

**AN INTERVENTION FOR MOTORCYCLE HELMET USAGE BASED ON
TECHNOLOGY ACCEPTANCE MODEL**

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DEDICATION

*“Special for my beloved daddy, Mr Rosli Bin Yusoff
and my beloved mommy, Mrs Midah Binti Tairak,
And also to my beloved siblings,
Nadia, Noora, Nazry, Nabil dan Najwa.
Thanks for supporting me until this level.*

*For all my friends and lecturers.
Thanks for guidance, motivation and helps me to finish my study.*



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ABSTRACT

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. R^2 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.

ABSTRAK

Motosikal merupakan pengangkutan persendirian utama di Malaysia. Namun begitu, kebanyakan kemalangan maut di jalan raya melibatkan penunggang motosikal. Polis Diraja Malaysia melaporkan bahawa kepala merupakan anggota badan yang paling banyak kecederaan dan penyebab kematian pada tahun 2014. Salah satu strategi untuk menangani masalah ini ialah dengan pemakaian topi keledar yang betul. Oleh itu, kajian ini telah memperkenalkan pendekatan baru yang melibatkan keselamatan motosikal dengan menggunakan Model Penerimaan Teknologi (TAM) bersama pemboleh ubah tambahan. TAM merupakan model teori yang digunakan oleh penyelidik untuk mengenal pasti faktor penerimaan teknologi dalam kalangan pengguna. Bagi menguji model hipotesis, 319 orang responden dalam kalangan penunggang motosikal telah dipilih sebagai saiz sampel kajian. Pendekatan Model Persamaan Struktur telah dijalankan untuk menguji model struktur yang lengkap. Hasil kajian menunjukkan *goodness-of-fit* adalah sangat baik dan kesemua pemboleh ubah (Persepsi Tahu Kegunaan, Persepsi Tahu Mudah Guna, Norma Deskriptif, Norma Subjektif dan Persepsi Keselamatan) adalah signifikan terhadap keinginan tingkah laku untuk menggunakan SPTK. Hal ini menunjukkan, SPTK secara signifikannya menggalakkan pemakaian topi keledar dalam kalangan penunggang motosikal. Nilai R^2 adalah .77 menunjukkan 77% perubahan dalam pemboleh ubah bersandar terhadap pemboleh ubah tidak bersandar. Persepsi Keselamatan merupakan pemboleh ubah yang paling dominan terhadap niat tingkah laku untuk menggunakan Sistem Peringatan Topi Keledar (SPTK). Oleh itu, Model Penerimaan Teknologi dan beberapa pembolehubah lanjutan adalah sesuai untuk meramalkan niat tingkah laku untuk menggunakan SPTK dalam kalangan penunggang motosikal. Konsep SPTK telah dicadangkan untuk berfungsi dengan berkesan kepada pengguna dan secara terus akan meningkatkan pemakaian topi keledar.

| CONTENT | PAGE |
|-----------------------------------|-------|
| TITLE | i |
| DECLARATION | ii |
| DEDICATION | iii |
| ACKNOWLEDGEMENT | iv |
| ABSTRACT | v |
| ABSTRAK | vi |
| TABLE OF CONTENT | vii |
| LIST OF TABLES | xii |
| LIST OF FIGURES | xv |
| LIST OF SYMBOLS AND ABBREVIATIONS | xviii |
| CHAPTER 1 INTRODUCTION | 1 |
| 1.1 Background of Study | 1 |
| 1.2 Problem Statement | 3 |
| 1.3 Objectives of Study | 4 |
| 1.4 Scope of Study | 5 |

| | | |
|------------------------------------|--|----------|
| 1.5 | Significance of Study | 6 |
| 1.6 | Thesis Outline | 7 |
| CHAPTER 2 LITERATURE REVIEW | | 9 |
| 2.1 | Introduction | 9 |
| 2.2 | Transportation in Malaysia | 9 |
| 2.2.1 | Major Transport Mode among Malaysian | 10 |
| 2.3 | Road Accident Involving Motorcyclist | 11 |
| 2.3.1 | Head Injury the Highest Contributor towards Motorcycle Fatalities | 14 |
| 2.4 | Motorcycle Safety Helmet | 16 |
| 2.4.1 | Safety Helmet Compliance | 19 |
| 2.5 | Behavioral and Science Theories in Transportation Studies | 21 |
| 2.6 | Theory Reasoned Action and Theory Planned Behavior | 23 |
| 2.6.1 | Theory Planned Behavior (TPB) use in transportation studies | 25 |
| 2.7 | Technology Acceptance Model | 26 |
| 2.7.1 | Technology Acceptance Model (TAM) in Previous Study | 27 |
| 2.7.2 | TAM Hypothesis | 30 |
| 2.7.3 | Social Influence as additional variable in TAM | 31 |
| 2.7.4 | Perceived Safety as additional variable in TAM | 37 |
| 2.8 | Summary | 40 |

