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Observation Study on Distracted Driving Behaviour in Shah Alam Area

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Abstract – *Distraction while driving among drivers is one of the factors which cause road accidents. Data from the Ministry of Transport Malaysia shows that accidents involving cars, vans, buses, lorries, 4-wheel drives and taxi drivers contribute to road accidents which involve 787,237 cases that is 82% from total cases in 2016. Distraction while driving is involving the lack of focus of a driver due to another task doing instead of driving. The distraction while driving includes mobile phone use, manipulating car navigation system devices or car's features, eating or drinking, interaction with passengers and smoking. In Malaysia, there is not enough data regarding driver distraction. For example, research from the Malaysian Institute of Road Safety Research (MIROS) only depends on the survey regarding driver distraction while driving. The objective of this research is to determine the portion of drivers in Shah Alam who involve in the form of distracting activities while driving. The method for this research is a set of questionnaires to survey the distraction influenced by the age of the drivers. Next, a method of a real-life observation by using a high definition camera from upper view. The collected data is to investigate the differences between gender and between peak and non-peak hours for distracted driving. The observation took place in three selected locations which is the major road that consists of three lanes in Seksyen 7, Seksyen 19 and Seksyen 21. It is obtained that 9.5% of drivers observed in Shah Alam are distracted while driving. Next, the male is more into smoking compared with female. There is a slight difference between the other types of distraction. Next, as in total, peak hour shows that drivers tend to be distracted more than a non-peak hour. As for gender, younger drivers tend to be distracted by mobile phones compared with older drivers.*

Keywords: Distracted driving behaviour, real-life observation study, mobile phone use, road safety

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1.0 INTRODUCTION

In recent days, transportation becomes something that is important to the community. It is an important element for the community to travel anywhere for various reasons. This is due to the distance, time and human energy that escalates the use of transportation in daily life. One's might use a car to go to the workplace, shopping, travel to hometown and many more.

Road transportation such as cars, taxis and buses are the choices for the community to travel. With the use of transportation, there are possibilities for accidents to occur. Road accidents could lead to fatalities of the driver or the passengers. In the year 2016, there were 960,569 road accident cases were recorded and involved with 7,152 fatalities (0.74%) (MOT, 2016). The trend data from the Malaysian Institute of Road Safety Research (MIROS) shows that road accidents gradually increase from 341,252 cases in 2006 to 960,569 in 2016 which is 64% cases increases. An indication of increasing trend of road accidents, the government under MIROS has launch Road Safety Plan 2011-2020 (MIROS, 2016). The purpose of this plan is to reduce road accidents in Malaysia that cause silent fatalities in Malaysia and give awareness to road user regarding road safety.

The number of road accidents recorded gives something to be improved. Something or any task that related to the drivers on how he or she drives the vehicle could lead to safe driving or not. For example, driving with exceeding speed limits could get a ticket by the authorities. This approach is one of the ways to reduce accidents as the drivers aware of the speed limit and could lead to safer driving.

The authorities in Malaysia also take seriously on mobile phone use while driving. This behaviour will lead the driver to lose focus while driving and increase the possibility of involving an accident. Drivers who are being caught using a mobile phone while driving will get a ticket or fine. A finding by McEvoy in the year 2007, road accidents that involve vehicles on the road contribute at least one over four from the total number is caused by driver distraction while driving (McEvoy et al., 2007). The number of road crashes in Malaysia might increase as our world now is moving forward aligned with the improvement of portable technologies such as smart mobile phones and also car navigation systems. These portable devices could lead to their usage in a car by the drivers while driving and the probability of the risk for the accident is also increased. A study from MIROS that is related to driver distraction was performed in Klang Valley involving 300 respondents that give the result of 43.4% of the respondents use the phone while driving and 61.9% use the phone while stopped at the red light of traffic light (Abu Bakar & Osman, 2016). These results show that nearly half of the respondent is putting themselves in danger and could lead to the risk of an accident.

Furthermore, in Malaysia, the data regarding driver distraction issues is still lack. The available research is only depending on the survey on how the drivers behave while driving. Thus, this research is trying to enhance the data available in Malaysia regarding distraction issues. From this research, we also tried to identify the distraction based on age, time-based and gender.

The main objective of this research is to investigate the portion of Shah Alam drivers that involve in a distracting manner while driving and the type of distraction that they involved in.

