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Private Vehicle Roadworthiness Inspection – Towards ELV Realization

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Abstract – *Being one of the most critical sectors worldwide, the rapid increase of automobility has necessitated effective management of End-of-Life Vehicles (ELVs). However, in Malaysia, an ELV policy and initiative is absent from the country's automotive ecosystem which resulted in a proliferation of aged and unsafe vehicles; thus potentially increasing the chance of occupant injury in a crash. The government had already mooted an ELV policy but due to public outcry, the proposed plan for the scrapping of aged vehicles was postponed. This paper aims to provide an overview of a potential private vehicle inspection to be introduced and also the challenges facing the government towards the implementation of the ELV directive in Malaysia. It is believed that the results presented in this paper will be useful to academics, government officials, and researchers to establish strategies for ELV policy in Malaysia effectively via a vehicle roadworthiness inspection.*

Keywords: Roadworthiness, inspection, End-of-Life Vehicles (ELV), vehicle safety

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1.0 INTRODUCTION

The automotive industry is one of the most critical sectors worldwide. In 2019 alone, almost 92 million vehicles were estimated to be produced to meet consumer demand, with Asian countries including Malaysia emerging as major vehicle producers (Statista, 2020). Statistics showed that 571,632 vehicles were produced in Malaysia in 2019 comprising 93% of private vehicle types (MAA, 2020). Besides, data from the Road Transport Department (RTD) for the year 2019 revealed that approximately more than 31 million units of vehicles were registered in Malaysia, with around 23 million categorized as active vehicles (RTD, 2019). This scenario points out that almost eight million vehicle units can be considered inactive. A vehicle becomes

inactive due to nonrenewal of road tax beyond three years according to RTD (RTD, 2019). Some of these inactive vehicles are still illegally driven on the road or off-road while some are permanently or legitimately retired due to several reasons including being not roadworthy, aged, or involved in a crash (Jawi et al., 2012).

Surprisingly, although consumer demand and the number of newly registered vehicles have increased rapidly, a policy regarding End-of-Life Vehicles (ELV) has never been introduced into Malaysia's automotive ecosystem (Jawi et al., 2017a; Solah et al., 2019). The government had already included a scrapping program in the National Automotive Policy (NAP) 2006 but due to public outcry, the proposed plan for the disposal of aged vehicles was canceled and replaced instead with a Voluntary Vehicle Inspection (VVI) policy in 2014 (MITI, 2014). Ironically, although determination of a vehicle age is one of the key action plans in *"Dasar Pengangkutan Negara 2019-2030"*, such a move is yet to be carried out (MOT, 2019). As a result, the situation leads to an "unhealthy" automotive ecosystem in the country.

A study by ERIA 2017 from an ASEAN region's perspective predicted that approximately 2.4 million vehicles would be categorized as aged or unfit by 2020 (Kojima, 2019). This would pose a challenge for ASEAN countries to manage ELVs if there were no proper regulations and infrastructures introduced by the governments. Many low- and middle-income countries (LMIC) allowed imported used vehicles to enter their automotive market to boost motorization with Malaysia being no exception. In ASEAN, only Singapore and Vietnam have specific regulations to limit vehicle age while the rest are yet to develop such measures. Malaysia, however, has a regulation to limit the usage period for commercial vehicles especially buses and taxis (APAD, 2019). Figure 1 below illustrates the ELV policy in the ASEAN region.

