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Smartphone Distraction while Driving Influencing Driving Performance at FT050, Jalan Batu Pahat-Kluang

Nurazrin Amira Zawawy[1], Ahmad Raqib Ab. Ghani[1*]

[1]Department of Infrastructure and Geomatic Engineering, Faculty of Civil and Built Environment,
Universiti Tun Hussein Onn Malaysia, Batu Pahat, 86400, MALAYSIA

*Corresponding Author Designation

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Abstract: An average of 18 people are killed on the road every day, with the number expected to rise as a result of the road user inattention error, which has been highlighted by the Malaysia Consumer Movement (MCM). With the increased usage of smartphone devices, distracted driving is assumed to be the main causes that contribute on driving performances and crash risk. This study is conducted to investigate the influence of smartphone usage on driving performance and to identify the characteristic that influence the use of smartphone while driving. The respondent for this study are selected among residents in Kluang and Batu Pahat as they are using the federal road FT050 as their regular road. In this study, the researcher uses the quantitative and questionnaires to collect data related to influence of smartphone use while driving on driving performance and characteristic that influence the use of smartphone while driving. There were 3 sections in the questionnaire which is section A for demographic profile (5 question), section B for independent variable (11 question) and section C for dependent variable (10 question). The data collected was being analyses by using Statistical Package for Social Sciences (SPSS) version 25. The result shown that the first objectives of the study were supported, which is the most influence of smartphone usage while driving on driving performance is receive and making calls (β=0.257) and the characteristic that influence the smartphone use while driving was identified. In conclusion, this study will encourage individuals to recognize the dangers of using a smartphone while driving and be more alert.

Keywords: Smartphone, Distraction, Driving performance, Characteristic, Influence

1. Introduction

Distractions while driving has become another risk that people need to be more concern about it. It can be distractions from mobile phone, talk to passenger, adjusting radio, eating, use GPS and smoking. The majority of research and concentration in this topic is on driver distraction, which is primarily due to driver's increasing usage of smartphones and other devices [7]. Distracted driving is highly

Corresponding author: ahmadraqib@uthm.edu.my

dangerous because not only the driver but also the passengers and innocent citizens are affected. Technological progress and the rise of distracted driving on our roads have created a problem that has a huge impact on the population.

Driver distraction diverts the attention of the driver from vital safe driving tasks to competing tasks and has emerged as a leading cause of traffic accidents [2]. Distracted driving requires sharing attention to non-driving necessities such as eating, singing and interacting with electronic devices [3]. Their focus is briefly separated between frequently referred as the "primary task" of driving and "secondary tasks" that are not connected to driving while drivers are distracted [8]. Distraction can cause a driver's eyes to be taken off the road (visual distraction), mind to be taken off the road (cognitive distraction), and hands to be taken off the steering wheel (manual distraction) [8].

It is a trend nowadays to use smartphone while driving especially for young adults updating social media and also for navigation GPS. The use of smartphones in developing countries surpassed 50% of the world's population between 2008 and 2009 hitting an estimated 57 per 100 inhabitants, whereas the use of smartphones in high income countries has mostly exceeded 100% [8]. A total of 36,078 drivers responded to a survey on their driving habits, recent crashes, and smartphones usage. The survey results were compared to smartphones and driving records, and the results were analyzed to see if there was a relation between smartphone use and crashes. Drivers who use their smartphones while driving had a 38 percent higher risk of being involved in an injury crash and all sorts of crashes, according to the study.

The aim of this research is to investigate the influence of smartphone use on driving performance on distracted driving and to identify the driver characteristic that influence the use of smartphone while driving. Using a smartphone while driving remains an important problem for traffic safety in general. In Malaysia, more than 43% of drivers use their smartphones while driving [11]. By extrapolation, that means that nearly half of all Malaysian drivers are endangering themselves and others. The data reveals even more alarming statistics, such as 61.9 percent of drivers using their phones at traffic signals and 56.3 percent of drivers using their phones during traffic jams. There is much more surprising news to come which is while driving, 61.1 percent of drivers played video games. Based on this issue, the future investigation is needed to identify the influence of smartphone use on distracted driving.

