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A Study of Driving Behavior and Smartphone Usage Among University Students

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Abstract: This study was conducted to obtain more accurate and detailed data on driver behavior and smartphone use among university students while driving. A field study about taking speed data using Laser Speed Gun was undertaken to make self-observations on road users from the way from IIUM Pagoh to UTHM Pagoh, Johor. 20 drivers representing 10% drive while using a smartphone. 90% of drivers equivalent to 180 drivers drive by not using a smartphone. A total of 2 female drivers (10%) drove while using a smartphone. A total of 18 male drivers (90%) drove while using a smartphone. It can be concluded that male drivers are more likely to use smartphones than female drivers. 50 university students were interviewed and questioned to gain insight into their perspectives on the usage of smartphones while driving. Drivers should take more proactive actions such as reducing the use of smartphones while driving for the safety of themselves, passengers, and other drivers to prevent unwanted things from happening.

Keywords: Distractions, Driving, Smartphone, University Students',

1. Introduction

The Traffic Safety Research Institute (MIROS) reported that human irresponsibility, non-compliance with road laws, and rapid driving were responsible for 80.6% of all accidents. The police focused on six offenses during the main Op Selamat 15/2019, and one was using a smartphone while driving. According to the report, one of the key reasons for the insanely high percentage of car ownership is the desire of youngsters to own their vehicles [1]. The younger generation uses their smartphones while driving long distances. It appears that using the phone while driving has become a habit, whether to answer calls, utilize GPS to get directions, or play social media apps like Facebook and Instagram. However, drivers should be wise in using a smartphone as there are situations where a

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smartphone is not suitable for use at the time. The risk of a car accident is very high which can threaten the lives and safety of drivers, passengers, and even other road users [2]. It is the responsibility of every driver to reduce the risk of accidents on the road and ensure the safety of passengers [3].

Several types of distractions prompt the driver to use a smartphone while driving. This type of distraction is divided into three parts namely, manual disruption, visual disruption, and cognitive disruption [4].

1.1 Manual Disruption

When the driver must hit a button, activate the smartphone display, or answer a call while driving, this is referred to as manual disruption. The driver will automatically remove one hand from the steering wheel, even if only for a few seconds, which could lead to an accident. According to studies, texting messages reduce driving performance dramatically. Driving skills are also harmed when talking on the phone or texting while driving. When driving while on a smartphone, the capacity to pay attention to the road ahead, react to previous occurrences, avoid unexpected crossings, and keep control of the vehicle are all greatly impacted [5].

1.2 Visual Disruption

Drivers are frequently distracted whenever they look away from the road to look at applications on their smartphones. When a driver looks aside from the road, he or she loses focus on driving and the surrounding environment. This is typically done by drivers who are irrational and unqualified to put other road users in danger. Changes in incident risk as a result of using a phone while driving were also investigated utilizing road studies. The most current and largest naturalistic study in the United States, the Second Strategic Highway Research Program for Naturalistic Driving Research (SHRP 2 NDS), collected data from over 3500 drivers over three years [6]. Changes in accident risk as a result of using a phone while driving were also investigated utilizing road studies.

1.3 Cognitive Disruption

Cognitive disruption is a condition or disorder that affects one's ability to think and reason. These people will have issues with memory, perception, and learning [7]. Drivers, for example, are either daydreaming or wandering and imagining into the clouds, leaving them unable to focus on the road. It is common for drivers to return home after a long day at work. When people are fatigued, they often think about their homes, their food, and how much sleep they need. When it comes to fully understand these forms of distractions while driving, studies have discovered that when a driver uses a smartphone while driving, it covers all the types of distractions listed above [8].

Smartphones have many benefits as well as downsides, such as addiction and the tendency to gaze at the phone screen while driving. The following information pertains to Malaysian road accident statistics, which have increased by 2.8 percent from 467,196 in 2014 to 489, 606 in 2015 [9]. To avoid accidents, every driver must be cautious and focused when driving [10]. Statistical results were established for five measures on self-reported knowledge of traffic safety attitudes and awareness among genders [11].

