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USER ACCEPTANCE OF CRASH HELMET BY MOTORCYCLISTS IN MALAYSIA: AN EMPIRICAL ANALYSIS

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Abstract: Malaysia ranks among the first twenty countries with the highest death rate from road accidents with death from motorcycle accidents accounting for more than sixty percent of this death rate. The Malaysian government, in the year 2010, started the enforcement of helmet (head protector) in an effort to reduce the rate of death from this source. This paper examines users' acceptance of helmet by motorcyclist, using the theory of reasoned action (TRA). The data for this study comes from field survey of motorcyclists in Malaysia. This data was analysed using structural equation modelling. It was discovered that different factors from the theory account for user acceptance of this novelty. The paper concludes by specifying the policy implications of this and recommends other ways of improvement.

Keywords: Motorcyclist, Crash Helmet, Theory of Reasoned Action, Structural Equation Modelling.

JEL Codes: L91, L92, B21

1. Introduction

Deaths from motorcycle accidents account for 61% of annual road traffic fatalities in Malaysia with many sustaining life threatening injuries (Malaysian Institute of Road Safety Research (MIROS), 2012). The Malaysian government has introduced many measures to curb road traffic accident as well as to reduce the impact of motorcyclists and pillions (Abdul Manan & Várhelyi, 2012). One of such efforts is the enforcement of crash helmet on motorcyclists and their co-riders. To a large extent, the enforcement is successful as many authors have put the compliance rate at more than 75% throughout the country, including urban and rural areas (Abdul Manan & Várhelyi, 2012). Something that is obvious from this high rate of compliance is that there seem to be other driving forces that make riders to use

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crash helmet as law enforcement agents cannot be everywhere at every time to enforce the use of this crash helmet.

This study explores the roles that user attitude and social influence play in this compliance of using the crash helmet, by employing the framework of theory of reasoned action. Theory of Reasoned Action (TRA) is a theory that attempts to explain people's behaviour (Fishbein & Ajzen, 1975). It is premised on the assumption that behavioural intention precedes actual behaviour. Intention is a thought that is conceived by an individual before taking an action. TRA has two independent determinants of intention: Attitude and Subjective Norms towards behaviour. Attitude refers to the extent to which an individual has a good or poor evaluation of a particular behaviour (Ajzen & Fishbein, 1980). Subjective Norms refer to social pressures perceived to be exerted on an individual to act or not to act (Ajzen, 1991).

In relation to this study, user evaluation of how good or bad the use of crash helmet regarding issues that bother around personal safety will affect their preconceive notion of whether to use the crash helmet or not. This is likely to be reinforced by social pressure or encouragement. A strong intention after serious thought and yielding to social pressure would have serious effect on the actual behaviour, which is always using crash helmet for every ride. Therefore, the objective of this paper is to examine users' acceptance of helmet by motorcyclist, using the theory of reasoned action (TRA).

1.1. Overview of Road Accident in the World

World Health Organization (WHO) (2013) estimated worldwide death from road traffic injuries at 1.24 million in the year 2010, a value which is about 2 percent lower from 1.26 million in 2000. In order words, road traffic accidents claim the life of at least one person in every 25 seconds in the year 2010. A survey of traffic rules around the world showed that few countries (28) have adequate laws to check all the five risk factors: speed, drink-driving, helmets, seat-belts and child restraints of road accidents. These 28 account for a total population of 449 million, which is about 7 percent of the total population of the world and they are mostly the developed countries. However, more than one-third of the death from road traffic occurs in low- and middle- income countries among pedestrians and cyclists. The irony of this that more than sixty percent of these low- and middle- income countries have no policies to protect these road users in place.

From an overall view, in the world , it should be noted that the average death rate from road accidents drop slightly from 20.8 to per 100,000 in year 2000 to 18 person per 100,000 in the year 2010. However, the situation is not the same for the middle-income countries that have the highest annual road traffic fatality rates above the world average for the same year (2010), at 20.1 per 100 000. This is far

worse when compared with the average death rate from road accidents in high-income countries which stands at 8.7 per 100 000 in 2010. This total road traffic death in the middle-income countries accounts for eighty per cent of road traffic deaths in the world despite the fact that these countries are inhabited by only 72 percent of the world's population with only 52 percent of the world's registered vehicles. This implies that the burden of road traffic death in these countries is relatively higher than their level of motorization (WHO, 2013).