The objectives of this study are to investigate the influence of smartphone use on driving performance on distracted driving and to identify the driver characteristic that influence the use of smartphone while driving.

2. Methodology

A. Instrument and measurement

Quantitative method analysis is conducted using SPSS tools for the questionnaires. Questionnaire that has been created consist of three sections, namely section A, B and C. All questions are close ended questions which the related to the research and easy to understand. Closed ended questions are those that required respondents to choose from a limited set of pre-defined responses such as 'yes or no' or multiple choice questions. Section A will cover the respondent's demographic information which includes age, gender, residence, employment status and marital status. Section B which consists of two part is the measurement item for independent variable while section C is about dependent variable and respondent need to answer the questions by scaling them according to Five-point Likert Scale. All the data collected analyzed by using Statistical Package for Social Science (SPSS) version 25. The probability sampling method used is random cluster sampling. Through this method, populations are divided into smaller groups often based on location or geographical boundaries. The sample size will identified based on the population of residents Kluang and Batu Pahat. Respondent was choose randomly that are believed to be great as a representative in order to gain valid results.

B. Sample size and location of study

This study focused on the influence of smartphone use while driving and driving performance, thus the respondents or sample of this study focus on people who lives at Kluang and Batu Pahat that use federal

road FT050 (Jalan Batu Pahat-Kluang). For this research, it did not focus on any age or gender thus all the people who lives and used the federal road has the chance to be chosen as respondent. To determine the number of sample size that appropriate for this research is according to Krejcie & Morgan [6]. This is because, calculations table are more suitable for survey type research that has population size and it also does not take into account statistical power and effect size [6]. The number of respondents or sample size (S) that needs to be obtained in this study is as much 384 residents who lives in Kluang and Batu Pahat. The location involved in this study is around Kluang and Batu Pahat and the questionnaire were distributed through google form because it is easier to collect data. Furthermore, Covid-19 also one of the reason why the questionnaire only be distributed through online.

C. Analysis tool

All the demographic data of respondents including all the information required were analyzed using descriptive statistics to obtained frequency distribution and percentage for each variable. The characteristic that influence a driver to use a smartphone while driving was identified using descriptive statistic to find the highest frequency. The sample size distribution is determined using the normality test. This is crucial in determining if the sample gathered is within an appropriate range and the skewness of the sample.

As for independent variable and dependent variable which are the smartphone usage while driving and driving performance affected from smartphone usage while driving, reliability analysis is used to testing the data collected through sustainability and reliability of the research to ensure the objectives can be achieved. The data collected from the sources were used to measure reliability and it is measured using Cronbach's Alpha. The benchmark that a Cronbach's Alpha coefficient of 0.90 is measured as excellent, $0.90>\alpha\geq0.80$ is good, $0.80>\alpha\geq0.70$ is acceptable and anything under 0.70 poor, questionable and unacceptable [4].

The validity test was carried out to see if the questionnaire are addressing the correct concept [10]. The suitability of the measurable items employed in this study is validated using factor analysis. Kaiser-Meyer-Olkin (KMO) sample adequacy and Barlett's test of sphericity were used to determine the ability to do factor analysis. The factor analysis should be considered appropriate if Barlett's test of sphericity is significant ($p<0.05$), and the Kaise-Meyer-Olkin (KMO) index minimum value is 0.60 [9]. In addition, to determine the influence of smartphone use while driving on driving performance, Pearson correlation analysis and multiple regression analysis were used.

3. Results and Discussion

3.1 Demographic respondents

The questionnaire was distributed to the targeted respondents through google form. A total of 384 questionnaire were filled. There was no missing data and the main objective for descriptive analysis is to understand the profile of the respondent. This analysis carried out through the questionnaire in Section A. The objective of Section A in the questionnaire was to see the background of the respondent also known as demographic respondent.