| | |
|--|-----------|
| CHAPTER 3 METHODOLOGY | 44 |
| 3.1 Introduction | 44 |
| 3.2 Design of Study | 44 |
| 3.2.1 Measurement and Instrument Design | 46 |
| 3.2.2 Sampling Method and Sample Size | 49 |
| 3.3 Location of Study | 54 |
| 3.3.1 Johor is the second state that has the highest road accident | 54 |
| 3.3.2 Parit Raja is a Small Town in Batu Pahat | 56 |
| 3.4 Data Collection Method | 58 |
| 3.5 Statistical Analysis Method | 58 |
| 3.6 SPSS Version 22 and SEM-AMOS | 65 |
| 3.6.1 Structural Equation Modelling (SEM) | 65 |
| 3.6.2 Technology Acceptance Model on Structural Modelling | 67 |
| 3.7 Summary | 70 |
| CHAPTER 4 RESULT AND STATISTICAL ANALYSIS | 71 |
| 4.1 Introduction | 71 |
| 4.2 Demographic Of Respondent | 71 |
| 4.3 Knowledge and Attitude of Respondents towards Safety Issues and Helmet Usage | 74 |
| 4.4 Mean Score for Technology Acceptance Model (TAM) | 77 |

| | | |
|-------|--|-----|
| 4.5 | The Use of Safety Helmet | 78 |
| 4.6 | Multivariate Analysis | 79 |
| 4.6.1 | Correlation Analysis | 80 |
| 4.6.2 | The Regression Analysis between Perceived Usefulness Descriptive Norm and Perceived Ease of Use | 80 |
| 4.6.3 | The Regression Analysis between Perceived Usefulness Subjective Norm, Perceived Safety, and Behavioral Intention to use SHR system | 82 |
| 4.6.4 | The Regression Analysis between behavioral intention and helmet use | 84 |
| 4.7 | Structural Equation Modelling | 86 |
| 4.7.1 | Exploratory Factor Analysis (EFA) | 87 |
| 4.7.2 | Confirmatory Factor Analysis (CFA) | 90 |
| 4.7.3 | Full Structural Model for Extended TAM | 93 |
| 4.7.4 | Hypothesis Testing (Objective 2) | 102 |
| 4.8 | Conceptual of Safety Helmet Reminder System(Objective 3) | 103 |
| 4.8.1 | Incidents Identification | 108 |
| 4.9 | Summary | 110 |

CHAPTER 5 DISCUSSION AND CONCLUSION

| | | |
|-------|---|-----|
| 5.1 | Introduction | 113 |
| 5.2 | Technology Acceptance Model | 113 |
| 5.2.1 | Perceived Usefulness (TAM) on Safety Helmet Reminder Usage | 113 |
| 5.2.2 | Perceived Ease of Use on Safety Helmet Reminder Usage | 115 |
| 5.2.3 | Perceived Safety on Safety Helmet Reminder Usage | 116 |

| | | |
|----------------------------|---|------------|
| 5.2.4 | Subjective Norm on Safety Helmet Reminder Usage | 117 |
| 5.2.5 | Descriptive Norm on Safety Helmet Reminder Usage | 118 |
| 5.2.6 | Safety Helmet Reminder System for Motorcyclist Safety | 114 |
| 5.3 | Conclusion | 116 |
| 5.4 | Recommendation | 118 |
| REFERENCE | | 120 |
| LIST OF PUBLICATION | | 134 |
| APPENDICES | | 135 |



LIST OF TABLE

| | | |
|-----|---|----|
| 2.1 | The number of registered motor vehicles based on types of vehicles in | 11 |
| 2.2 | Types of helmet and description | 17 |
| 2.3 | The variables and definition from Theory Planned Behavior | 25 |
| 2.4 | Summary of Literature Review | 42 |
| 3.1 | Example of categorical data and code | 48 |
| 3.2 | The differences between probability sampling and non-probability sampling | 49 |
| 3.3 | The new registered of motorcycle by state | 51 |
| 3.4 | Suggestion for minimum sample size in SEM | 53 |
| 3.5 | The strength coefficient of correlation | 61 |
| 3.6 | Reliability of the instrument | 63 |
| 3.7 | Construct variable in TAM | 67 |
| 4.1 | Characteristic of respondents (N=319) | 72 |
| 4.2 | The detail of scale for items in part B | 74 |
| 4.3 | Determining the level of mean score (Landell, 1997) | 74 |

| | | |
|------|---|----|
| 4.4 | Mean score of items | 74 |
| 4.5 | The detail of scale for measure the agreement of respondents | 75 |
| 4.6 | Determining the level of mean score (Nik Yusoff, 2004) | 77 |
| 4.7 | The detail of scale for measure the frequency of respondents wearing helmet | 78 |
| 4.8 | Mean Score of Items | 78 |
| 4.9 | The correlation between helmet use with intention towards behavior, perceived usefulness, perceived ease of use, descriptive norm, subjective norm and perceived safety | 78 |
| 4.10 | Model Summary (R^2) between perceived ease of use, and descriptive norm perceived usefulness | 80 |
| 4.11 | ANOVA Summary between perceived ease of use, subjective norm and perceived usefulness | 81 |
| 4.12 | Multiple Regression Coefficient for Perceived Ease of Use and Descriptive Norm towards Perceived Usefulness | 82 |
| 4.13 | Model Summary (R^2) between perceived safety, subjective norm, perceived usefulness, perceived ease of use and behavioral intention. | 83 |
| 4.14 | ANOVA Summary between subjective norm, perceived usefulness, perceived safety and behavioral intention. | 83 |
| 4.15 | Multiple Regression Coefficient for Perceived Safety, Subjective Norm Perceived Usefulness, Perceived Ease of Use and Behavioral Intention | 84 |
| 4.16 | Model Summary (R^2) between behavioral intention and helmet use | 85 |