When viewing in terms of regions in the world, there are wide disparities in road traffic death rates among different regions of the world. African Region has the highest risk of dying as a result of a road traffic injury with 24.1 per 100 000 population, and lowest in the European Region with 10.3 per 100 000. There is also discrepancy in road traffic death based on the mode of transport involved. More than half of the world's road traffic deaths occur among the two-wheelers - motorcyclists (23%), pedestrians (22%) and cyclists (5%) – i.e. "vulnerable road users" – with 31% of deaths among car occupants and the remaining 19% among unspecified road users. According to the statistics released by the World Health Organization (WHO) in 2013, 59 percent of global road traffic deaths occurred among adults aged between 15 and 44 years, of which 77 percent are male. The total fatalities figures come from the WHO report and are often an adjusted number of road traffic fatalities based on road traffic death that are recorded and have been adjusted in order to reflect the different reporting and counting methods among the many countries.

1.2. Road accidents in Malaysia

Malaysia ranks among 20 countries with the highest number of road traffic death in the world. Malaysia has the highest fatality risk among the ASEAN countries and motorcycle crash fatalities accounts for about 60 percent of Malaysia's road crash fatalities. Road deaths per annum increase from 5,712 in the year 1995 to 6,917 in 2012. Road accidents that involve motorcyclist are increasing from year 1995 until 2012 according to the statistics by Malaysian Institute of Road Safety Research (MIROS). For many years, motorcycle has been more preferable, convenient and affordable mode of transport.

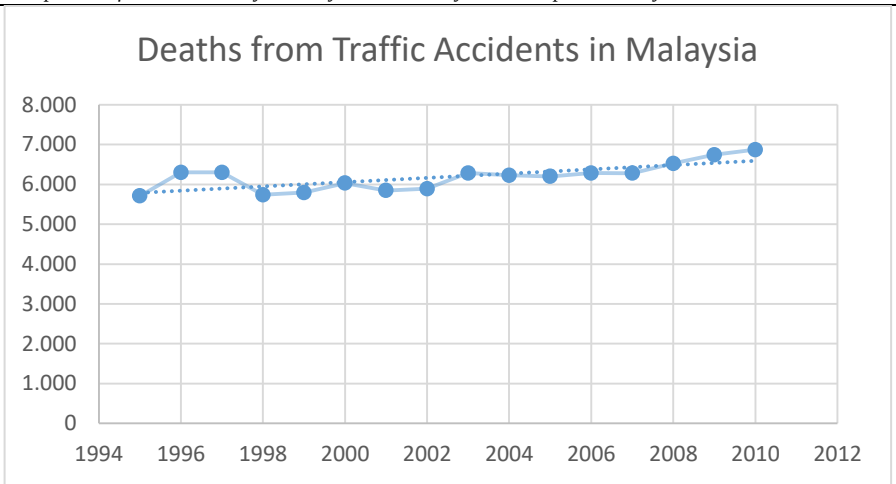


Figure 1 Death from Traffic Accidents in Malaysia
Source: Data from the MIROS

However, this has also contributed to the number of road traffic death. By and large, two-wheeler has contributed the highest number of road deaths in Malaysia. In 2012 alone, they caused 61 percent of the road deaths followed by car occupants with 21 percent and pedestrian 8 percent of all fatalities. Thus, between the year 2003 and 2012 the death among motorcyclists and car occupants have increased by 18 percent and 21 percent respectively.

The situation is not different in year 2013 and 2014 as the road traffic death statistics seems even worse. Thus in October 2014, the a Malaysian member of Parliament (MP) from Kluang noted the rising number of road fatalities in Malaysia in his article, while making reference to the 2013 World Health Organization (WHO) report that allegedly showed that Malaysia has the highest number of death from road traffic accident in the world. "Malaysia's road fatality was estimated at 25 deaths per 100,000 populations, a value which is higher than India (19.9), Russia (18.6) and China (20.5). Malaysia has 31.4 road fatalities per 100,000 vehicles. At this value, Malaysia ranked 129 out of 185 countries for having the world's most dangerous roads".

1.3. Motorbike and road accidents in Malaysia

The freedom that accompanies the use of motorcycle as a form of transportation places the motorcyclist in a unique position on the road. However, they are also open to different types of danger that other automobile drivers and motorists are protected from. For example, there is no enough protective barrier for motorcyclist between his motorcycle and the road aside from the problem the other road users

may have in anticipating and seeing a motorcycle. These open riders to serious injury in the occurrence of an accident. Motorcycle accident claims are also put under the legal concept of negligence as in the case of most motor vehicle accidents that are governed by the legal concept of negligence. Thus, it becomes difficult for a motorcyclist to claim damages if he was found to have been fully or partially at fault for the accident.