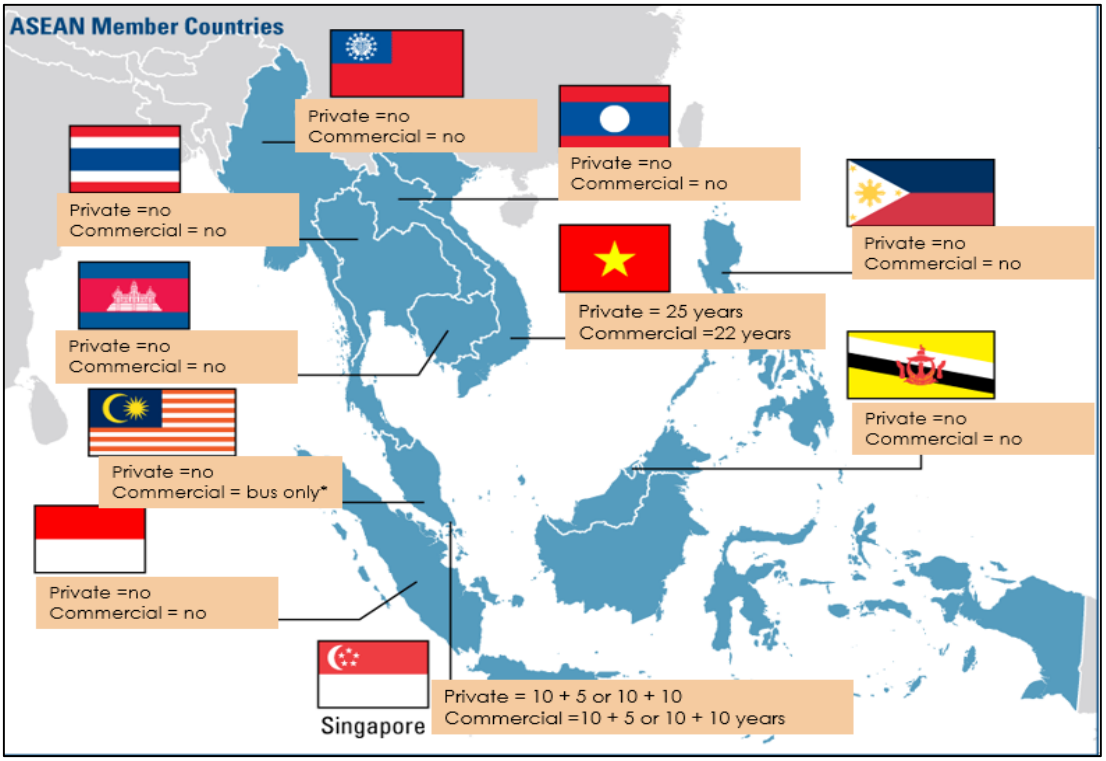

Figure 1: ELV policy in ASEAN countries (Clean Air Asia Center, 2016)

A study by Jawi et al. (2017b) on the Malaysian automotive ecosystem revealed an unhealthy situation in Malaysia especially due to the lack of roadworthiness of private vehicles, ELVs, and vehicle ownership situations. Figure 2 illustrates the automotive ecosystem whereby the ideal situation constitutes incoming vehicles to the system being balanced by the ELV policy (Jawi et al., 2012). However, in Malaysia's situation, an unhealthy ecosystem exists whereby the annual number of registered and active vehicles is high compared to the small number of retired vehicles. Statistics from RTD indicated that less than 11,000 vehicles were retired administratively (RTD, 2019). All these reasons suggest that ELV management is a crucial issue to be explored and deliberated over to benefit the public, the government, and our environment. The absence of an ELV policy in the country's automotive ecosystem could potentially increase the number of the less roadworthy vehicles, thus, increasing the risk of occupant injury in a crash.

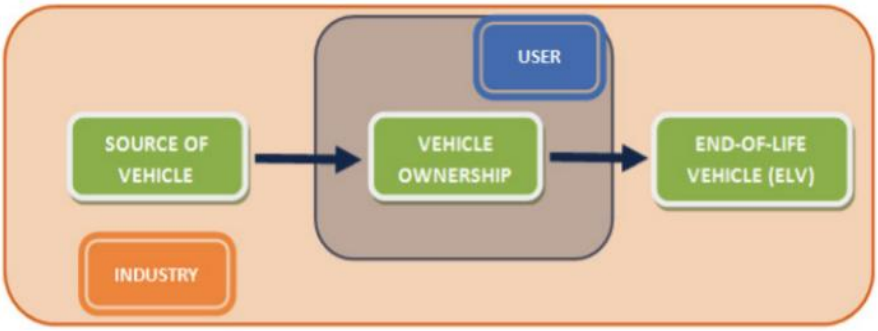

Figure 2: Generic automotive ecosystem (Jawi et al., 2012)

ELV policy in Malaysia is difficult to materialize due to economic challenges, public acceptance, and other reasons. The softer approach to introduce an ELV directive is by dealing with vehicle ownership through a vehicle roadworthiness inspection. Since vehicle inspections are already implemented in Malaysia for commercial vehicles, public rejection of its implementation for private vehicles can potentially be lower. A study by Solah et al. (2019) revealed that more than 50% of the respondents agreed that private vehicles also need to undergo periodical inspections at designated Periodical Technical Inspection (PTI) centers with minimum inspection fees and easy access to the PTI center. Therefore, this study is conducted to provide an overview of the potential private vehicle inspection as a catalyst to encourage the implementation of the ELV policy in Malaysia.