| | | |
|------|---|----|
| 4.17 | ANOVA Summary between behavioral intention to use SHR and helmet use | 85 |
| 4.18 | Multiple Regression Coefficient for behavioral intention to use SHR and helmet use | 86 |
| 4.19 | KMO and Bartlett's test for extended TAM model | 87 |
| 4.20 | The Principal Component Analysis (PCA) for extended TAM | 88 |
| 4.21 | Notes for TAM from AMOS | 91 |
| 4.22 | Goodness of fit indexes for extended TAM | 92 |
| 4.18 | Discriminant and convergent validity for extended TAM proposed | 94 |
| 4.24 | TAM measurement model identification from AMOS | 95 |
| 4.25 | Goodness of fit indexes for extended TAM | 96 |
| 4.18 | The standardized regression weight and square multiple correlation for extended TAM | 94 |



LIST OF FIGURES

| | | |
|------|---|----|
| 2.1 | The number of registered motor vehicles in year 2013 and 2014 by state | 10 |
| 2.2 | The percentage total road accident based on type of vehicles in year 2012 | 12 |
| 2.3 | The percentage of fatal road accident based on type vehicles in year 2014 | 13 |
| 2.4 | The number of motorcyclist casualties by part of body injured | 14 |
| 2.5 | Injured body region of motorcyclist | 15 |
| 2.6 | How brain can damage during road traffic accident | 15 |
| 2.7 | Motorcycle Safety Helmet Approved by SIRIM | 19 |
| 2.8 | Motorcyclist casualties by usage of safety helmet | 20 |
| 2.9 | Theory Reasoned Action | 23 |
| 2.10 | Theory Planned Behavior | 24 |
| 2.11 | Original Technology Acceptance Model | 27 |
| 2.12 | Technology Acceptance Model and Theory Planned Behavior Structural Model for ETC by Chen <i>et al.</i> , (2007) study | 28 |

| | | |
|------|--|-----|
| 2.13 | TAM2 proposed by Venkatesh and Davis (2000) | 32 |
| 2.14 | The result of extended TAM | 33 |
| 2.15 | Result of Multigroup analysis in US: Korea | 34 |
| 2.16 | Result of Structural Modelling analysis | 38 |
| 2.17 | Car Technology Acceptance Model (CTAM) | 39 |
| 3.1 | A flow chart of research methodology | 45 |
| 3.2 | Stratified Random sampling | 50 |
| 3.3 | Total accident by states, Malaysia in year 2014 | 54 |
| 3.4 | Death caused by road accident by states | 55 |
| 3.5 | The number of motorcycle registered in Malaysia by year 2014 | 56 |
| 3.6 | Motorcycle fatality by locality | 56 |
| 3.7 | Motorcycle fatality based on area type | 57 |
| 3.8 | Procedure of SEM analysis | 66 |
| 3.9 | Structural Model based on Technology Acceptance Model (CTAM) | 67 |
| 4.1 | The scree plot chart for extended TAM proposed | 89 |
| 4.2 | The first order CFA for extended TAM | 93 |
| 4.3 | The full structural model of extended TAM (Objective 1) | 98 |
| 4.4 | The Speedometer including mini camera and reminder system (Safety Helmet Reminder System (SHR) | 102 |
| 4.5 | The algorithm how the Safety Helmet Reminder System (SHR) work in sequences | 104 |
| 4.6 | The conceptual of Safety Helmet Reminder System for Motorcyclist | 105 |

| | | |
|-----|--|-----|
| 4.7 | Incidence Identification for outside environment | 107 |
| 4.8 | Incidence Identification for white screen | 108 |



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



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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 Varhelyi, 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.

REFERENCES

- Abdul Kadir, I. S., Radin Umar, R. S., Midi, H., H, K., Stevenson, M., & Hariza, A. (2006). Mode choice model for vulnerable Motorcyclists in Malaysia. *Traffic Injury Prevention*, 7:1-5.
- Abdul Manan, M. M. and Várhelyi, A. (2012). Motorcycle fatalities in Malaysia. *IATSS Research* 36, pp. 30-39.
- Abeysekera, I., & Kamaruddin, K. (Ed.). (2013). *Intellectual Capital and Public Sector Performance* (Vol. 27). Emerald Group Publishing.
- Akaateba, M. A., Gyimah, A. R., & Yakubu, I. (2014). A cross-sectional observational Study of helmet use among motorcyclists in Wa, Ghana. *Accident Analysis and Prevention* 64, pp. 18-22.
- Ahmed, M.B., Ambak, K., Raqib, A., and N.S. Sukor, N. S. (2013). Helmet usage among adolescents in rural road from the extended theory of planned behaviour.. *J. Appl. Sci.*, 13: 161-166.
- Ajzen, I., 1985. From intentions to actions: A theory of planned behavior. In J. Kuhl & J. Beckmann (Eds.), *Action control: From cognition to behavior*. Berlin, Heidelberg, New York: Springer-Verlag
- Ajzen, I., 1991. The Theory of Planned Behavior. *Organizational Behavior and Human Decision Processes*, 50, 179–211