Motorcycle accidents can cause traumatic and tragic consequent moment for the victim. Serious bodily injury and even death could occur because of motorcycle accidents. The lack of a protective barrier between the driver and the road leaves motorcyclists in a very vulnerable situation. There are many common causes of motorcycle accidents. One of the most predominant ones is other heavy vehicles not seeing or recognizing motorcycles in crowded traffic. One can see then, the devastating effects between car and motor cycle accidents. There are many other causes of motorcycle collisions that occur rather frequently. One in particular is riders who are inexperienced and do not know the limitations of their motorcycles, thus, tend to push the barriers. This takes about another common cause of motorcycle accidents. Surely, racing is not exclusively restricted to young motorcyclists, as often aged and more experienced drivers are likewise guilty of running their motorcycles beyond the legal upper limit speed. Many motorcyclists love the feel when their hair blew by wind, the freedom of the free road and the thrill of going so fast at a mere few inches from the asphalt, but travelling at speed over the upper limit can cause terrible effects. A few cases of the wheel or unexpected objects in front of the motorcycle can also cause the driver reeling out of control.

Therefore, racing can be very unsafe and is frequently the cause of motorcycle accidents. Some other common cause of motorcycle accidents is a consequence of the motorcyclist's carelessness. In situation where the accident is not caused by another vehicle, the loss of the motorcyclist to slow down when cornering or simply under cornering as well as over braking in some examples can cause accidents.

The risk that motorcycle riders face, and the need to protect their rights of recovery after an accident, becomes readily apparent through a review of the following statistics. In two-thirds of motorcycle accidents involving another vehicle, the driver of the other vehicle violated the motorcycle rider’s right of way and caused the accident. Motorcyclists are about 26 times more likely to die in a crash than someone riding in a passenger car, and are 5 times as likely to be injured. Although the number of fatalities for drivers and passengers of automobiles and light trucks has been steadily falling since 1999, the fatality rate for motorcycle accidents has more than doubled in that time.

1.4. Government efforts to mitigate road accidents in Malaysia

Road traffic accidents are the second leading cause of mortality in the young (5–25 years old) (WHO, 2015). The reality that stare the world in the face is that Road traffic accidents (RTAs) cause 1.2 million deaths worldwide and leave 20-50 million people disabled. An estimated 90 percent of the total world fatal accident occurs in low-income and middle income countries. Thus, it is not surprising that the World Health Organisation (2004) warns that road accidents will jump from ninth place to third place in 2020. There are many reasons that can cause road traffic accident which are still yet to be clarified, but major studies are blaming the human error as a prone accident pull.

Malaysia built its first motorcycle lane along the Federal Highway Route 2 in the early 70s. This stretches a 16-kilometere from Kuala Lumpur city centre to Subang International Airport to separate motorcyclists from other vehicles, to reduce conflict and accidents. This was extended in 1993 to Shah Alam and Klang under improvement projects of four-lane dual carriageway PLUS highway. Generally, separating motorcycles from other vehicles has reduced motorcycle accidents by 34 percent (Umar et al., 1995).

According to World Health Organization (WHO) in 2010 on Malaysia National Motorcycle Helmets Law, approximately 76 percent of riders and pillion in Malaysia wear helmets with the level of enforcement force given 5/10 on rating. Malaysia government impose maximum penalty RM300 for every person who do not wear helmets when ride. The use of helmet has been found to reduce road traffic injuries worldwide as it was found to reduce riders head injuries and death by about 72 percent (Liu et al., 2003).

Besides, Malaysia has also implemented Kejara's system under Motor Vehicle (Demerit Points) Rules 1997. Kejara's system will punish the irresponsible motorcycle and vehicle users by giving them demerit system and once they reach certain level, their license will temporary be suspended and etc. Stricter Punishment System via KEJARA remained the focused agenda in Road Safety Plan of Malaysia 2014-2020.

Inexperienced motorcyclists have also shown a tendency to violate traffic rules (Perez-Fuster et al., 2013). Worried by increasing numbers of teenagers and unlicensed people involve in motorcycle crash, Road and Transport Department Malaysia has establish "SatuKomunitiSatu JPJ" (SKSJ) programme to give awareness and relevant course for motorcycle user about the law, and precaution that is compulsory to be followed. According to Ambrose Rirang (2014), this programme has helped to lower the numbers of fatal accident among bikers for two consecutive years.