2.0 LITERATURE REVIEW

Driver distraction could be defined as more time taken for a driver to deliver high capabilities to control the wheel with highly manner in the presence of some objects, events, activity or persons inside or outside of the vehicle that give the possibilities to the driver to lose their judgement and focus while driving (Young et al., 2003). There are four main types of driver distractions which are manual distraction, audio distraction, visual distraction and cognitive distraction (Regan et al., 2011). Manual distraction is a distraction that involves the use of driver's hand regarding any event such as manipulating car features, mobile phone usage smoking and others (Chen & Donmez, 2016). Next, audio distraction which is the involvement of sound within or outside of a car such as radio sound and the sound of other car's exhaust system that could attract the hearing of a driver that could lead to losing focus of driving task (Martens & van Winsum, 2000). Furthermore, visual distraction mostly involves what outside the driver's car such as billboard sign that could attract the driver's eyes off the road (Yellapan et al., 2016). Next, cognitive distraction which is the involvement of the mind that was thinking of other things instead of driving task that could lead the driver to lose focus while driving (Llaneras, 2000).

A study from the National Highway Traffic Safety Administration (NHTSA) in the year of 2013 shows that 411 crashed were involved with mobile phones as a distraction. Fatalities involved in the accidents are 14% out of distracted affected fatal crashes (Abu Bakar & Osman, 2016). Table 1 shows that the numbers are considered high and show that mobile phone is one of the contributors to road accidents. The frequent check of the mobile phone while driving such as scrolling social media, calling or texting could be the attitude of the driver himself or herself. This shows that the drivers are risk-taker and maybe not aware of the danger of using mobile phones probably because no experienced in road accidents.

Table 1: Road Accidents Report 2013 by NHTSA

	Crashes	Drivers	Fatalities
Total fatal crashes	30,057	44,574	32,719
Distracted-affected fatal crashes			
Number	2,910	2,959	3,154
Percent of total fatal crashes	10%	7%	10%
Mobile phone in use in distracted-affected fatal crashes			
Number	411	427	445
Percent of fatal distracted-affected crashes	14%	14%	14%

Source: U.S. Department of Transportation, National Highway Traffic Safety Administration (NHTSA) 2013.

Distracted driving could lead to increases in the risk of road accidents (Tison et al., 2011). There are various pieces of evidence that show the risk of near-miss probability to an accident due to distracted driving. For example, a study involving participants in Transilvania University regarding advanced driver assisting systems (ADAS) to investigate if the participant will be distracted with in-vehicle smartphone-based ADAS. This study is a simulator study. ADAS aims to ensure that the driver's attention will be return to the road as the driver tends to use the smartphone most likely when distracted with social networking applications. ADAS reduced 43.43% violating of laws of using mobile phones while driving but there are still drivers that exposed to the road accident risks (Dumitru et al., 2018).

A study by Choudhary & Velaga (2017) shows that the driver tends to reduce their speed by 30% or more when using mobile phone or texting. This shows that the driver tends to use mobile phones when cruising at low speed most probably because they feel safer to use the mobile phone. A major road in Malaysia is classified into three lanes which are left one for normal speed, middle lane for higher speed and right lane is for overtaking vehicle. From the study by Choudhary & Velaga (2017), it could be said that drivers tend to use the mobile phone or any other manual distraction while in the left lane (Kevyan-ekbatani et al., 2016).

Another example of a study is the 15-second rule. This study has been done by Tijerinna et al. in 2000 to determine the result from static vehicles which are no motion involved and also for the moving vehicle. This approach required the participants to enter manipulate Global Positioning System (GPS), radio and air-conditioning control within 15 seconds. If they required more than 15 seconds, it is said that they are at risk for road accidents (Young et al., 2003).

All these examples of research and study are basically focused on the effect before and after secondary tasks such mobile phone usage, interaction with passengers, manipulating car's features, eating or drinking as for example for the workload or activities is put into test. The study on measuring the exposure to the driver's distraction is still on early stage. As for example, several studies from MIROS is basically a normal and simple survey that tackle the respondent regarding driver distraction issues.

The exposure of driver distraction could be obtained by several approaches such as naturalistic observation, roadside observation, cross-sectional survey and epidemiological approaches (McEvoy et al., 2007). Two main approaches to investigate the commonness of driver distraction are roadside observation and naturalistic studies. For example, truck drivers were investigated for naturalistic studies to obtain data regarding critical incidents and distractions (Blaschke et al., 2009). According to McGehee et al. (2007), based on their study with the approach of roadside observation finds that drivers were not only tending to use mobile phones as their source of distraction. He also finds that drivers also are distracted by the interaction with passengers, eating or drinking and manipulating car features (McGehee et al., 2007).