- Ali. A., Mohd Jawi, Z., Osman, S., Shariff, S., Low, S. F., & Wong, S. V. (2017). *Understanding the Use of Motorcycles Among the Secondary School Students Based on Protection Motivation Theory (210)*. Malaysia Institute of Road Safety Research (MIROS).
- Ambak, K., Riza Atiq, A., & Rozmi, I., (2009). Intelligent Transport System for motorcycle safety and issues. *European Journal of Scientific Research* 28 (4), 600-611.
- Ambak, K., Ismail, R., Abdullah, R. A., Borhan, M. N. (2011). Using Structural Equation Modelling and the Behavioral Sciences Theories in Predicting Helmet Use. *Proceeding Of The International Conference On Advances Sciences, Engineering and Information Technology 2011*. Putrajaya, pp. 639-645.
- Ambak, K., Ismail, R., Abdullah. R. A., Latif, A. A., & Sanik, M. E. (2013). Application of Technology Acceptance Model in Predicting Behavioral Intention to Use Safety Helmet Reminder System. *Research Journal of Applied Science, Engineering and Technology*. 5(3). pp. 881-888.
- Ariffin, A. H., Hamzah, A., Paiman, N. F., Solah, M. S., Mohd, Z., Said, J., & Mohamed, N. (n.d.). (2016). *Association of Seatbelt Reminders (SBRs) with Seatbelt Wearing Rates among Front Occupants of Private Vehicles in Klang Valley Association of Seatbelt Reminders (SBRs) with Seatbelt Wearing Rates among Front Occupants of Private Vehicles in Klang Valley, (191)*. Malaysia Institute of Road Safety Research (MIROS).
- Austin, D. M., Furr, L. A., & Spine, M. (2002). The effects of neighborhood conditions on perceptions of safety. *Journal of Criminal Justice*, 30(5), 417–427.
- Awang, Z. (2014). *A Handbook on SEM for Academicians and Practitioners*. MPWS Rich Publication.

- Azhar, H., Yahaya A., and Wong, S. V. (2010). *Child Helmet Efficacy for Motorcycle Use in Malaysia*, MRev 04/2009, Kuala Lumpur: Malaysian Institute of Road Safety Research.
- Babbie, E. (1990). *Survey Research Method*. 2nd ed. California. Wadsworth Publishing Company.
- Backer-Grondahl, A., Fyhri, A., Ullerberg, P., & Amundsen, A. H. (2009). Accidents and unpleasant accidents: Worry in transport and prediction of travel behavior. *Risk Analysis*, 29, 1217-1226.
- Bagozzi, R.P., and Yi, Y. (1988). On the evaluation of structural equation models. *Academy of Marketing Science. Journal of the Academy of Marketing Science* 16 (1), 74–94.
- Bailey, K. D. (1994). *Method of Social Research. Fourth Edition*. New York: The Free Press
- Broughton, P. S., Fuller, R., Stradling, S., Gormley, M., Kinnear, N., O'dolan, C., Hannigan, B. (2009). Conditions for speeding behaviour: a comparison of car drivers and powered two wheeled riders, *Transportation Research Part F: Traffic Psychology and Behaviour* 12 (5) 417–427
- Brink, H., Van der Walt, C., & Rensburg, G. V. (2006). *Fundamentals of Research Methodology for Health Care Professionals* 2nd ed. Capetown: Juta & Co (Pty) Ptd.
- Bruton, M. J. (1985). *Introduction to Transportation Planning*. 3rd ed. London: Hutchinson & Co. Ltd.
- Ceccucci, W., Alan, P., and Patricia, S. (2010). An empirical study of behavioral factors influencing text messaging intention text messaging. *Journal of Information Technology Management* (1): 16–34

- Cestac, J., Paran, F., & Delhomme, P. (2011). Young drivers' sensation seeking, subjective norms, and perceived behavioral control and their roles in predicting speeding intention: How risk taking motivations evolve with gender and driving experience. *Journal of Safety Science* 49, pp. 424-432.
- COST327, (2001). Motorcycle safety helmet. Final Report of the action, European Communities, Belgium.
- Cochran, W. G. (1977). *Sampling techniques (3rd ed.)*. New York: John Wiley & Sons.
- Cozby, P. C. (2009). *Methods in Behavioral Research*. 10th ed. California State University. The Mc Graw Hill.
- Chang, S. C., & Tung, F. C. (2008). An empirical investigation of students' behavioral intentions to use the online learning course websites. *British Journal of Educational Technology*, 39, 71-83.
- Chen, C.D., Fan, Y.W., & Farn, C.K. (2007). Predicting electronic toll collection service adoption: An integration of the technology acceptance model and the theory of planned behavior. *Transportation Research Part C: Emerging Technologies*, 15(5), 300-311.
- Chin, F. C. & Cheng, W. C. (2011). Speeding for fun? Exploring the speeding behavior of riders of heavy motorcycles using the theory of planned behavior and psychological flow theory. *Accident Analysis and Prevention* 43. Pp. 983-990.
- Choi, Y. Kyun., and Jeff W. Totten. (2012). Self-construal's role in mobile TV acceptance: Extension of TAM across cultures. *Journal of Business Research* 65(11): 1525-1533.
- Chua, Y. P. (2014). *Kaedah dan Statistik, Ujian Regresi, Analisis Faktor dan Analisis SEM*. Buku 5: Malaysia. The Mc Graw Hill.
- Chuttur, M. (2009). Overview of the Technology Acceptance Model: Origins, Developments and Future Directions. *Sprouts: Working Papers on Information Systems*, 9(2009), 1-23.