During festive season, motorcyclist has been found to be 6000 times prone to fatal crash than normal day, thus Malaysia government implement 15 days "OPS

SIKAP" a joint force between Ministry of Works (engineering), Ministry of Transports (media campaign), Royal Malaysian Police, Road Transportation Department (enforcement). OPS SIKAP monitors high-risk accident area and has effectively control the accident rate in Malaysia during the festive period (Rahimi, 2013). Karak Highway, a very famous death accident place has become the massive concern of the government since 1997, and to control the death crash in Karak, government has used the technology of porous asphalt, micro surfacing, whisper grip, zebra line and gap radar to improve the safety on the road.

International Road Assessment Programme (iRAP) a nationwide inspection of selected Malaysian of about 3,700 kilometres, representing around 6 percent of nation's paved roads between March and April 2007. During the inspections, multi-view, high-definition videos and geometry data of the roads were collected. The videos were then ranked using the iRAP inspection manual and rated roads from one to five stars. iRap has become a precursor to a better road design and a safer transport lanes in Malaysia (iRap, 2009).

As motorcyclist always violates the traffic light, Malaysian government has put camera in certain places. According to Khulantayan, Phang and Hayati (2012), it is clearly shown that Traffic light violation at intersections without camera enforcement was significantly higher by 14.8 percent than intersections with camera enforcement, example of such places are Kajang, Bangi, USJ and Klang in Malaysia.

When it comes to speed, Malaysia has implement AES or Automated Enforcement System. According to Jamil, Rahim and Shabadin (2014), the installation of AES is indeed timely and it was found to be very beneficial in Malaysia. The AES had been proven in previous studies as an effective tool in reducing the occurrence of red light crashes.

Another effort to reduce road traffic accident in Malaysia is the use of mobile-eyes. According to Desmond Bentley (2012), Malaysia government has enforced the entire vehicle in the country to use the mobile-eyes advanced driver assistance system (ADAS) and it has lower 40-50 percent accident risk. ADAS consist of lane departure warning, vehicle detention of vision fusion, forward collision warning and etc.

2. Literature review

2.1. Crash Helmet and Road Accident

Death of motorcycle riders involved in road traffic accidents is mainly as a result of injury to the 'head' and face. Mohamad Ghazali Masuri, Khairil Anuar Md Isa & Mohd Pozi Mohd Tahir (2015) observed that there are few options available to motorcyclists to protect themselves from injury caused by accident. For instance,

crash helmet is the only protective tool that is available to protect the cranium which is the most vital part in human body. Helmet use may help to reduce road traffic injuries worldwide as it is found to reduce motorcyclist head injuries and death by around 72 percent (Liu et al., 2003). Not wearing a helmet increases the likelihood of sustaining head injuries from a crash by three times (Yen et al., 1999). However, the use of helmet in protecting riders or pillion passengers is limited to only certain type of collision. It may not be able to protect the cranial from being crashed if one is run over by heavy vehicles such as Lorries or trucks. This is a clear example where helmet is not always able to protect riders or pillion passengers. Another problem observed with using helmet is that riders tend to abuse the use or use it as a camouflage to deceive the law enforcement agents in order to escape punishment. According to Muhammad Marizwan Abdul Manan and AndrásVárhelyi (2011) in their study, 76% of those involved in motorcycle fatalities wear helmets, and 4 percent wear helmets not strapped properly. They also found out that percentage of female motorcyclists involved in fatal accidents and not wearing helmets (24%) is slightly higher than for males (20%). In rural areas, absence of rescue and the late arrival of rescue at the scene of accidents may also contribute to fatality. Moreover, helmet compliance is low in rural areas due to lack of enforcement and road safety awareness.

3. Methodology

This research was carried out to study the factors that predict the user acceptance of crash helmet by motorcyclists among the youths in Malaysia. This study was an outcome of the joint research conducted by the undergraduate research method group B (BEER 3043, Semester 2, 2014/2015) of the department of Economics, Universiti Utara Malaysia (UUM). Primary data was used for the study. The questionnaire used comprises of adapted questions from the questionnaire developed by Ajzen and Fishbein to test the theory of reasoned action. The 28 members of the class were asked to survey at least 12 respondents within the school using convenience sampling technique. Most of the students in UUM ride motorcycle due to combination of facts of the location of their school and the flexibility of motorcycle as a form of transport.