A research in England for driver distraction with observational study is also widely investigated using observational data. This study based on the placement of an observer at the roadside to observe the behaviour of drivers that passed by. This study shows that 14.4% of 7168 drivers observed were involved with several secondary activities while driving. The research finding which is the most frequently observed was the interaction with passengers, followed by smoking and using a mobile phone (Sullman, 2012).

In Malaysia, there are not sufficient data regarding driver distraction. The research from MIROS only focused on self-reported data which is a normal survey and the biased result could be obtained as the respondent could answer the survey without a true and valid answer. Therefore, this research is to add the data for a strong reason for a proper approach to reduce the accident rate in Malaysia.

3.0 METHODOLOGY

3.1 Survey (Questionnaire)

A set of questionnaires is constructed regarding the driving distraction. This survey is classified as self- reported data as the driver him or herself evaluate their driving behaviour. Nowadays, self-reported data becomes well-known in the research of traffic safety as it could show the differences of the individuals (Af Wåhlberg et al., 2015).

Two types of hand-outs of same questionnaire are prepared to be distributed to the public. The first one is manually distributed by printing out the questions. The questionnaire construct is by reviewing with NHTSA questionnaire (Tison et al., 2011) and also referring to driver behaviour questionnaire (DBQ)'s previous research (Stephens & Fitzharris, 2016). The target audience for manual hand-outs questionnaire was a person that is older in age.

Next, the survey is assisted by the use of Google Form as the tool for questionnaire survey and Whatsapp application as shown in Figure 1. The reason why manual hand-outs were prepared because the older audience might not be able to fill the survey by online form.

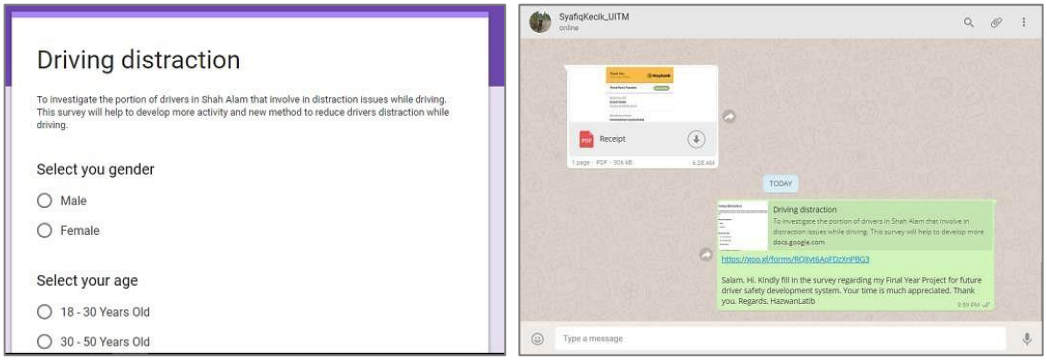

Figure 1: Google Form interface for survey

The audience or respondent was the person around Shah Alam by personally meet and the WhatsApp user basically that is known live in Shah Alam area such as groups of UiTM students. The questionnaire constructed is based on the research paper that continuously improved based on the comment on the unreliable and the biased question (Cordazzo et al.,2014).

This survey is focused on driver distraction and the relation of the distraction with the person or the respondent's age. The age is classified as young (18-30 years old), young-adult (31-50 years old) and Old (above 50 years old) (Stephens & Fitzharris, 2016). It is done as supporting data to investigate the age relationship with the distraction of drivers as age cannot be identified by an outside real-life observation method.

3.2 Real Life Observation

A cross-sectional study is done in the city of Shah Alam and a total of 18 hours of observation were taken under daylight hours. The observation was helped by the use of a camera as video recording tool for the purpose of video playback to detect driver distraction. The camera model is Olympus OMD EM-10 as shown in Figure 2.

Figure 2: Olympus OMD EM-10 camera used for observation

3.2.1 Camera Positioning

The observer takes place from upper view for each location from upper view (road crossing by means of bridge). The camera is set up with tripod as in Figure 3 to ensure the positioning of the camera to record the vehicles passes by the road. The camera was set into video mode to record the moving vehicles with the behaviour of the drivers while driving. The period for the camera to record the video was one hour for each location and selection time base.