2.0 STATISTICS OF ROAD TRAFFIC CRASHES IN MALAYSIA

Since 2016, statistics have shown that the number of fatalities due to crashes has declined significantly from 7,152 to 6,167 in 2019, with approximately a 13% drop (PDRM, 2019). In addition, the number of fatal crash cases involving private vehicle types also showed a downward trend. Although the number of fatal cases has decreased, data revealed that private vehicle type is the leading cause of motorcycle crash fatalities (Abdul Manan & Várhelyi, 2012). There are three main factors of road crashes, namely the environment, road users, and vehicles (Zainal Abidin et al., 2012; JKJR, 2018; Rumar, 1985). Usually, road crashes result from a combination of these factors. In terms of vehicle factors of a road crash, based on 11-year PDRM data (PDRM 2010-2017), it was revealed that braking system defects contributed the highest number to road crashes with over 1,000 fatal cases. The second highest vehicle defect was related to tire defect (a combination of a bad and retreaded tire) with nearly 300 fatal accident cases (Solah et al., 2019; Abdul Khalid et al., 2018). Moreover, regarding the

service life of a vehicle, statistics showed that approximately 40% of vehicles over 10 years were involved in fatal road crashes (Sarani & Hashim, 2014). Such evidence suggests that unsafe and aged vehicles pose high risks not only to their occupant but to other road users as well. Therefore, it is very important to determine the "health condition" of a vehicle that can be used on the road to eliminating the risk of a crash.

3.0 PRIVATE VEHICLE INSPECTION IN ASEAN

All vehicles will degrade in performance. Thus, the role of a vehicle roadworthiness inspection is to ensure the accepted fitness of a vehicle according to certain standards for it to be on the road. There are numerous evidence-based studies worldwide showing the link between vehicle maintenance and technical defects. Statistically, vehicle defect-related crashes are significantly higher in low- and middle-income countries (LMIC) by up to 25% (DEKRA, 2005; Treat et al., 1977). A study conducted by Autofore (2007) revealed that a better roadworthiness level might be achieved by vehicles that have undergone periodical inspections. Over time, a vehicle will deteriorate proportionately with usage. By making periodical inspections compulsory, it will ensure that the vehicle is returned to the required standards (Autofore, 2007) (Figure 3).

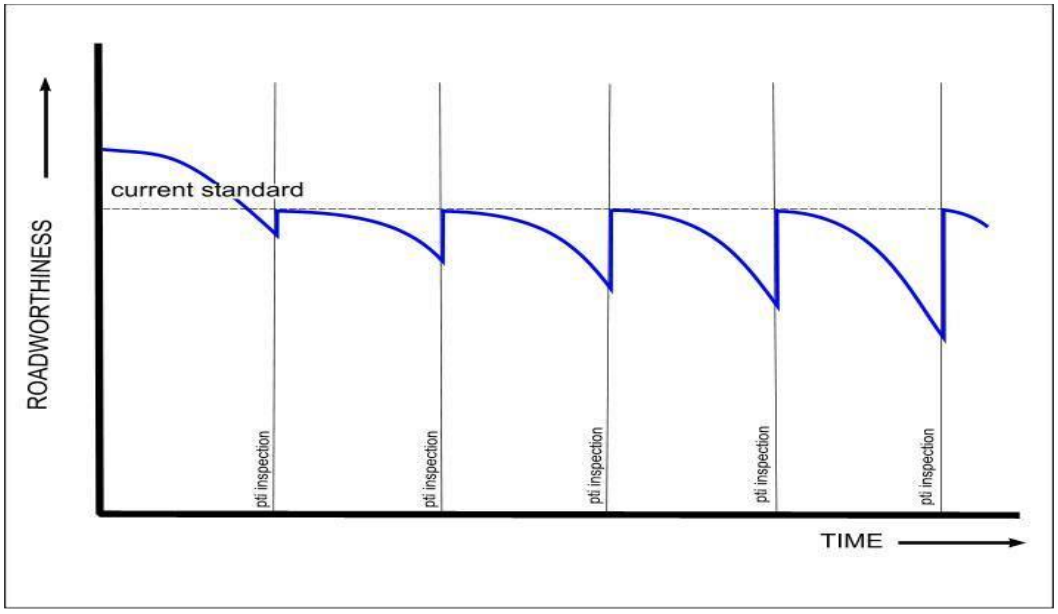

Figure 3: Rate of vehicle deterioration (Autofore, 2007)