This research aimed to analyze driver attitudes and the frequency of smartphone use while driving. In addition, this study is also to identify the effects of smartphone use while driving among university students. A study was carried out to observe road users from the International Islamic University Malaysia, Pagoh Campus to University Tun Hussein Onn, Pagoh Campus, Johor. The total number of data samples taken was 200 vehicles. A total of 50 respondents were interviewed to assist the study by answering some questions provided by the researcher. The results of the research were analyzed in the form of a percentage of driver attitudes and frequency of telephone use while driving.

2. Material And Method

2.1 Methods

The research was carried out according to the flow chart in **Figure 1**. The procedures followed during this study are indicated in the diagram.

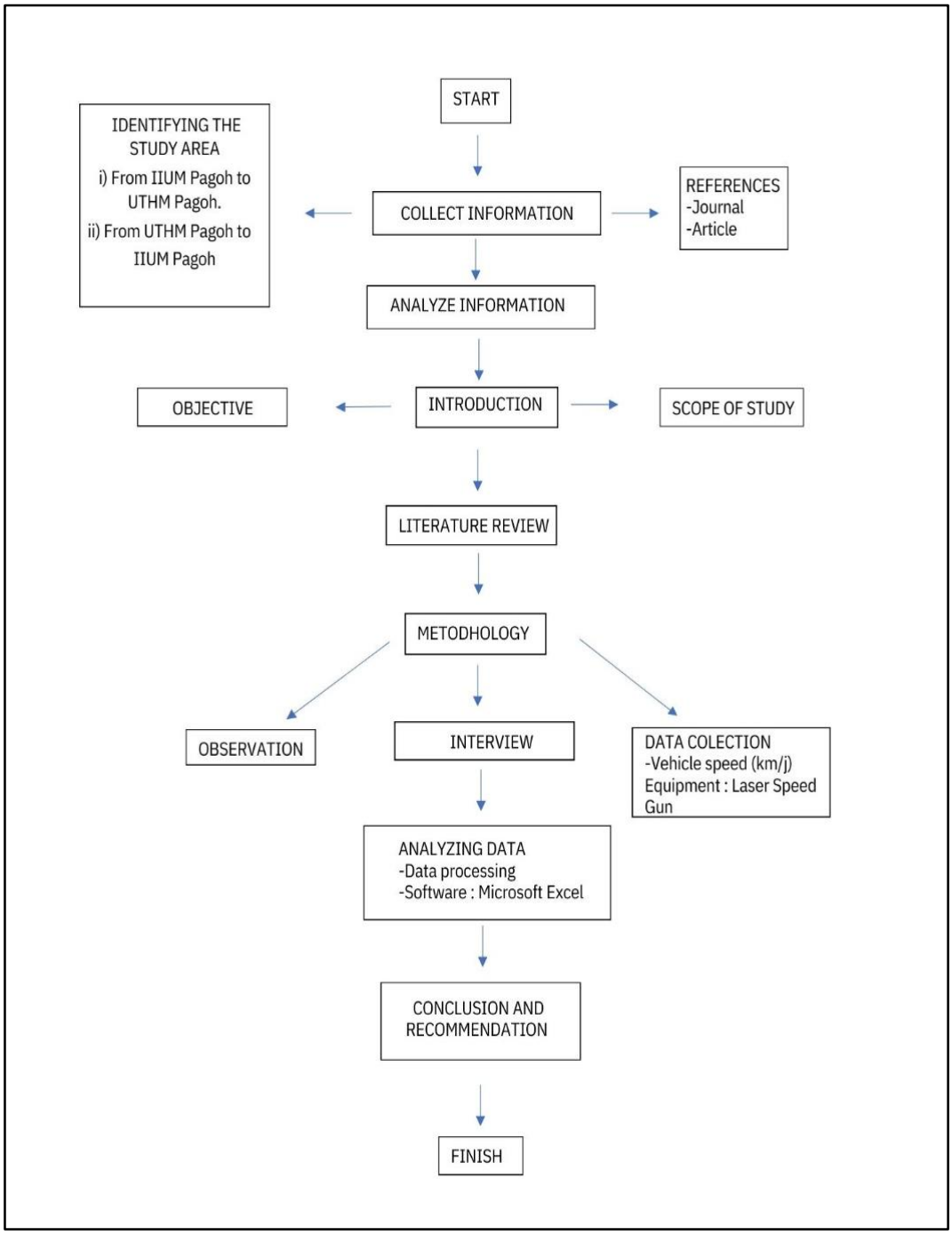

Figure 1: Flow Chart of Methodology

2.3 Location Identification

For the study location, the researcher will take data around the central campus area of Universiti Tun Hussein Onn Malaysia (UTHM), Pagoh. The specific location to record the data done by the researcher is in front of the UTHM Pagoh campus where there is a bus stop in the area. The researcher