Figure 3: Camera positioning for observation study

The camera and the observer were set to place at the upper view as mention earlier to record three lanes of the major road vehicles that pass by. Emergency vehicles such as ambulance and police vehicles are excluded from the observation. The observed vehicles were cars, vans, lorry and buses. This selection of vehicles was selected based on the previous research in Spain to avoid any form of selection bias (Prat et al., 2015).

It is almost impossible to observe all the vehicles that pass by regarding their driver behaviour. The video playback from the camera kept rolling to help on counting the cars and observed the driver behaviour related to driver distraction. Only the drivers that were clear enough to be observed been counted.

3.2.2 Location and Timing

The locations selected for the observation were the major road in Shah Alam area: (1) *Seksyen 7*, (2) *Seksyen 19* and (3) *Seksyen 21*. These locations consist of three lanes that are categorised as left (normal speed), middle (high speed) and right (overtaking lane). These locations were selected also because of the existence of upper pedestrian pass. This was to ensure the safety of the observer while the observation process is done.

The selection of these locations was based on random selection with the testing of availability of upper pedestrian pass and the availability of vehicles passed by. A pre-test was done to check the availability of the car with the assumptions of within five seconds, a vehicle was passed by the image in the camera. This approach was helped by the use of stopwatch. Each location was observed with a total of 6 hours for each location. The time was divided into peak and non-peak hours. Peak hours selected were between 8am-9pm and 5-6pm on weekdays and between 5-6pm on weekends. While for the non-peak hours were between 2-3pm on weekdays and between 8-9am and 2-3pm on weekends. Each of the locations was observed one day on weekdays and one day on weekends.

As for the survey, the online form was distributed for three weeks. The manual survey questionnaire was distributed within Shah Alam area. Figure 4-6 shows the location where observer places the camera for the observation purpose. The picture of map and 3D views was obtained with the help of Google Maps. The location for observer was marked with red line in the figures.