3.1.1 Results

Table 1: Profile of respondent

Demographic	Count	Percentage (%)
Gender		
Female	198	51.6
Male	186	48.4
Age		
< 30 years	332	86.5
30 < years < 50	48	12.5
>50 years	4	1.0

Residence		
Kluang	168	43.8
Batu Pahat	139	36.2
Others	77	20.0
Employment Status		
Employed	184	48.0
Unemployed	95	25.0
Student	105	27.0
Marital Status		
Single	334	87.0
Married	48	12.5
Single parent	2	0.5
Total	384	100

3.1.2 Discussions

From the overall data collection, the completed 384 of the answered collected and the validity based on the sample was valid and reliable. Based on the Table 1, there were 51.6% of female respondents and followed by 48.4% of male respondents. The majority of respondents which is 332 are aged < 30 years old (86.5%), 48 respondents are aged between 30-50 years old (12.5%) while 4 respondents are aged >50 years old. From 384 respondents, total respondents that from Kluang is 168 (43.8%), Batu Pahat with 139 respondents (36.2%) and 77 (20%) were from other state. From the sample of respondent's 27% (105 respondents) were students while 27% (95 respondents) were unemployed and majority of the respondents which is 48% (184 respondents) are employed. Among the respondents, there were 87% (334 respondents) were single and 12.5% (48 respondents) were married while 0.5% (2 respondents) are single parent.

3.2 Characteristic that influence driver to use smartphone while driving

The research have been done using multiple choice question and dichotomous question. There were six variables and descriptive analysis were used in assessing the characteristic that influenced the respondents to use the smartphone while driving. The questionnaire was carried out to residence who live in Kluang and Batu Pahat with expectation that they have used the federal road FT050 Jalan Batu Pahat-Kluang.

3.2.1 Results

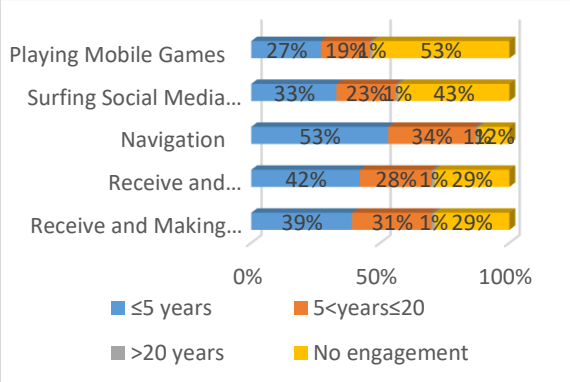

Figure 1: Smartphone use while driving overall and driving experience of respondents in years (N=384)

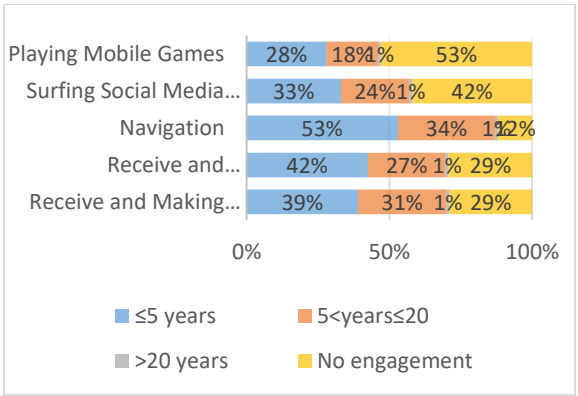

Figure 2: Smartphone use while driving overall and license owning period of respondents in years (N=384)

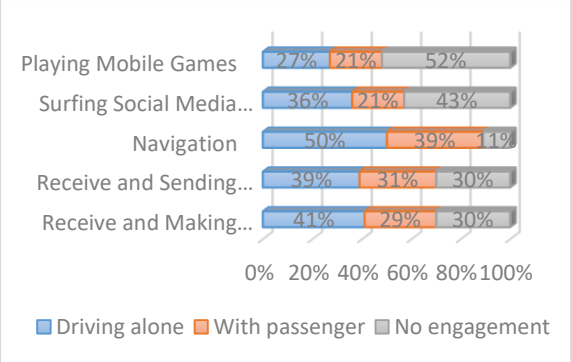

Figure 3: Smartphone use while driving overall and number of respondents in vehicle (N=384)