The questionnaire used contains two parts: the demographic part and the Likert-scale part for the participants to rate their opinion regarding the statements concerning their use of crash helmet. The part on demography contains questions on gender, age, race, level of education, hobbies, licence and geographic location of the participants. The second part features the modified questionnaire instruments of the theory of reasoned action. This part contains twelve items, three each on the constructs "Attitude", "Subjective Norm", "Intention" and "Actual Use". Respondents were asked to rate their opinion on each of the items based on 5-point

Likert-Scale: "1"- strongly disagree, "2"- disagree, "3"- neutral, "4"- agree, "5"- strongly agree.

3.1. Theory of Reasoned Action (TRA)

Theory of reasoned action (TRA) was developed in 1967 and was revised and expanded by Icek Ajzen and Martin Fishbein in 1970s. The development of TRA originated in the field of social psychology. This theory grew out in the nineteen century when the field of psychology began to look at the term 'attitude'. Those theories suggested that 'attitudes could explain human actions' (Ajzen & Fishbein, 1980). Basically, Theory of Reasoned Action (TRA) is a theory which essentially attempts to explain people's behaviour (Fishbein & Ajzen, 1975). It focuses on behavioural intention as precedence to the actual behaviour. Intention is the main thought that exists in an individual before he or she acts on it. It indicates to what extent individuals are willing to try or how much effort they would give to perform the behaviour (Ajzen, 1991). Based on TRA, there are two independent determinants of intention, these are, Attitude and Subjective Norms towards behaviour. Attitude is defined as the degree to which an individual has a good or poor evaluation on a particular behaviour (Ajzen & Fishbein, 1980). One of the factors that determine Attitude is behavioural belief, which involves evaluation of the consequences or outcomes of a particular behaviour (Ajzen & Fishbein, 1980). Subjective Norms refer to social pressure perceived to be exerted on an individual to act or not to act (Ajzen, 1991). A Normative Belief is the belief under Subjective Norms which means one's belief is influenced by others or referent group. It means an individual attempts to act an action when he or she believes other people think the action is important to be carried out. The theoretical relationships as suggested in the theory are shown in figure 2 below.

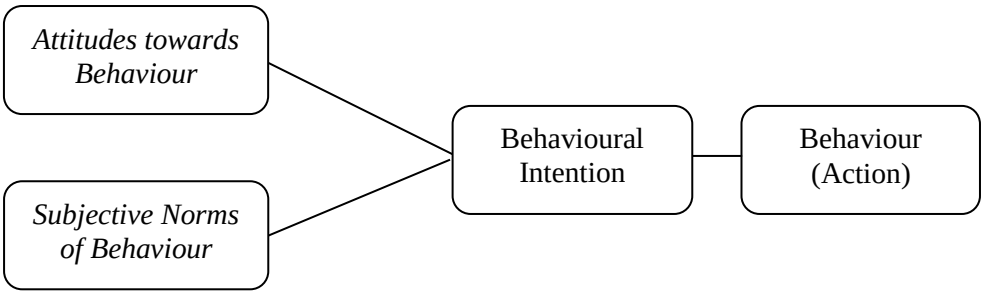


Figure 2 Theory of Reasoned Action

Emanating from this theory are the following three hypotheses examined in this study:

H1: User attitude to the use of crash helmet will have significant effect on their intention to use it.

H2: Subjective norm will have significant effect users' intention to use crash helmet.

H3: User's Intention will have significant effect on their actual behaviour of using crash helmet.

There are several uses of this theory which include (1) to predict and understand motivational influences on behaviour that is not under the individual's volitional control, (2) to identify how and where to target strategies for changing behaviour, (3) to explain virtually any human behaviour such as; why a person buys a new car, votes against certain candidate, absent from work or school and others. As a conclusion, TRA mainly focuses on behavioural intentions as being the immediate antecedents to behaviour which believe the stronger a person's intention to perform particular behaviour, the more successful they are expected to be. Intentions are a function of salient beliefs and information about the likelihood that performing a particular behaviour will lead to a specific outcome. The longer the time period between intention and behaviour, the greater the likelihood that unforeseen events will produce changes in intentions (Parikh, 2011).

4. Methods of data analysis

This study used descriptive statistics and structural equation modelling (SEM) to analyse the response obtained from the field. Descriptive statistics were used to describe the response under the demographic characteristics of the respondents. Frequency distribution tables were used to describe the categorical and ordinal variables under this section and measure of central tendencies (mean, mode and standard deviation) were used to describe the continuous variable of the demography. Structural equation modelling technique was used to test the causal hypotheses of the model based on the response of the participants to the questionnaire instrument for the model.