Other than saving lives, vehicle roadworthiness also plays an important role in protecting the environment. Various studies conclude that vehicle emissions can seriously affect human health depending on the level of exposure, pollutant concentration, and individual health status (WHO, 2015; Adeyanju, 2018). By imposing periodical inspections on private vehicles, which statistically outnumber commercial vehicles, will hopefully help control air pollution due to land transport emissions thus decreasing the number of deaths across the ASEAN region due to acute and chronic respiratory diseases.

A roadworthiness inspection is significant to determine private vehicle safety and emission level. In the ASEAN region, only Malaysia and Cambodia are lagging in terms of the relevant legislation. Studies have shown that there is a significant difference in terms of implementation of the inspection especially concerning first-time inspection and its interval. Myanmar and Laos have the most stringent regulation whereby private vehicles must undergo

an annual inspection upon reaching one year of use. The Philippines, however, focuses only on emission tests with private vehicles reaching the three-year mark having to undergo an inspection. In Singapore and Vietnam, there is a two-stage implementation – the first being an annual inspection whereas, in the second stage, vehicles reaching a certain year will have to be inspected once every six months. As for Malaysia, a regulation to compel private vehicle inspections is still in the nascent stage. As mentioned above, beginning with the voluntary inspection and due to the emergence of e-hailing services, the number of private vehicles undergoing periodical inspections has increased dramatically (Muhammad, 2019). The motorcycle is also categorized as a private vehicle. Nevertheless, in the ASEAN region, only Singapore, Vietnam, Brunei, and The Philippines have implemented the private vehicle inspection for motorcycles. Figure 4 illustrates the different compliance schedules of private vehicle inspections in the ASEAN region.

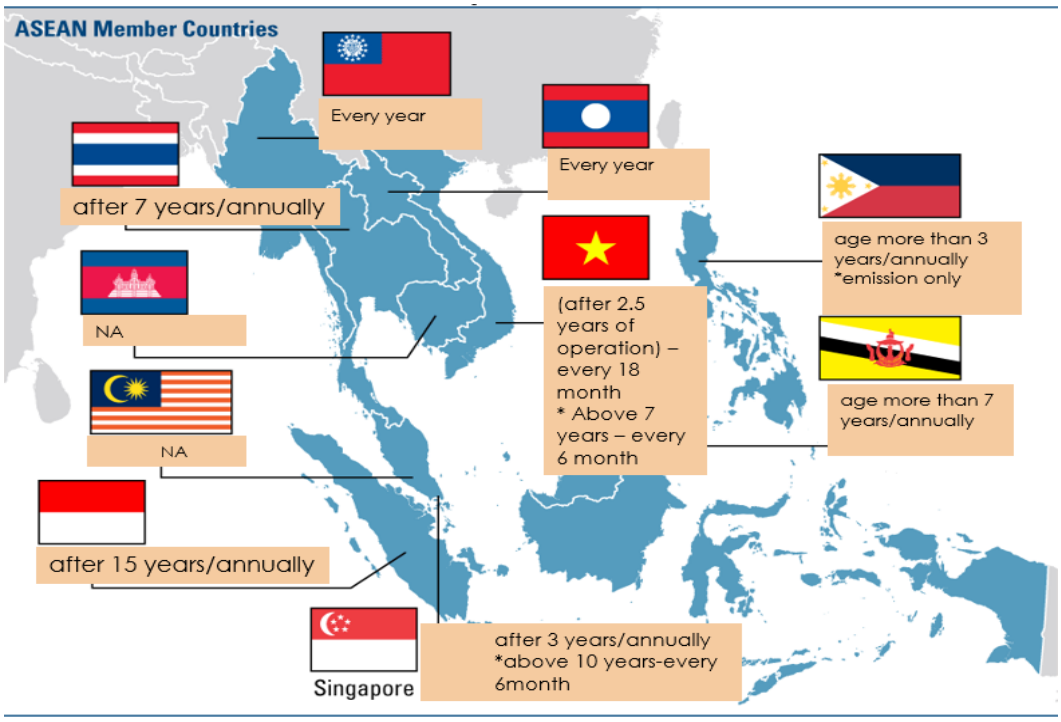

Figure 4: Compliance of private vehicle inspection in the ASEAN region (Clean Air Asia Center, 2016)