recorded the data in area A as shown in Figure 2. The selected area is shielded from the view of the driver. Vehicle speed is taken from both directions, namely from the direction of UTHM Pagoh to IIUM Pagoh and from the direction of IIUM Pagoh to UTHM Pagoh to obtain various data. Researchers conduct observations based on a strategic location to capture data and record data perfectly. **Figure 2** shows the location of data acquisition taken from satellite images.

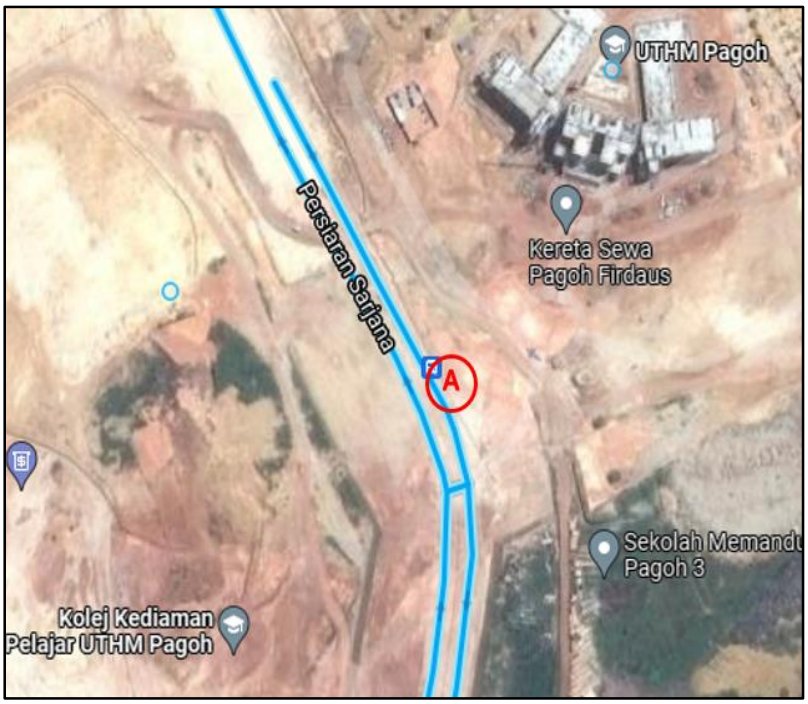

Figure 2: **The location of data acquisition taken from satellite images.**

2.2 Data collection

Study data will be taken based on observations, interviews, and vehicle speed taking using a laser speed gun. The data obtained are random data and will be analyzed using Microsoft Excel software.

2.2.1 Observation

Researchers identified the gender of the driver and the class of vehicles passing through the study area. Data collection was conducted on a normal working day which is Thursday. A total of 200 vehicles were observed to collect this data. The observers should be cautious during the observation process because there will be slight errors such as a few vehicles slowing down the vehicle and stopping from doing other activities besides driving while using a smartphone.