This involves a number of steps. These steps include data screening, exploratory factor analysis (EFA), confirmatory factor analysis (CFA) and structural model analysis. The data was screened for missing data and tested for normality, linearity, homoscedascity and outlier to be sure none of the assumption was violated. The exploratory factor was to ensure that the questions for the constructs are valid and reliable items of their constructs and to remove any poor loading item. These loadings were confirmed in the measurement model during the CFA to ensure that the result obtained during EFA is not a fluke. The last stage in SEM is the analysis

of the causal path during the structural model analysis. This stage tests the hypothesised links for practical and statistical significance.

4.1. Results and discussions

4.1.1. Demographic characteristics of the respondents

As noted earlier, the demographic characteristics of the respondents include parametric and non-parametric variables. The non-parametric variables include gender, race, hobbies, level of education, licence and geographic location of the participants. These variables were summarised using percentage frequency. The only parametric variable in our data is the age of the respondents. This was summarised using the measure of central tendency. Looking at the percentage distribution of the non-parametric variables one after the other revealed that majority of the respondents are female, representing 70% of the data. This is expected as female tends to be more in the universities in Malaysia than their male counterpart. The variable, race, was grouped into four. These are the three primary races in Malaysia, Malay, Chinese and India, and others which represent someone who is not a Malaysian among the participants. The break-down of the respondents according to race shows that Malay are the majority, representing about 62% of the data, followed by Chinese (24%), India (10%) and others (3.3%). This, incidentally, seems to approximate the percentage distribution of the ethnic group in the national population.

The percentage distribution of the participant based on their marital status revealed that overwhelming majority of them are still single, 97.1%, followed by those who are married, 2.3% and others, 0.7%. This is expected as most of them are still young and taking their first degree. The frequency according to educational status of the participants shows that about 96% of them are undergraduate, 3.9% are taking their masters and 0.3% are doing their doctorate degree. On the question on whether the respondents are licensed or not, 83% of them indicated that they possess one form of valid licence or the other while the remaining 17% said they did not have any form of licence. Inquiring further on the types of licence the participants hold revealed that 45.4% have motorbike licence, 72.2% possess valid licence to drive a car and 3.4% get other form of licence. This result shows that some of them possess more than one form of licences. In terms of the geographic location of the respondents, 56.4% reside in urban area while the remaining 43.6% live in rural area of Malaysia.

The average age of the respondents is 22 years. The youngest is 19 years and the oldest is 30 years of age. The highest occurring age group in the sample is 22 years and the standard deviation of their age distribution is 1.352. This indicates that most of the respondents are undergraduate students from semester 1 – 7 according

to Malaysian standard. This confirms educational status frequency obtained above and reflects the fact that this is the generation that is very prone to road accidents especially by motorbike as indicated in the literature earlier.

Table 2 Demographic characteristics of the respondents

Demographic Characteristics	Percentage Frequency
Gender:	
Male	30
Female	70
Race:	
Malay	62
Chinese	24
Indian	10
Others	3.3
Marital status:	
Single	97.1
Married	2.3
Others	0.7
Education:	
Undergraduate	95.8
Masters	3.9
PhD	0.3
License:	
Yes	83
No	17
License:	
Motorbike	45.4
Car	72.2
Others	3.4
Location:	
Rural	56.4
Urban	43.6
Age:	
Average = 22 years	
Minimum = 19 years	
Maximum = 30 years	
Mode = 22 years	
Std Dev. = 1.35	

Source: Authors' computation

4.1.2. Exploratory Factor Analysis

This study used principal component analysis (PCA) of the factor extraction technique with varimax rotation technique to extracts maximum variance from a

data set with few orthogonal components. This is suitable for variable reduction before performing CFA. The factor loadings of each item on their construct are shown in the Table 1. All the factor loadings of each of the items are more than 0.7 and the communalities are above 0.5 as recommended by Hair et al. (2010).