4.0 IMPLEMENTATION OF PRIVATE VEHICLE ROADWORTHINESS INSPECTION – THE CHALLENGES

In an automotive ecosystem, vehicle safety regulations and standards are important for consumers to purchase a "good" and reliable product. For new vehicles entering the Malaysian market, their safety is guaranteed through the Vehicle Type Approval (VTA) by the Road Transport Department (RTD) besides the safety star rating awarded by ASEAN NCAP. However, as soon as the vehicle is on the road, there is no requirement to inspect its periodic safety performance unless there is a change in ownership or if the vehicle is involved in a crash. As mentioned earlier, Malaysia does not require a registered private vehicle to perform any periodic safety inspection regardless of its age. Based on several analyses, a private vehicle inspection in Malaysia is difficult to implement due to the reasons below.

4.1 Public Readiness

A study by Solah et al. (2019) on the need for private vehicle inspections in Malaysia revealed that only half of the respondents agreed with their implementation. Nevertheless, more than 90% agreed that vehicle inspections were important to maintain the roadworthy level of the vehicle. Another concern among the public was accessibility as there were only 55 PTI centers authorized by the government which was insufficient as the number of private vehicle types kept increasing yearly (Puspakom, 2020). More than half of the respondents suggested that authorized vehicle service centers (SC) be allowed to conduct a periodical inspection with proper devices and competent personnel.

4.2 Government Readiness

Government policies remain the key to success in the implementation of private vehicle inspections. Although there is no clear regulation or standard on the private vehicle periodical inspection, the *"Dasar Pengangkutan Negara 2019 - 2030"* addresses the service life of a vehicle in Malaysia (MOT, 2019). A vehicle inspection is a softer approach to implement an ELV policy whereby it objectively measures the performance of a vehicle – as the vehicle ages, its performance potentially degrades. Private vehicle inspection standards and regulations need to be developed. Since 2018, the government has introduced a regulation for e-hailing vehicles over three years to undergo vehicle inspections (PIAM, 2019). Therefore, an initiative that indirectly involves more than 200,000 e-hailing vehicles has already been started (Muhammad, 2019).

The Malaysia Automotive Robotics and IoT Institute (MARii), under the Ministry of International Trade and Industry Malaysia (MITI), is prepared to implement the private vehicle inspection in Malaysia with the introduction of its Malaysian Vehicle Evaluation Inspection Management System (VIMS), development of Malaysia Standard for vehicle inspection center and vehicle inspector competency standard (MARii, 2019). However, the fact that there is only a single authorized PTI provider in the country potentially creates an unhealthy business environment. With the increase of registered vehicles yearly, the government should approve more PTI providers to cater to market demand and at the same time increase the service and minimize the cost of the inspection.

The implementation of a private vehicle inspection can potentially be a financial burden to certain segments of vehicle owners. As the government collects fees from the inspection, the government needs to formulate a solution to give back to the people such as in terms of rebates to buy a new vehicle, insurance discounts, and others. To ensure success, the government can make the first move by ordering all the government fleets to be inspected at authorized PTI centers periodically. Although their number is small and there is a rule that government fleets are not required to undergo periodical inspections, such a move can potentially manufacture the consent of the public regarding periodic vehicle inspections.

4.3 Vehicle Technology

The need for vehicle roadworthiness inspections is essentially due to road safety and environmental protection. With the advent of "smart technologies" in the vehicle, driver errors can be mitigated and eliminated. Nevertheless, failure of any of these technologies can result in a crash. With our increased reliance on advanced technologies, the role of vehicle roadworthiness is also changing. Although the mechanical system in a vehicle still plays an important role in vehicle inspections, the PTI center and the government need to react to the flood of assistive technology in the vehicle through the introduction of a new method. A study

by CITA showed that electronically controlled systems on vehicles had failure rates comparable to mechanical systems that were considered important enough to be included in periodic inspections (Rompe, 2002). Also, the study stated that failure rates of electronic systems increased both with vehicle age and distance traveled.