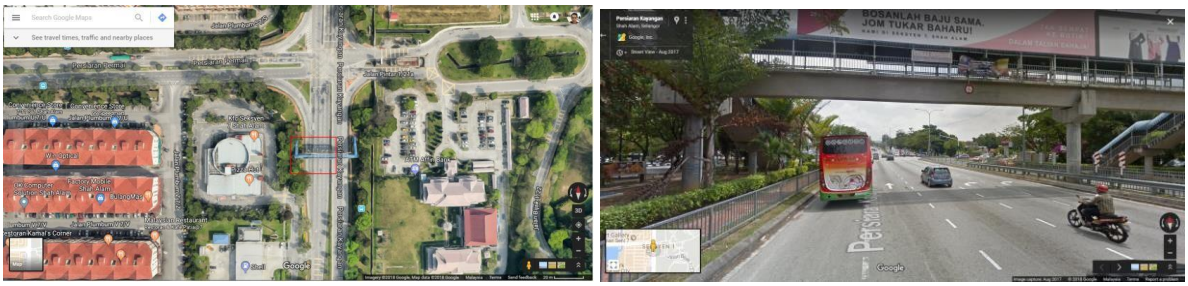

Figure 4: The location in Seksyen 7 for observation

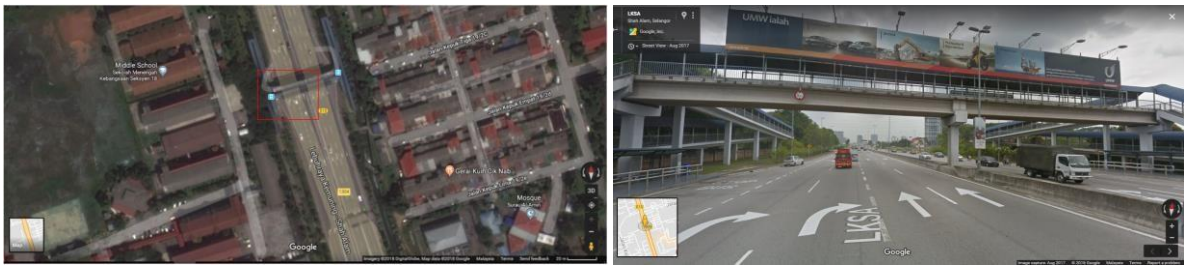

Figure 5: The location in Seksyen 19 for observation

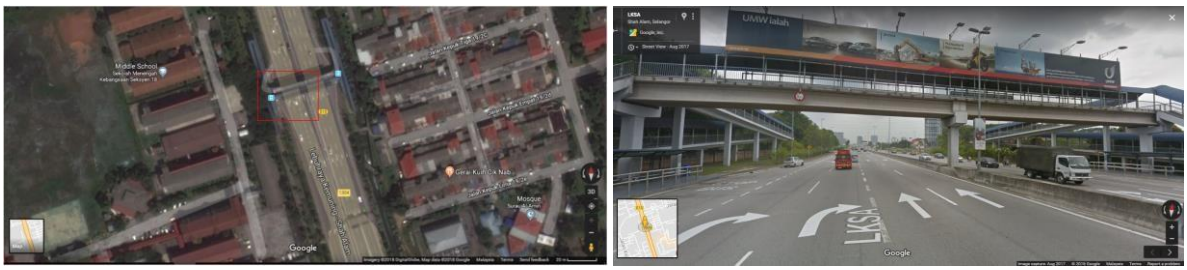

Figure 6: The location in Seksyen 21 for observation

3.2.3 Measures

The definitions of the secondary activities were referring to the National Highway Traffic Safety Administration (NHTSA) (2010). The categories and definitions used in this research were presented in Table 2.

Table 2: Definition of secondary task activities (distracted while driving)

Distracted Behaviour	Definitions	Example
Normal driving	The driver does not involve or engage in any distraction activity or secondary task while driving.	
Uses of mobile phone	The driver is observed engaging with his or her mobile phone while driving whether in a situation of holding it for texting or hold the mobile phone close to the ears.	
Eating or drinking	The driver is holding, eating or eating some form of foods or beverages in clearly visible behaviour.	
Smoking	The driver is observe lighting the cigarette, holding the cigarette by one hand outside the window or had a cigarette in their mouth.	

Distracted Behaviour	Definitions	Example
Interaction with passenger	This distraction is counted if only the driver was moving their lips or shows hand movement with at least one passenger in the car.	
Manipulating car's features	The driver is observed clearly manipulating the audio system, air-conditioning control or Car Navigation Systems.	

4.0 RESULTS AND DISCUSSION

Basically, the research was done to find out the number of drivers that considered distracted while driving. The video recorded by the camera can help in obtaining the numbers of distracted drivers by the playback of the video. Based on the video playback, the drivers were visible to be manually counted for each location. After obtaining the numbers of drivers that were distracted while driving, the comparison was done to determine the difference between gender, age and time-based. The data of the differences can be used in further studies regarding driver distraction.

4.1 Portion of Drivers in Shah Alam Involved in Secondary Task

Table 3 shows the total of 13,578 drivers were observed during the study. It was also showed the numbers of normal driving and distracted driving that are observed. As for the percentage, it could be said that 9.5% of the observed drivers were distracted while driving as shown in Figure 7.

Table 4 and Figure 8 show the number for each type of distraction that gives a total of 1,289 drivers. Interaction with passengers gives the highest percentage of distracted driver which is 30% followed by phone use which is 27% and the less frequent is eating and drinking, 10%.

Table 3: The total numbers of observed drivers

Behaviour	Seksyen 7	Seksyen 19	Seksyen 21	Total
Normal Driving	3,940	4,502	3,847	12,289
Distracted driving	403	410	476	1,289
Total	4343	4,912	4,323	
Grand Total				13,578

Table 4: The numbers of drivers that involved with secondary task

Driving Behaviour	Phone Use	Interaction with Passenger	Manipulating Car's Features	Eating or Drinking	Smoking
Numbers of drivers involved	354	390	242	128	175