2.2.2 Interview

50 UTHM Pagoh students were interviewed to hear their opinions on the use of smartphones while driving. Interviews were conducted for around 5-10 minutes for each respondent. Each respondent answered the same question so that the information obtained is consistent and avoids the occurrence of question deviations that are not related to the objectives of the study conducted and facilitate the process of data analysis.

2.2.3 Speed Data

Each researcher plays an important role, such as recording data, recording speed data using a laser speed gun, and making gender identification as well as the use of smartphones while driving. A laser speed gun uses infrared laser light. The gun calculates the number of nanoseconds needed for a round

trip, and by dividing by two it can calculate the distance to the car. As a safety measure when recording data, researchers must wear safety jackets and safety helmets.

2.3 Analysis Data

Data was taken around peak time which is between 11 am to 1 pm. All genders were recorded and entered the speed data table. Total of 200 vehicles will be recorded at random. A laser speed gun is used to detect vehicle speed limits according to vehicle class. Each observed vehicle data is recorded into a table that has been classified into gender, vehicle class, and smartphone usage. The data is then transferred into Microsoft Excel to further facilitate the process of analyzing the data. The data results from observations using the laser speed gun are shown in the form of graphs. The percentage of gender and smartphone usage will be formed on a pie chart.

As a precaution, a laser speed gun must always be hidden from the view of drivers to prevent them from realizing and hiding their smartphones as well as slowing down their vehicles. Next, data will be recorded for drivers who use a smartphone while driving, and those who do not use a smartphone also be recorded in the speed data.

3. Results and Discussion

3.1 Interview Data

As shown in **Table 1**, 44% of respondents stated that they do not often use smartphones while driving at a rate of once an hour. In addition, as many as 36% of the respondents stated that they use a smartphone while driving at a regular rate of two to three times an hour. The remaining 20% of the respondents stated that they often use smartphones while driving long distances. The average respondent was found to use a smartphone four to five times an hour for a specific purpose. Drivers should take more proactive actions such as less use of smartphones while driving for the safety of themselves, passengers, and other drivers to prevent unwanted things from happening.

Table 1: Percentage of Frequency of Smartphone Use While Driving

Frequency	Percentage (%)	Total
Not often	44	22
Often	36	18
Very often	20	10

The majority respondents stated that they use their smartphones while driving for navigation, listening to music, and changing tracks via Bluetooth, which can be connected to the car radio. While driving, 20% of respondents use their smartphones to respond to messages and make emergency calls. Furthermore, 13% of respondents use their smartphones for social media to pass the time while driving long distances.

According to several responders, one of the consequences of using a smartphone while driving is that the driver would lose focus and may cause an accident. It poses a significant risk to drivers, passengers, and other road users. Then there are those who say they are more confident in their ability to go to their intended destination. Drivers can also check navigation apps like Waze and Google Maps to see if there is traffic. Drivers can avoid clogged highways by taking a different route. Furthermore, using smartphones while driving long distances is thought to reduce tiredness and boredom while driving. The impact of smartphone use is seen to have both positive and negative effects on drivers. Drivers need to be careful and prudent in the use of smartphones while driving and take care of the lives of drivers and passengers by reducing the risk of accidents.

3.2 Vehicle Speed Data

As a result of the observation of vehicle speed limit data that has been conducted in the UTHM Pagoh area, the researchers have analyzed the results from the data obtained. Data was taken on Thursday between 11.00 am to 1.00 pm. The sunny weather conditions further facilitated the data collection process. A total of 200 vehicles were successfully observed along with gender according to vehicle class.

There are a total of 200 drivers that the observance obtained. 160 of them are men which consists of 80% of the drivers and another 40 drivers are women which consists of 20% of the drivers. The data might be slightly different because of drivers' car-tinted windows and the distance between the observers and the vehicles. Vehicle and gender classes are presented in a descriptive form to facilitate the analysis process.