Table 2 Result of the EFA of the TRA constructs

Construct	Indicators	Factor loadings	Communality	Crombach's Alpha
Use KMO: 0.677 Bartlett's Test: X^2(299.596; 3) = 000 Var. Ext = 71.28	 SN1 SN2 SN3	 0.806 0.890 0.834	 0.649 0.793 0.696	0.793
Attitude KMO: 0.728 Bartlett's Test: X^2(401.608; 3) = 000 Var. Ext = 77.20	 SN4 SN5 SN6	 0.894 0.863 0.878	 0.800 0.745 0.771	0.852
Intention KMO: 0.705 Bartlett's Test: X^2(355.344; 3) = 000 Var. Ext =74.66	 SN7 SN8 SN9	 0.842 0.897 0.852	 0.709 0.804 0.726	0.828
Subjective Norm KMO: 0.734 Bartlett's Test: X^2(458.973; 55) = 000 Var. Ext = 79.58	 SN10 SN11 SN12	 0.872 0.898 0.906	 0.761 0.806 0.821	0.872

Source: Authors' computation

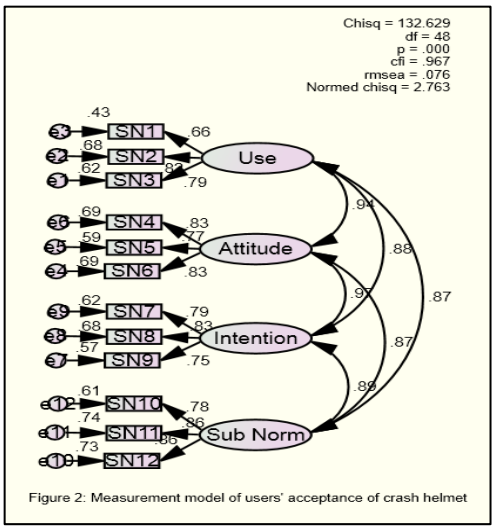
It should be noted that the factor analysis for each of the constructs is conducted separately to avoid undue interference resulting from cross-loading of an item on more than one constructs. The adequacy and suitability of the latent constructs for EFA was determined by KMO. As shown in table 1, all the KMO above 0.5 and Bartlett's test are all significant at 5 percent. The factor loadings represent each of the latent variable's level of construct validity. According to Hair et al (2010), the entire factor loading should be more than 0.50, which means 25 percent of the total variance is accounted for by the factor. For this to hold, the loadings must exceed 0.70 for the factors to account for 50 percent of the variance to assess the fit between a construct and its indicators. Based on this criterion, it could be seen that

the instrument of the study exhibits required validity as shown in the Table 2 above.

4.1.3 Measurement Model

A confirmatory factor analysis was conducted on the 307 sampled data collected for this study through Structural Equation Modeling in AMOS (Version 18), using Maximum Likelihood (ML) estimation (Byrne, 2010). The measurement model of the four constructs show that the overall data model fit was χ^2 (48) = 132.629, p = .000. The significance of the model at 5 percent is an indication of misfit between the covariance matrix of the observed data and the implied covariance matrix of the model. However, this is expected as chi-square test used to determine the model fit is known to be affected by large sample size such as ours. Thus, following the suggestion of Byrne, (2001, 2010) and Hair et al, (2010) that at least one absolute fit index and one incremental fit index be used in addition with the chi-square and its associated degree of freedom, we chose the Normed chi-square (CMIN/DF), the Comparative Fit Index (CFI) and the Root Mean Square Error of Approximation (RMSEA).

The fit indices, CFI of 0.967 (above the threshold of 0.9), Normed chi-square of 2.763 (within the recommended ≤ 3 cut- off point) and RMSEA of 0.076 (within the recommended ≤ 0.08) we conclude that our model fit the data collected and it is appropriate (Byrne, 2001, 2010; Hair et al, 2010). All the loading values of observed variables of the model constructs are all above .50 minimum recommended value and they are all statistically significant.



Source: Authors'

Analysis of the Structural Model

The hypothesized model (Figure 1) was evaluated using AMOS version 18.0 based on the following indexes: the normed chi-square of ≤ 3, the comparative fit index (CFI) of ≥ 0.9, and the root mean square error of approximation (RMSEA) of ≤ .08. In addition, the path coefficients were assessed for statistical significance at $p < .05$; and practical significance at path loading of ≥ 0.20.

As indicated in Figure 2, the chi-square test was significant, χ^2 (50, N=307) = 142.272, p <0.000. As done for the measurement model when chi-square was significant, the other model fit indices were used to determine our model fit. This showed that the results yielded acceptably high goodness-of-fit indexes. This is an indication that the hypothesized model fits the observed data well. This was established with a Normed chi-square (CMIN/df) value of 2.845, which is well below the maximum value of 5 often indicated as the upper ceiling in SEM literature. The CFI of 0.964 is also higher than the minimum recommended value of 0.9 and the RMSEA value of 0.078 which is below the 0.08 ceiling. All these show a good fit of the model.