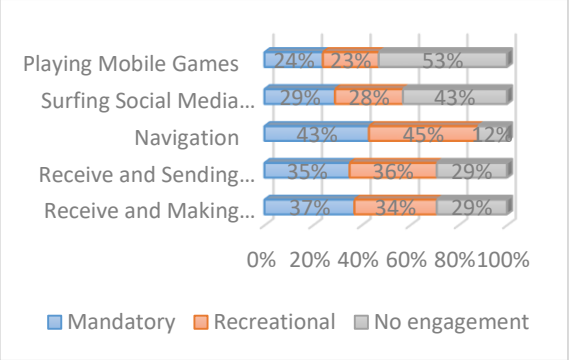

Figure 4: Smartphone use while driving overall and type of trip made generally (N=384)

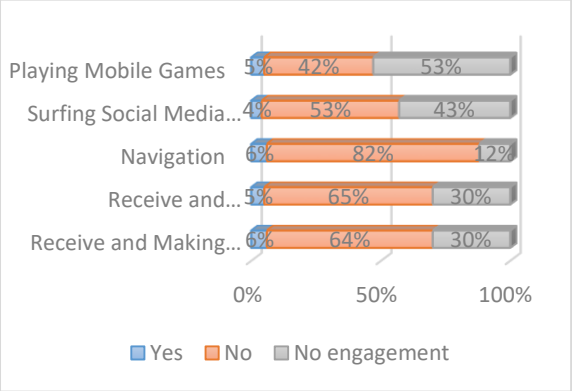

Figure 5: Smartphone use while driving overall and traffic offence due to smartphone use (N=384)

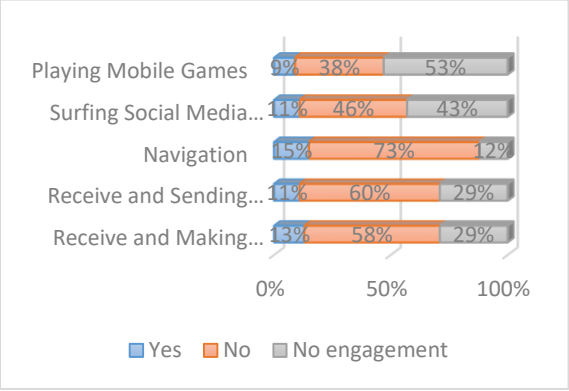

Figure 6: Smartphone use while driving overall an accidents due to distraction of smartphone use (N=384)

3.2.2 Discussion

Based on figure 1, reveals that respondents who have driving experience less than 5 years tend to use smartphone more while driving. The drivers who have driving experience less than 5 years display a constant rate of using smartphone while driving for each type of behaviours. Drivers who have driving experience less than 5 years it can call as novice driver and they tend to use smartphone while driving. Driving experience is important because it plays an important role in the development of a number of cognitive and behavioural skills. Traffic environment is full of events and exposed to dangers. Inexperience drivers or can be call as novice driver which is related to poor driving skills are prone to error and near crash events than experienced drivers. Lack of experience on the road can lead them to use smartphone while driving without thinking that the use of smartphone while driving can affect the driving performance. The use of smartphone while driving for inexperienced drivers can reduced the ability to use peripheral information and ability to detect hazards.

According to figure 2, respondents who have driving license owning period less than 5 years which is the period is not long enough tends to use smartphone while driving. They might not aware the dangerous would happen if use smartphone while driving. This is related to driving experience. Drivers with a license of less than 5 years tend to use smartphone while driving even though they have already take driving class and have exposure towards the danger of using smartphone while driving. Most of them are the younger generation who just got a vehicle license and as we know they are a generation that always spend the time on screen phone.

Figure 3 indicates that most of the respondents who use smartphone while driving to are driving alone. Smartphone can be a way to get rid of drowsiness and boredom while driving for some people.

Driving alone will make the driver feel lonely and sleepy which will be dangerous and likely to involve in accident. To prevent the incident from happening, they will use the smartphones either to surf social media or listen to songs.

Figure 4 indicates that majority of type behaviour of smartphone use while driving is when the respondents do the recreational trip. Overall, the type of trip which is mandatory activities influence the smartphone usage while driving. There are two types of activity that was mention in the questionnaire which are mandatory activities and recreational activities. Mandatory activities shows that most of the people use smartphone while driving. Mandatory activities is an essential activities that need people to connect with others. This may be the reason why they use the smartphone while driving in order to do the mandatory activities.