- Creswell (2003) Creswell, J. W. (2003). Research design: Qualitative, quantitative, and mixed method approaches. Thousand Oaks, CA: Sage.
- Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology, *MIS Quarterly*, 13, 319-340.
- Davis, F.D., Bagozzi, R. P., Warshaw, P.R., (1989). User acceptance of information computer technology: a comparison of two theoretical models. *Management science* 35 (8), 982-1003.
- Davis, F. D. (1993). User acceptance of information technology: system characteristics, user perceptions and behavioral impacts. *Int. J. Man Machine Studies* 38, 475-487.
- Denscombe, M. (2007). *The good research guide for small scale social research project*. Third Edition. New York. McGraw Hill Companies.
- Efrat, K., & Shoham, A. (2013). The theory of planned behavior, materialism, and aggressive driving. *Accident analysis and prevention* (59). Pp. 459-465.
- Farmer, C. M., & Wells, J. K. (2010). Effect of enhanced seat belt reminders on driver fatality risk. *Journal of Safety Research*, 41(1), pp. 53-57.
- Featherman, M., & Fuller, M. (2003). Applying TAM to e-services adoption: the moderating role of perceived risk. *36th Annual Hawaii International Conference on System Sciences, 2003. Proceedings of the*, 00(C), 1-11.
- Ferguson, S.A., Wells, J.K. & Kirley, B.B. (2007). *Effectiveness and driver acceptance of the Honda belt reminder system*. In: Traffic Injury Prevention, vol. 8, nr. 2, p. 123-129.
- Fernandez, F.A.O., Alves De Sousa, R. J. (2013). Motorcycle helmets- A state of the art review. *Accident Analysis and Prevention* 56, pp. 1-21.

- Fishbein, M., & Ajzen, I. (2005). The influence of attitudes on behavior. *The handbook of attitudes*, 173-222.
- Fitzharris M, Dandona R, Kumar G.A, Dandona L. (2009) Crash characteristics and patterns of injury among hospitalized motorised two-wheeled vehicle users in urban India. *BMC Public Health* 9:11.
- Forward, S. E. (2009). The theory of planned behaviour: The role of descriptive norms and past behaviour in the prediction of drivers' intentions to violate. *Transportation Research Part F: Traffic Psychology and Behaviour*, 12(3), 198–207.
- Fyhri, A., Hof, T., Simonova, Z., de Jong, M., & Judd, H. S. (2010). The influence of perceived safety and security on walking. *Pedestrians' Quality Needs*, 49.
- Ghadiri, S. M. R., Prasetijo, J., Sadullah, A. F., Hoseinpour, M., & Sahranavard, S. (2013). Intelligent Speed Adaptation: Preliminary Result of On-Road Study in Penang Malaysia. *LATSS Research*, 36, pp 106-114.
- Gould, J. D., Boies, S. J. & Lewis, C. (1991). Making usable, useful, productivity-enhancing computer applications. *Communications of the ACM*, 34, 74-85.
- Ghozali, I. (2008). *Konsep Aplikasi dengan Program AMOS 16.0*. Indonesia: Badan Penerbit-Undip.
- Ha, R. R., & Ha, J. C. (2012). *Integrative Statistics for the Social and Behavioral Sciences*. University Of Washington: Sage Publications.
- Hair, J.F., Anderson, R.E., Tatham, R.L., & Black, W.C. (1998). *Multivariate Data Analysis*, 5th Ed. New Jersey: Prentice Hall Inc.
- Hair, J.F., Anderson, R.E., Tatham, R.L., & Black, W.C. (1995). *Multivariate Data Analysis with Readings (4th Ed)*, Eaglewood Cliffs: Prentice Hall Inc.

- Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2010). *Multivariate Data Analysis*, 7th
- Haque, M. M., Chin, H. C., Huang, H. (2009). Modeling fault among motorcyclists involved in crashes, *Accident; Analysis and Prevention* 41 (2)327–335.
- Hasan, B. and Ahmed, M.U., (2007). Effects of interface style on user perceptions and behavioral intention to use computer systems. *Computers in Human Behavior*, 23(6), pp.3025–3037.
- Hsu, T.P. (1997). .Proposed ITS issues on motorcycle traffic. *Proceedings of the 4th World Congress on Intelligent Transport Systems*, Berlin, Germany, June 6-7.
- Hsu, C. L., & Lu, H. P. (2004). Why do people play on-line games? An extended TAM with social influences and flow experience. *Information and Management*, 41(7), 853–868.
- Ismail, R., Hafezi, M. H., & Nor, R. M. (2013). Passengers preference and satisfaction of public transport in malaysia, part II: A comparative analysis of Komuter and LRT network. *Research Journal of Applied Sciences, Engineering and Technology*, 6(8), 1450–1456.
- Israel, G. D. (1992). *Determining sample size*. Program Evaluation and Organizational Development, PEOD-6, IFAS, University of Florida, FL.
- Jabatan Keselamatan Jalan Raya (2006). *Pelan Keselamatan jalan Raya Malaysia 2006-2010*. Malaysia: Kementerian Pengangkutan Malaysia.
- Jabatan Keselamatan Jalan Raya (2014). *Pelan Keselamatan jalan Raya Malaysia 2014-2020*. Malaysia: Kementerian Pengangkutan Malaysia.

- Jaafar, T. R., Mustafa, M. F., kemin, S., & Kasiran, R. (2003). Kemalangan Jalan Raya: Analisis Data Membabitkan Pengguna Motosikal. *Jurnal Teknologi*, 38(B), pp. 1-14.
- Jaccard, J. & Becker, M. A. (2002). *Statistics for the Behavioral Sciences*. Fourth Edition: New York. Wadsworth Thomson Learning.
- Jianwei, H. E., Zhenxiang, Z. E., & Zhiheng, L. I. (2010). Benefit evaluation framework of Intellingent Transportation System. *Journal of Transportation System Engineering and Information Technology*, 10(1), pp. 81-87.
- Joreskog, K.G. & Sörbom, D. (1984). LISREL-VI user's guide (3rd ed). Mooresville, IN: Scientific Software.
- Keng, S. H., (2005). Helmet use and motorcycle fatalities in Taiwan. *Accident Analysis and Prevention* 37(2), 349-355.
- Kaneko, S., & In Kawanishi, M. (2016). *Climate change policies and challenges in Indonesia*. Japan. Springer.
- Knoke, D., Bohrnstedt, G. W., & Mee, A. P. (2002). *Statistics for Social Data Analysis*, 4th Itasca: F. E. Peacock Publishers.
- Kopits, E. A. (2013). Traffic Fatalities and Economic Growth, dissertation Submitted to the Faculty of the Graduate School of the University of Maryland, College Park in Partial Fulfillment of the Requirement for the Degree of Doctor of Philosophy, 2004.
- Kothari, C. R. (2004). *Research methodology, method and techniques*. Second Revised Edition. India. New Age International (P) Limited.
- Krishnan, R. (1995). Study of motorcycle injuries. *Annual General Meeting Report 36*, National Road Safety Council Malaysia, Kuala Lumpur.

- Kulanthayan, S., R.S. Umar, H. A. Hariza, M.T Nasir and S. Harwant (2000). Modelling of compliance of motorcyclist to proper usage of safety helmet in Malaysia. *J. crash Prev. Inj. Control*, 2: 239-246.
- Landell, K. (1997). *Management by menu*. London: Wiley and Sons Inc.
- Lay, Y. F., & Khoo, C. H. (2010). *Introduction to Statistical Analysis in Social Sciences Research*. Series 3. Sabah: Venton Publishing.
- Law, T. H., Hamid, H., & Goh, C. N. (2015). The motorcycle to passenger car ownership ratio and economic growth: A cross-country analysis. *Journal of Transport Geography*, 46, 122–128.
- Levin, K. A. (2006). Study design III: Cross Sectional Studies. *Evidence-Based Dentistry* 7, pp. 24-25.
- Levy, P. S and Lameshow, S. (2008). *Sampling of Population Methods and Application*. Fourth Edition. Canada: John Wiley & Sons, inc., Publication
- Liu, B.c., Ivers, R., Norton, R., Boufous, S., Blows, S., Lo, S. K., (2009). Helmet for preventing injury in motorcycle riders. *The Cochrane Database of Systematic Reviews* 2005(4).
- Loose, F. (1995). *Research Foundation for Psychology and the Behavioral Sciences*. New York. Harper Collins College Publisher.
- Marican, S. (2006). *Penyelidikan Sains Sosial Pendekatan Pragmatik*. Second Edition. Malaysia. Percetakan Naz Sdn. Bhd.
- Mathieson, K., “Predicting user intentions: comparing the technology acceptance model with the theory of planned behavior”, *Information Systems Research*, Vol. 2(3), 1991, 173-191.
- Meyers, L. S., Gamst, G., & Guarino, A. J. (2006). *Applied Multivariate Research, Design and Interpretation*. London, Sage Publication.

Mc Inally, S. (2003). A model for motorcycle rider skill development. Dorn, L. (Ed). *Driver Behavior and Training*. Cranfield University: Ashgate Publishing. Pp. 35-43.

Ministry Of Transport (2014). *Transport Statistic Malaysia 2014*. Malaysia: Ministry Of Transport.

