safety Helmet Reminder system. Therefore, TAM model with extended variables are suitable to predict the behavioral intention to use SHR system among motorcyclist. The conceptual of SHR system is proposed to function effectively and directly will increase safety helmet usage.
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LIST OF SYMBOL AND ABBREVIATIONS

TAM  - Technology Acceptance Model
TPB  - Theory Planned Behavior
SHR  - Safety Helmet Reminder System
SPTK - Sistem Peringatan Topi Keledar
SEM  - Structural Equation Modelling
SPSS - Statistical Package for Social Science
CHAPTER 1

INTRODUCTION

1.1 Background of Study

Motorcycle is one of private transportation, which has been widely used in many countries including Malaysia. Abdul Kadir et al., (2006) stated the increasing of urbanization and development of economic, infrastructure and personal wealth led to rapid growth in motorcycle use among Malaysia, China, Vietnam and other Asian countries. Nowadays, many people riding motorcycles for daily activities such as going to work or school because motorcycles are compact, agile, consume less fuel and are cheaper to buy and maintain than are automobiles (McInally, 2003). In addition, motorcycles are suitable for riding in high congested town areas. Although motorcycles have more attraction and advantages than other vehicles they are still riskier to ride than other transportation such as cars.

Based on statistical report road accident in Malaysia 2014 by Royal Malaysia Police (PDRM) shows that motorcycles are the highest involved in traffic accidents compared to other vehicles. The report also mentioned that fatal accidents involving
motorcyclists are mostly because of head injuries. This is further supported by Ambak et al. (2011) which stated that many researchers indicate that the major cause of death involving motorcycle users is due to serious head injuries. Therefore, a few strategies and initiative programs have been implemented by Malaysian government to mitigate this problem. One of the strategies that has been implemented is Helmet Initiatives Programs. In addition, Road Safety Plan of Malaysia 2006-2010 strategies are focusing towards vulnerable road users such as motorcyclists in which a few strategies have been highlighted towards safety helmet motorcycles (JKJR, 2006). The latest is Road Safety Plan of Malaysia 2014-2020, still focusing on high risk group road users such as motorcyclists and pedestrians.

However, helmet initiative is only meaningful if motorcyclists use their safety helmets properly secured (Kulanthayan et al., 2003) because there were still motorcyclists who were severely injured or died in road accidents even though they were wearing safety helmets. Furthermore, Talib et al. (2003) reported that the percentage death of motorcyclists with their helmets on is high, exceeding 79%. There are several possible reasons why motorcyclists who wear helmets are still suffering head injuries, motorcyclists are (1) not wearing helmets properly as the size are too large or not fastened properly (2) wearing unstandardized motorcycle helmets (3) wearing helmets that have long been used (4) riding motorcycles in high speed. Furthermore, wearing helmets incorrectly can cause the helmets to come off during the impact and to cause injury to the head (Kulanthayan et al., 2003). Akaateba et al., (2014) stated that existing intention need to be intensified to develop appropriate and effective measures for increasing helmet use in many countries. Therefore, the aim of this study is to introduce a new approach on motorcyclist safety using the TAM as part of the intervention. Also, it will increase the proper usage of safety helmets among motorcyclists.

1.2 Problem Statement
Motorcycle has become a major transportation among Malaysians. Ministry of Transport (2014) reported that motorcycle is a vehicle with the highest number registered in Malaysia by year 2014. Law et al., (2015) indicated that more people in less advanced economic countries such as Malaysia is an affordability to purchase a motorcycle. Furthermore, unsatisfactory public transportation service is another reason most road users prefer to use private vehicles. Ismail et al., (2012) stated that people prefer to use private transportation because public transportation still could not compete with the attractiveness of private cars or motorcycles can offer such as flexibility, direct access, shorter travel time, and safety during travelling. Congested roads, lack of public transport facilities and parking spaces are main problems why most Malaysians use private transportation (Mohd Shariff, 2012). The increase of public transportation fare has also caused most of users prefer to use private transportation especially motorcycles.