Figure 5 indicates that majority of respondents do not have been fined for using smartphone in the last three years. Using a smartphone while driving has been outlawed for decades. However, it appears that Malaysians continue to break the regulations (as defined by the Road Traffic Rules 1959 and the Road Transport 1987), with the Royal Malaysian Police (PDRM) now announcing a change for those who commit a specific offence. According to the PDRM, guilty offenders would face fines of up to RM1000 or three months in prison. For the second offence, fines of up to RM2000 will be imposed, as well as a six-month jail sentence. However, despite the change in fines, Malaysians continue to disobey the legislation prohibiting the use of a smartphone while driving. People who never been fined for using smartphone while driving are continuously keep breaking the law because they does not know the fines imposed was involved a large sums of money.

Figure 6 shows that the characteristic which is accidents due to smartphone distraction influence the smartphone usage of respondents. When they are never been experience the accidents due to distraction of smartphone, they tend to use it without having any worry. Majority of the respondents who did not involve with accidents for the last three years are using the smartphone while driving. Most of the respondents who use smartphone while driving to receive and makes call, receive and sending text messages, surf social media applications, use smartphone as navigation and play mobile games are never been involved in accidents. It shows that that they do not have high confidence in the use smartphones can give a bad impression on driving performance.

3.3 To investigate the influence of smartphone, use while driving on driving performance.

3.3.1 Pearson correlation analysis

The Pearson's product-moment correlation coefficient method was used to measure the correlation between the variables in order to meet the goal. The samples are reliable and valid, as they were tested in previous tests. . The strength of the relationship can be determined via the Pearson correlation (r). If the r value is 0 it can be interpreted as perfect positive correlation while if the r value is -1, it can be interpreted as negative correlation. The r value can be used to determine the strength of a relationship between two variables [5].

3.3.1.1 Results

Table 2: The correlation between the independent variables and the dependent variables (N=384)

	RMC	SRM	NAVI	SMA	PMG	DP
RMC	1	0.146**	0.081	0.145**	0.141**	0.300
SRM		1	-0.048	0.160**	0.131*	0.096
NAVI			1	-0.016	-0.020	0.093
SMA				1	0.096	0.182**
PMG					1	0.146**
DP						1

N=384. RMC = Receive and Making Calls; SRM = Sending and Receive Messages; NAVI = Navigation; SMA = Social Media Application; PMG = Play Mobile Games; DP = Driving Performance

**. Correlation is significant at the 0.01 level (2-tailed)

*. Correlation is significant at the 0.05 level (2-tailed)

3.3.2 Multiple regression analysis

To find the predictor and its contribution to the criterion, researchers used multiple regression analysis. The goal is to find a single dependent variable's prediction from a set of independent variables. The assumptions of multiple regression must be strictly followed to ensure the appropriateness of the regression analysis outcomes. Normality, linearity, homoscedasticity, multicollinearity, autocorrelation, and multivariate outlier are all terms that refer to different features of the score distribution and the nature of the underlying relationship between the variables in this context.

3.3.2.1 Results

Table 3: Model summary of multiple regression analysis

Model	R	R square	Adjusted R square	Std. Error of the Estimate
1	0.353	0.125	0.113	0.75429

a. Predictors: (Constant), RMS, SRM, NAVI, SMA, PMG

b. Dependent variable: DP

Table 4: ANOVA of multiple regression analysis

Model		Sum of squares	df	Mean square	F	Sig.
1	**Regression**	30.708	5	6.142	10.795	0.000
	Residual	215.067	378	0.569		
	Total	245.775	383			

a. Predictors: (Constant), RMS, SRM, NAVI, SMA, PMG

b. Dependent variable: DP

Table 5: Coefficients of multiple regression analysis

Model		Unstandardized coefficients		Standardized coefficients Beta	t	Sig.	Collinearity Statistics	
		B	Std. Error				Tolerance	VIF
1	**Constant**	2.642	0.164		16.089	0.000		
	RMC	0.150	0.029	0.257	5.189	0.000	0.942	1.061
	SRM	0.017	0.029	0.028	0.571	0.568	0.946	1.057
	NAVI	0.054	0.034	0.077	1.597	0.111	0.989	1.011
	SMA	0.077	0.029	0.132	2.688	0.008	0.955	1.047
	PMG	0.073	0.038	0.095	1.932	0.045	0.963	1.038