Mohd Shariff, N. (2012). Private Vehicle Ownership and Transportation Planning in Malaysia Private Vehicle Ownership and Transportation Planning in Malaysia *2012 International Conference on Traffic and Transportation Engineering (ICTTE 2012) IPCSIT vol. 26 (2012) IACSIT Press, Singapore*

Mohd Solhi, N. S., & Yusof. Y. (2014). Kesan Pembangunan Jalan Raya Terhadap Pembangunan Jalan Raya Terhadap Pembelajaran Pelajar dari Aspek Keselamatan. *8th MUCET 2014, Melaka Malaysia*.

Nardi, P. M. (2006). *Interpreting Data, A guide to Understanding Research*. Pitzer College: Pearson Education, Inc.

Nasri, W. & Charfeddine, L. (2012). Factors affecting the adoption of Internet banking in Tunisia: An integration theory of acceptance model and theory of planned behavior. *The Journal of High Technology Management Research*, 23(1), 1–14.

NHTSA. (2008). Traffic Safety Facts, Data: Motorcycles, DOT HS811159, National Highway Traffic Safety Administration, Washington, DC.

NHTSA, (2011). Determining Estimates of Lives and Costs Saved by Motorcycle Helmets. DOT HS811433, National Highway Traffic Safety Administration, Washington, DC.

Nii, S., Attuquayefio, B., Achampong, A. K., & Aryeetey, I. T. (2014). Extending Tam with Social Norm to Model Students' Intentions to Adopt Ict. *European Scientific Journal* 10(14), 435–446.

- Nicholas, F. K. (1979). *Behavioral Research A Conceptual Approach*. First Edition. United States of America. Holt, Rinehart and Winston.
- Nik Yusoff, N. R. (2004). Kemahiran mendengar bahasa Arab: Satu kajian di Sekolah Menengah Kerajaan Negeri. Tesis Ph.D, Universiti Kebangsaan Malaysia, Bangi.
- Osswald, S., Wurhofer, D., Trösterer, S., Beck, E., & Tscheligi, M. (2012). Predicting Information Technology Usage in the Car : Towards a Car Technology Acceptance Model. *Precedings of the 4th International Conference on Automotive User Interfaces and Interactive Vehicular Applications* (pp. 51–58).
- Pai, C. W. (2011). Motorcycle right-of-way accidents — a literature review, *Accident; Analysis and Prevention* 43 (3) 971–982.
- Pang, T. Y., R.S. Radin Umar, R. S., Azhar Abdul, A., Harwant, S., Shahrom, A. W., M. Abdul Halim, Zahari, N., Mohd Shafiee, O. (1999). Fatal injuries in Malaysian Motorcyclist, *International Medical Research Journal* 3 (2) 115–119.
- Polis Diraja Malaysia (2009). *Laporan Tahunan PDRM 2009*. Malaysia: Polis Diraja Malaysia.
- Polis Diraja Malaysia (2010). *Laporan Perangkaan Malaysia 2010*. Malaysia: Polis Diraja Malaysia.
- Polis Diraja Malaysia (2012). *Laporan Perangkaan Malaysia 2012*. Malaysia: Polis Diraja Malaysia.
- Polis Diraja Malaysia (2014). *Laporan Perangkaan Malaysia 2014*. Malaysia: Polis Diraja Malaysia.
- Pramesti, G. (2011). *SPSS 18.0 Dalam Rancangan Percobaan. Indonesia*: PT Elex Media Komputindo

- Radin Umar, R. S. (2000). The effect targeted safety campaign and enforcement programs in Hulu Langat District, Malaysia. Holst, H. V. (Ed), Nygren, A. (Ed) & Aderson, A. E (Ed). *Transportation, Traffic Safety and Health*, New York: Springer, pp. 357-370.
- Ramli, R. and Oxley, J. (2016). Motorcycle helmet fixation status is more crucial than helmet type in providing protection to the head. *Injury*, 47(11), 2442–2449.
- Ravis, A. and Sheeran, P. (2003). Descriptive norms as an additional predictor in the theory of planned behaviour: A meta-analysis. *Current Psychology*, 22(3), 218–233.
- Rosson, M. B., Maass, S. & Kellogg, W. A. (1987). Designing for designers: analysis of design practice in the real world. In J. M. CARROL & P.P. TANNER, Eds, *CHI+GI 1987 Conference Proceedings, Human Factors in Computing Systems and Graphics Interface*, pp. 137-141, Toronto, 5-9 April.
- Rotter, J.B., (1966). Generalized expectancies for internal versus external control of reinforcement. *Psychological Monographs*, 80 (1. Whole No. 609).
- Sanayei, A. and Bahmani, E. (2012). Integrating TAM and TPB with perceived risk to measure customers' acceptance of internet banking. *International Journal of Information Science and Management*, 10(SPL.ISSUE), 25–37.
- Sabahiah, N. and Sukor, A. (2014). Neglecting Helmet Usage in Rural Area: Behavioral Causal Factors According to Different Age Groups. In R. Hassan, M. Yusoff, Z. Ismail, N. M. Amin, & M. A. Fadzil (Eds.), *InCIEC 2013: Proceedings of the International Civil and Infrastructure Engineering Conference 2013* (pp. 413–422). Singapore: Springer Singapore.
- Sandra S. K. and Kenneth C. C. Y. (2014). The Effects of Social Norms on Consumers' Responses to Mobile Advertising. *Proceedings of the 2009 Academy of Marketing Science (AMS) Annual Conference*. Pp. 162-166.