Table 2: Distribution of the Number of Vehicles by Vehicle Class

Item	Vehicle Class	Number of Vehicles	Percentage (%)
1	1	23	11.5
2	2	127	63.5
3	3	26	13
4	4	24	12

Table 2 shows the distribution of the number of vehicles by vehicle class. There are four vehicle classes, they are Class 1 (motorcycle), Class 2 (car), Class 3 (van and medium truck), and Class 4 (lorry and bus). The researchers obtained a total of 23 vehicles from Class 1 (11.5%), 127 vehicles from Class 2 (63.5), 26 vehicles from Class 3 (13%), and 24 vehicles from Class 4 (12%).

Figure 3 shows the percentage of smartphone usage while driving. A total of 200 vehicles were observed, with 20 drivers representing 10% that drove while using a smartphone. 90% of drivers equivalent to 180 drivers drive by not using a smartphone. As mentioned above, the drivers' car-tinted windows are one of the reasons the result might vary because it's hard for the researchers to observe whether the drivers are driving while using their smartphones or not.

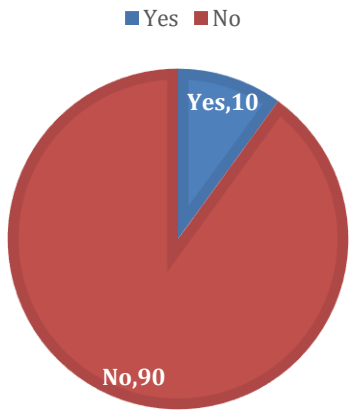

Figure 3: Percentage of Smartphone Usage While Driving

Table 3 illustrates the percentage of vehicle speed for drivers who drive using a smartphone-based on vehicle speed. Each vehicle speed limit interval is ten for each interval. The middle of the value class is taken, and x is taken and multiplied by the frequency to get the value of fx. The percentage value for each class is taken by dividing the frequency by the total frequency, then multiplied by one hundred. For cumulative percentages, the value of each percentage is added based on each interval. The final

cumulative percentage must be 100%. This table is built to facilitate generating histogram graphs as in **Figure 4**. The total frequency of drivers driving while using a smartphone is 20 drivers.

Table 3: Vehicle Speed Limit Frequency for Drivers Who Use Smartphones While Driving

Vehicle Speed Limit (km/j)	Middle Class, *x* (km/j)	Frequency, *f*	*fx*	Percentage in The Class (%)	Cumulative Percentage (%)
31-40	35.5	0	0	0	0
41-50	45.5	1	45.5	5	5
51-60	55.5	8	444	40	45
61-70	65.5	4	262	20	65
71-80	75.5	6	453	30	95
81-90	85.5	1	85.5	5	100

Figure 4 shows a histogram graph of the percentage in class with vehicle speed for drivers driving while using a telephone. The speed limit for the 51-60 km/h class shows the highest percentage value with a value of 40% equivalent to eight drivers out of twenty vehicles. Followed by a vehicle speed limit between 71-80 km/h with a percentage of 30% with the number of six drivers. The middle class can be seen as a vehicle class with a speed limit of 61-70 km/h with a total of four drivers. Vehicle speed limits for intervals of 41-50 km/h and 81-90 km/h show the value of the same percentage of drivers which is only 5% which is equivalent to one driver. No driver using a smartphone drives less than the speed limit of 40 km/h and more than 91 km/h. Therefore, the mode class for vehicle speed limit is 61-70 km/h for drivers who drive while using a smartphone.