a. Dependent variable: DP

3.4 Discussion

Based on the Table 2, the Pearson correlation value, receive and making calls shows r=0.300, sending and receive messages shows r=0.096, navigation shows r=0.093, social media applications shows r=0.182 and play mobile games shows r=0.146. Thus, receive and making calls while driving have medium significant relationship with driving performance followed by surf social media applications while driving. As a result, there is a significant relationship between receive and making calls, sending and receive messages, navigation, surf social media applications, play mobile games while driving and driving performance.

From Table 3, it shows that the R value is 0.353, R square is 0.125 and the adjusted R Square is 0.113. The 0.125 of the R Square represents that there is 13% of the driving performance can be explained by the five independent variables which include receive and making calls, sending and receive messages, navigation, surf social media applications and play mobile games. It means the 13% have been significantly explained by the five independent variable while another 87% have another factors to explain.

From Table 4, F value (5, 378) proven to be significant at 10.795; p=0.000 (p<0.001). The overall regression model with the five predictors include receive and making calls, sending and receive messages, navigation, surf social media applications and play mobile games are well explained the variation in driving performance.

From Table 5, the factors whether they are significant predictor for driving performance towards smartphone usage while driving are determined. When the significant level of the variable is less than 0.05, this shows that the particular factor is the significant predictor for the research model. Receive and making calls, navigation, surf social media applications and play mobile games have a significant level 0.000, 0.008 and 0.045 respectively. Thus, all the four independent variables are the significant predictor for the driving performance towards smartphone usage which having the significant level less than 0.05. While for the beta, the most influence of smartphone usage while driving on driving performance is receive and making calls 0.257 followed by surf social media applications and play mobile games which are 0.132 and 0.095 respectively whereas the least influence of smartphone usage while driving on driving performance is use smartphone as navigation and receive and sending text messages which are 0.077 and 0.028 respectively. Overall the most significant predictor in this research project is receive and making calls while driving.

4. Conclusion

In conclusion, the results obtain from this research indicate that most of the smartphone usage which is making and receive calls while driving tend to influence the driving performance. The characteristic that influence the use of smartphone while driving is driving experience less than 5 years, the license owning period less than 5 years, when the driver is driving alone, type of trip which is mandatory activities, does not involve in traffic offence due to smartphone usage while driving and does not involve in accident due to smartphone usage while driving.

There are several recommendations that could be made further research regarding relationship between smartphone usage while driving and driving performance in order to prevent using smartphone while driving. The results of the survey study helped acquire information on which group of people are likely to be involved in the smartphone distraction. All the information are useful for determining strategies and developing the campaign to targeting specific groups.

The effectiveness of smartphone restrictions in the state should be assessed using the data from the above survey study. If the state's distracted driving performance data is available before the prohibitions on smartphone use, a before and after research can be undertaken with proper control and comparisons to examine the effectiveness of the bans on smartphone usage while driving. Statistical tests can be performed to see if smartphone bans are linked to a significant reduction in smartphone use while driving safely. When combined with crash data, the effectiveness of smartphone bans can be assessed in terms of the change in distraction-related crashes prior to and after the bans enforcement. Enforcing the smartphone restrictions will help raise awareness about the dangers of using a phone while driving and, in the long run, minimize distracted driving behaviour.

In addition, as part of a complete strategy to counter smartphone use while driving, public awareness programs to enhance public understanding of distraction and encourage safe driving activities are essential. Smartphones have grown increasingly integrated into many parts of our professional and personal life, making the necessary cultural shift toward accepting the dangers of using a smartphone while driving more difficult to achieve. Education is an important part of the 3E method to change distracted driving behaviour and creating a distracted driving-free culture. Based on the results of the above study survey, educational materials can be designed to target specific demographics

who are involved in distracted driving. For instance, implementing the educational materials into subject in school for kids in order to expose them the dangers of distracted driving before they are allowed to drive and how to avoid them.

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