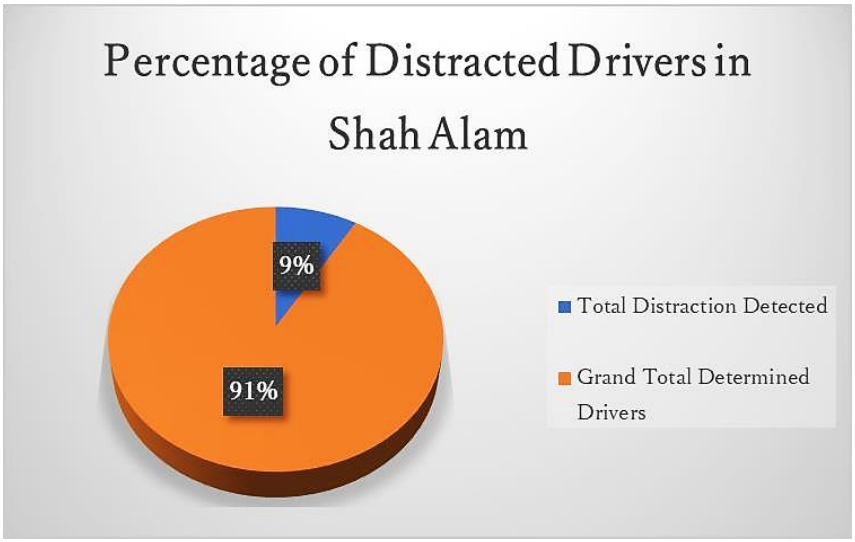

Figure 7: The percentage of distracted driver in Shah Alam

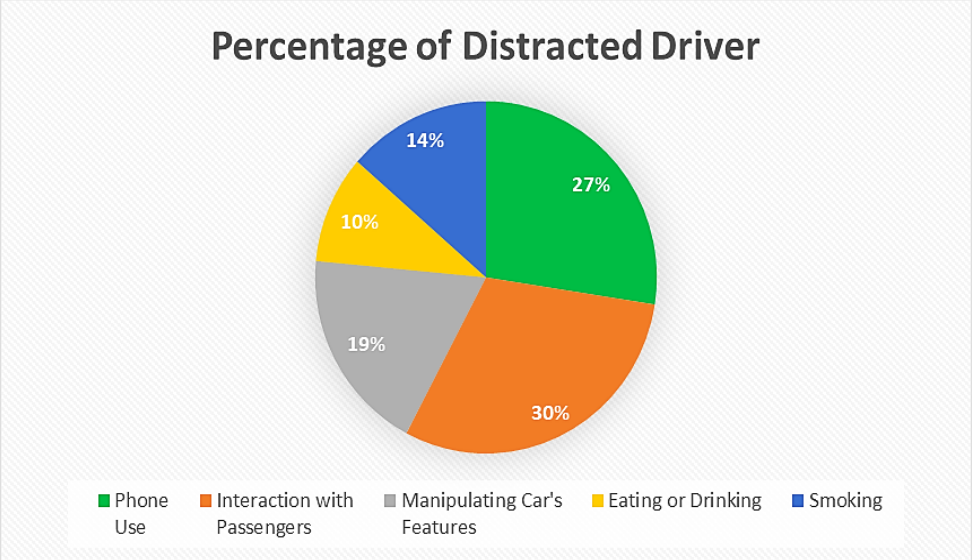

Figure 8: The pie chart of the percentage of distracted drivers

4.2 Comparison with MIROS Research on Driver Distraction

From this research, it was obtained that 9.5% of the total observed drivers were distracted while driving. The percentage shows a low value as compared with the findings by the Malaysian Institute of Road Safety (MIROS). Based on the finding by MIROS, Malaysian drivers that involve with secondary task or driving distraction while driving was 56.6% (Abu Bakar & Osman, 2016). From the value, it can be seen that the differences were large as more than half

of the respondents of their study were involved with distractions while driving and contrast with this research. The differences in the percentage were maybe due to the methodology of the study. MIROS's study was a study that focused on Klang Valley area and covered larger areas than current research. The methodology of the research was also different as this research focusing on real-life observation that is naturalistic study with a specific time and location.

5.0 CONCLUSION

The portion of 9.5% distracted drivers in Shah Alam was engaged in secondary tasks while driving, aware or not, they were putting themselves in dangerous situations that could lead to road accidents. Not just involves only themselves but might involve another road user that could lead to a bigger or catastrophic road accident. Further effort is needed to increase the enforcement of the law related to driver distraction. This is to ensure that everyone is aware the risk of driving with distracted manner and also to help reduce the numbers of road accidents in Malaysia

As for this research, the first is objective is achieved as the portion of distracted drivers in Shah Alam was recorded to be 1,289 drivers that were observed and manually counted. These numbers were contrasted with the research from MIROS that gave higher percentage of drivers who involved in secondary tasks. This was due to the limited location for this research which is only in Shah Alam. Although this number contribute only 9.5% distracted drivers, it is also giving impact to our road safety data in order to develop proper future plan in reducing road accidents.

The data in this research could help for future work aligned with the purpose to reduce the number of road accidents in Malaysia. All drivers in Malaysia should aware that secondary tasks while driving are exposing them to a risk of road accidents. An improvement in law regarding driver distraction also could be revised for the future.

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