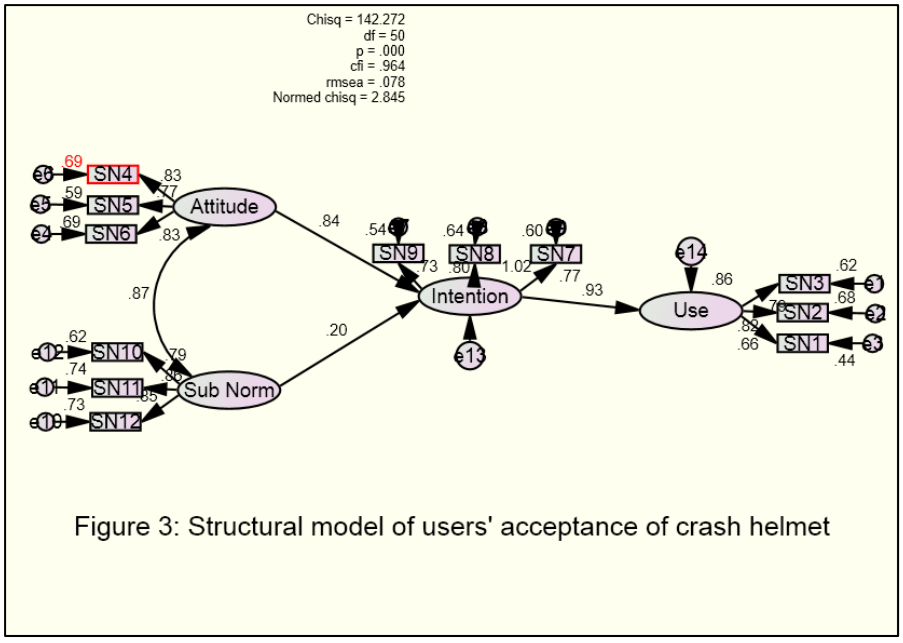


Figure 3: Structural model of users' acceptance of crash helmet

Source: Authors'

4.2 Results of the Hypotheses Testing

All the loadings of the items are more than the minimum 0.5 and none of the path loadings is below 0.2 and are significant. These show that all the path coefficients specified in this study is both practically and statistically significant. These paths are the two from "Attitude" and "Subjective Norm" to "Intention" (0.84 and 0.20 respectively) and the one from "Intention" to "Use", (0.93). The percentage variance explained by the model is also high. The model accounts for 86 percent variance of actual use of crash helmet among the respondents. This finding indicates that both "Attitude" and "Subjective Norm" are good predictor of "Intention" in user acceptance of crash helmet among the youth in Malaysia and "Intention" can be used to predict the "Actual Use" of crash helmet. This result is consistent with the findings of previous researchers (Cao, 2000; Trafimow & Finlay, 2002; Yilmaz & Özer, 2008; Manning, 2011; Choi & Jiang, 2013; Sanyal, Datta, & Banerjee, 2014) who find the influence of "Attitude" and "Subjective Norm" on "Intention" and that of "Intention" on "Actual Behaviour".

5. Conclusion, implications and suggestions for further studies

This study examines user acceptance of crash helmet by motorcyclist in Malaysia using the theory of reasoned action. Three hypotheses were tested. These include the hypothesised causal link from "Attitude" to "Intention", "Subjective Norm" to "Intention" and that of "Intention" to "Actual Behaviour". All the path coefficients are practically and significantly significant, and our model explains 86 percent of the variance of "Actual Behaviour". The implication of this is that both attitude and subjective norm play significant roles in users forming intention to use crash helmet and this intention translate to the actual behaviour which is use. Therefore, the policy makers should target the improvement of people's attitude and the use of family links to curb motor cycle accident. The policy makers may also wish explore how to leverage on these two constructs in order to reduce road traffic accidents in Malaysia. It should be borne in mind that this is a pioneer study along this line and the model employed has its own deficiency which can be improved upon. Therefore, further studies are recommended along these lines using time series data.

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Authors Contributions

MBOY conceived the study and weas responsible for the design and development of the data analysis. OASO were responsible for data collection and analysis and also for data interpretation.

Disclosure Statement

The authors have not any competing financial, professional, or personal interests from other parties.

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