However, Malaysia has the highest road fatality risk (per 100,000 population) among the ASEAN countries and more than 50% of the road accident fatalities involve motorcyclists (Abdul Manan and Varchely, 2012). This led, the government promptly undertakes various measures to mitigate this problem (Abdul Kadir et al., 2006). Nevertheless, to address this problem, the reduction and restrictions of motorcycle usage is difficult because motorcycle is a vehicle that has always been used by Malaysians since motorcycle reduces travel time during traffic congestion, offers a cost saving and is affordable (Abdul Kadir et al., 2006). Therefore, an effort that can be done to mitigate this problem is to increase the safety of the vehicle and the rider itself. Ambak et al., (2011) suggested that there is a need to introduce a new mechanism or method that can be utilized to incorporate behavior adaptation towards safety concern among motorcycle users.

Based on the road accident statistics report in 2014 by the Royal Malaysian Police, head is the part of the body that reported the highest number to be injured in road accidents among motorcyclists. This indicates that head is one of the body part that need to be focused on its safety. Therefore, helmets are regarded as the single most effective way of reducing head injuries and fatalities resulting from motorcycle crashes (WHO, 2006;
Akaateba et al., 2014). Moreover, motorcycle helmets are effective way to decrease the risks of head injuries in a motorcycle crash by about 6% and fatalities by around 42% (Liu et al., 2009; Keng, 2005; Akaateba et al., 2014).

Although safety helmets are the best protective equipment to prevent or reduce severity of head injuries, majority of motorcyclists do not use or fasten them properly (Ambak et al., 2011). This can be proven by previous studies such as Ambak et al., (2011) which indicates that the percentage of improper helmet usage was considered high (52.8%). Furthermore, another study that supports this statement is Jaafar et al., (2003) in which also indicates that motorcyclists who wear safety helmets are one of the highest numbers of fatalities in road accidents. There are several possible reasons why motorcyclists who wear helmets are still suffering head injuries, motorcyclists are (1) not wearing helmets properly as the size are too large and are not fasten properly (2) wearing unstandardized motorcycle helmet (3) wearing helmets that have long been used (4) riding motorcycle in high speed.

Therefore, this research looked into an effective way to mitigate this problem which was introducing a new approach on motorcyclist safety by using the TAM with additional determinants that contribute to behavioral intervention and to increase the proper usage of safety helmet among Malaysian motorcyclist.

1.3 Objectives of Study

The main goal of this research is to adapt a new approach using additional theoretical model of TAM to address security problem especially to motorcyclists to improve their behavior to wear helmets properly. Specific objectives of this study are:

i. To determine significant factors that contribute to behavioral intention to proper usage of safety helmet among motorcyclists.
ii. To develop a structural model using Technology Acceptance Model (TAM) with additional significant factors in predicting behavioral intention to proper usage of safety helmet.

iii. To design a new conceptual design of Safety Helmet Reminder (SHR) System that can be used to increase the proper usage of safety helmet among motorcyclist.

1.4 Scope of Study

Motorcycle is the most common transportation among road users. However, motorcyclists are the highest road users involved in road accidents and the cause of death are mostly related to head injuries. Therefore, this study will be focusing on motorcyclists as the respondents. Furthermore, a group of motorcyclists were selected at rural and in residential areas because these areas indicate the highest number of road accidents involving motorcyclists. Johor state was chosen as the location of study because this state has been reported as the second state with highest road accidents after Selangor. Parit Raja was selected because it represents the countryside and is surrounded by residential areas. Cross sectional study that was used is quantitative measurement using questionnaires. Data obtained through self-administered surveys from respondents. The data obtained would be analyzed using Statistical Package for Social Science (SPSS) version 22. The statistical analysis method would use descriptive analysis, reliability analysis, correlation analysis and multiple regression analysis. And, to test the extended model construct, researcher would use structural equation modelling technique by using AMOS.