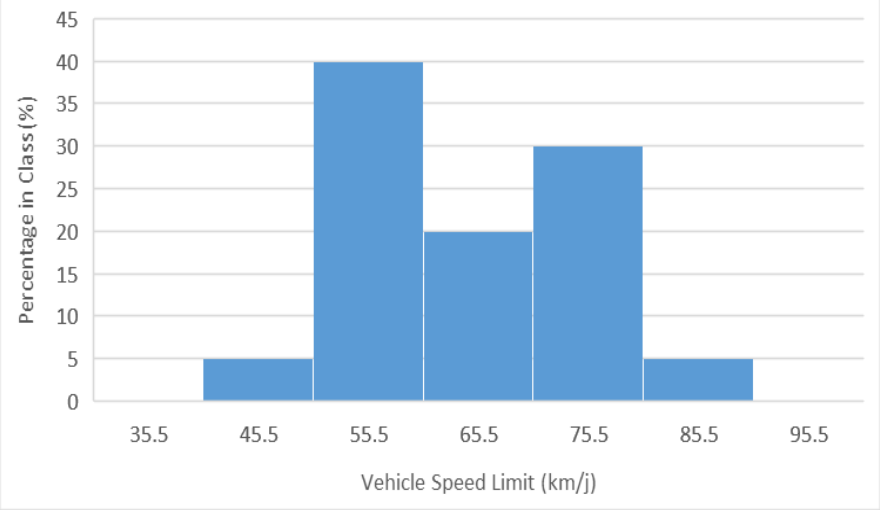

Figure 4: Percentage in Class with Vehicle Speed Limit for Drivers Driving While Using a Smartphone

Several recommendations are suggested to reduce the habit of using smartphones while helping to reduce the risk of loss of focus and accidents on the road. The recommendations given are expected to reduce the frequency of smartphone use while driving. The first suggestion is to encourage vehicle sharing to a place either for long-distance or short distance or the term carpool. Vehicle sharing can not only save the cost of vehicle fuel, but it can also eliminate drowsiness by inviting you to chat and be a driver's companion. Passengers should also play a role in helping drivers to see directions either using Waze or Google Maps. In addition, rotation while driving is especially for long-distance driving. Drivers will quickly feel tired and lethargic if only one person must drive. Rotation while driving can give each driver rest and calm while continuing the journey. The journey can be continued more quickly as each driver can rest adequately while waiting for his turn. However, if driving alone, it is very

important to get adequate rest before driving to avoid the occurrence of microsleep. Lastly, install Car Android/Apple Player on the vehicle. The software created has combined the functions of a smartphone and an infotainment system on the car to fill in the desired location and setting on the system. The use of smartphones can be minimized. Awareness and measures to reduce the risk of accidents due to the use of smartphones should be taken appropriate action by all parties. Awareness should be given to young people, especially university students.

4. Conclusion and Recommendations

In conclusion, based on observations and the observations of our research conducted in the field center point, the average driver of various types of vehicles, such as first-class (motorcycles), second class (cars), third class (vans and trucks medium), and fourth class (buses and large trucks) and different genders, do not use a smartphone while driving. Only 10% of drivers (out of 90%) use their phones while driving. Furthermore, based on the interview data we gathered, most respondents claimed that they use their cell phones less while driving, but only in the early hours. They begin to use their cellphones solely for certain objectives, such as browsing Waze applications and Google Maps for their destination, in the second hour and so on. However, responsible drivers should conform to the standards of the road to the best of their abilities to avoid road accidents for the benefit of other road users. Furthermore, we have seen a moderate number of drivers operating automobiles with speed limitations (80 km/h to 51 km/h). This is since the route between the UTHM and IIUM campuses is somewhat narrow. As a result, it's possible that the motorist is more cautious when driving on roads that are somewhat less well-maintained and when most of the road is potholed. Finally, according to the poll results, most drivers do not use their phones while driving and drive cars with speed restrictions. Drivers should take more proactive actions such as less use of smartphones while driving for the safety of themselves, passengers, and other drivers in order to prevent unwanted things from happening.

For upcoming researchers who would like to pursue further research in the field of Highway and Traffic Engineering, several suggestions and enhancements should be provided. Based on the researcher's experiences while working on this thesis. The first advice is to plan out your time for observing the driver's conduct while they are driving more attentively. The researcher should conduct the study for several days in order to analyze the driver's behavior more deeply. Finally, to further limit the study's potential scope.

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