- Sek, Y.W, Siong.H.L, Kung.K.T., Check.Y. L, and Shahril. B. P. (2010). Prediction of User Acceptance and Adoption of Smart Phone for Learning with Technology Acceptance Model. *Journal of Applied Sciences* 10(20): 2395–2402.
- Shen D., Laffey, J., Yimei L, and Xinxin H. (2006). Social Influence for Perceived Usefulness and Ease-of-Use of Course Delivery Systems University of Missouri, Columbia, 5(3), 270–282.
- Shinar, D. (2007). *Traffic safety and human behavior*, vol. 5620, Amsterdam: Elsevier Ltd.
- Shroff, R. H., Deneen, C. C., & Ng. E. M. W. (2011). Analysis of the technology acceptance model in examining students' behavioral intention to use an e-portfolio sytem. *Australasian Journal of Education Technology*. 27(4), pp. 600-618.
- Stangor, C. (2007). *Research Method for the Behavioral Sciences*. Third Edition. : New York,
- Suraji, A. and Tjahjono, N. (2012). Confirmatory Factor Analysis of Accidents Caused By the Motorcycle Aspect in Urban Area. *International Journal for Traffic and Transport Engineering*, 2(1), 60–69.
- Talib, R. J., Mustafa, M. F., Kemin, S., & Kasiran, R. (2003). Kemalangan jalan raya: Analisis data membabitkan pengguna motosikal. *Jurnal Teknologi*, 38(B): 1-14.
- Tarhini, A., Hone, K., & Liu, X. (2014). The effects of individual differences on e-learning users' behaviour in developing countries: A structural equation model. *Computers in Human Behavior*, 41, 153–163.
- The Institution of Civil Engineers (1996). *A Vision for Road Safety Beyond 2000*. United Kingdom: The Institution of Civil Engineers
- TRB (Transportation Research Board of the National Academics) 2003. Buckling Up. Technologies to Increase Seat Belt Use. Washington, D.C., USA.

- Venkatesh, Moris, M.G., Davis, G.B., and Davis F.D., 2003, "User Acceptance of Information Technology: Toward a Unified View," *MIS Quarterly*, Vol.27, No.3, September, pp.425-475
- Gulö, A. (2002). *Metodologi Penelitian*. Indonesia: Penerbit PT Grasindo.
- Wibowo, A. (2008). *Research on consumer behavior information systems approach to Technology Acceptance Model (TAM)*. Universitas Budi Luhur Jl.
- Williams, A.F., Wells, J.K. & Farmer, C.M. (2002). *Effectiveness of Ford's belt reminder in increasing seat belt use*. In: *Injury Prevention*, vol. 8, p. 293-296.
- Winston, F.K. and Jacobsohn, L. (2010). A practical approach for applying best prevention practices in behavioural interventions to injury. *Injury Prevention*, 16, 107-112.
- World Health Organisation, (2006). *Helmets: A road Safety Manual for decision makers and Practitioners*. WHO, Geneva, Switzerland.
- Xuequn, Y., Ke, L., Ivers, R., Du, W., & Senserrick, T. (2011). Prevalence rates of helmet use among motorcycle riders in a developed region in China. *Accident Analysis and Prevention*, 43(1), 214-219.
- Zwerling, C., Peek-Asa, C., Whitten, P.S., Choi, S.-W., Sprince, N.L., Jones, M.P., (2005). Fatal motor vehicle crashes in rural and urban areas: decomposing rates into contributing factors. *Inj. Prev.* 11, 24-28.

LIST OF PUBLICATION

Ambak, K., and Rosli, N. (2015). Behavioral Intention to Use Safety Helmet Reminder System Using the Extended Technology Acceptance Model. *3rd Annual International Conference on Architecture and Civil Engineering*, 10.5176/2301-394X_ACE15.114

Rosli, N. and Ambak, K. (2015). Penerimaan Sistem Penguatkuasaan Automatik (AES) dalam Kalangan Pemandu Menggunakan Model Penerimaan Teknologi. *Jurnal Teknologi* 75:1 (2015) 1-6.

Ambak, K., and Rosli, N. (2015). Model Penerimaan Teknologi Lanjutan Bagi Meramal Keinginan Menggunakan Sistem Peringatan Topi Keledar. *Jurnal Teknologi*. 77:1(2015) 163-169.

Ambak, K., Harun, N., Rosli, N., and Abdullah, M., E. (2016). Driver Intention to Use Electric Cars Using Technology Acceptance Model. *ARN Journal of Engineering and Applied Science*. 11(3):1524-1528

Rosli, N., Ambak, K., and Sanik, M., E. (2016). Structural Equation Modelling in Behavioral Intention to Use Safety Helmet Reminder System. *MATEC Web Conference*. 47:03002