1.5 Significance of Study

The increase of motorcycle registration every year shows motorcycle is a major choice of transportation. However, most of fatal road accidents involve motorcyclists and the cause
of death is mostly due to head injuries. One of the reasons for the injuries because motorcyclists do not wear their safety helmets. In addition, if they do have the safety helmets on, they do not fasten them properly or the helmets are unstandardized type which among other factors contribute to head injury during road accidents. Safety helmet is the best way to reduce head injury during road accident. However, the use of safety helmet is only meaningful if the safety helmet is properly fastened and if it meets the safety standard. Therefore, this study introduces a SHR system, a system in which enables a motorcyclist to wear safety helmet properly and to meet the standard. This system is also able to remind a motorcyclist to wear safety helmet during riding. Thus, this system is helpful for motorcyclist for safety purposes and it meets the strategies of Road Safety Plan of Malaysia 2014-2020 to focus on high risk group such as motorcyclists.

Furthermore, this study examines the acceptance of motorcyclists towards SHR system in addition to reveal the factors why users accept the system. In fact, improvements towards the system can be implemented through user (motorcyclist) responses. In addition, this study gives a guidance to motorcycle manufacturers to increase the level of customer satisfaction towards their products. This study also develops TAM with additional variables and can be applied for further studies.

1.6 Thesis Outline

This thesis was organized into five chapters and presented a new approach on motorcyclist safety by using the TAM. The structure of the thesis are as follows:
Chapter 2: Literature Review

This chapter collected previous studies as references and as a guidance which consists of transportation in Malaysia, major transport mode among Malaysian, road accident involving motorcyclists, head injuries the highest contributor towards motorcycle fatalities, motorcycle safety helmet, safety helmet compliance, behavioral and social sciences in transportation studies, theory reasoned action, theory planned behavior and lastly this chapter explains about TAM as a model references in this study.

Chapter 3: Methodology

This chapter explains how to solve the problems of the study by designing the study with appropriate methods. This study using questionnaire as the instrument of the study to gather information and data. Likert scale was used as a measurement of study to measure the level of disagreement and agreement of respondents (motorcyclists). The sample size was chosen by using a Cochran Formulae and Stratified Sampling Method was used to obtain the sample of data. The location of study selected was Parit Raja Batu Pahat, Johor. The statistical analysis method used was SPSS to obtain the descriptive analysis such as frequencies, mean, standard deviation, correlation and multiple regression while AMOS was used to analyze the structural equation modelling. TAM in structural equation modelling form is shown in this chapter.

Chapter 4: Result and Statistical Analysis

This chapter explains the results of the study in the form of graphs, tables and models. The first section of the chapter describes about descriptive statistic while the second section describes more detail on SEM and the last section presents the conceptual of SHR system.
Chapter 5: Discussion and Conclusion

This chapter discusses and gives the conclusion related to the finding in chapter 4. First, it discusses about TAM. Each variable (Perceived Usefulness, Perceived Ease of Use, Subjective Norm, Descriptive Norm and Perceived Safety) were also discussed and the results of the study were supported by previous studies. The next section, the conclusion based on the objectives of the study. Last section discusses the recommendation for further study to improve the system.
CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter describes briefly and concisely about previous studies covering transportation in Malaysia, road accident involving motorcyclist, motorcycle safety helmet and Technology Acceptance Model.

2.2 Transportation in Malaysia

Transportation is an important for society to function. Transportation affects the location and various productive activities; it has an impact on housing; it is affects the diversity and supplying of available goods and services for use (Bruton, 1985). This indicates that the community development is closely associated with the advancement of transportation. Mohd Shariff (2012) also stated that economic growth, rising incomes, and urbanization have led to rapid growth in vehicle ownership. For instance, Malaysia has recorded a
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