5.0 CONCLUSION

The rapid development of the automotive industry in Malaysia ultimately requires appropriate and specific policies and laws not only for the industry players but for the consumers. The study findings have shown that private vehicle roadworthiness is needed and as one of the leading automotive countries in ASEAN, the absence of this component in Malaysia's automotive ecosystem may lead to the failure to implement an ELV policy. Currently, vehicle owners only rely on the periodic maintenance provided by car manufacturers or via experience to check and verify the roadworthiness of their vehicles. The introduction of periodical technical inspections for private vehicles can hopefully eliminate the risks of a crash due to vehicle defects; thus reducing the number of road fatalities in Malaysia. More research and development are needed to ensure an appropriate framework for the sustainability of a private vehicle roadworthiness inspection before it can be implemented in Malaysia soon.

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REFERENCES

Abdul Khalid, M. S., Jawi, Z. M., Isa, M. H. M., & Abdul Wahab, M. A. F. (2018). Car users' knowledge & practices on tyre maintenance in Malaysia. Human Factors and Ergonomics Journal, 3(2), 84-94.

Abdul Manan, M. M., & Várhelyi, A. (2012). Motorcycle fatalities in Malaysia. IATSS Research, 36, 30-39.

Adeyanju, A. A. (2018). Effects of vehicular emissions on human health. Journal of Clean Energy Technologies, 6(6), 411-420.

APAD (2019). Pindaan bagi had usia melesenkan kenderaan baru sebagai bas ekspres dan bas berhenti-henti. Agensi Pengangkutan Awam Darat. Retrieved from https://www.apad.gov.my

Autofore (2007). Study on the future options for roadworthiness enforcement in the European Union. CITA, pp. 37-41.

Clean Air Asia Center (2016). Vehicle inspection & maintenance in Asia: Status and challenges 2016. Metro Manila, Philippines: Clean Air Asia Center.

DEKRA (2005). International strategies for accident prevention. Stuttgart, Germany: DEKRA Automobil GmbH.

Jawi, Z. M., Isa, M. H. M., Solah, M. S., Ariffin, A. H., Shabadin, A., & Osman, M. R., (2017a). The future of end-of-life vehicles (ELV) in Malaysia – A feasibility study among car users in Klang valley. In MATEC Web of Conferences (Vol. 90, p. 01038). EDP Sciences.

Jawi, Z. M., Lamin, F., Manap, A. R. A., Kasim, K. A., Abas, F., & Voon, W. S. (2012). Review of the National Automotive Policy on car maintenance issues: Malaysia's automotive ecosystem explained. MIROS Review Report.

Jawi, Z. M., Solah, M. S., Ariffin, A. H., Shabadin, A., Ali, A., Osman, M. R., & Voon, W. S. (2017b). Automotive consumerism: A study of car user's practices & behaviour in Klang Valley. MIROS Research Report.

JKJR (2018). Jabatan Keselamtan Jalan Raya Malaysia. Retrieved from http://jkjr.gov.my/en/muat-turun/func-startdown/139/lang,en-gb/

Kojima, M. (2018). Vehicle recycling in ASEAN and other Asian countries. Economic Research Institute for ASEAN and East Asia.

MAA (2020). Retrieved from http://www.maa.org.my/info_summary.htm

MARii (2019). Perodua enrolls first candidates under the Malaysian Vehicle Evaluation Inspection Management System. Retrieved from http://www.marii.my

MITI (2014). National Automotive Policy. Kuala Lumpur: Ministry of International Trade and Industry.

MOT (2019). Dasar Pengangkutan Negara 2019-2030. Ministry of Transport. Retrieved from http://dpn.mot.gov.my/

Muhammad, A. (2019). Masih banyak kenderaan e-hailing tidak diperiksa Puspakom. Retrieved from https://www.sinarharian.com

PDRM (2019). Statistical Report of Road Accidents in Malaysia. Royal Malaysia Police Traffic Branch, Bukit Aman, Kuala Lumpur.

PIAM (2019). Pemeriksaan kenderaan e-hailing. Retrieved from https://www.piam.org.my/wp-content/uploads/2019/06/Item-6-PUSPAKOM.pdf

Puspakom (2020). Retrieved from https://www.puspakom.com.my/branches

Rompe, K. (2002). Periodical inspection of electronically controlled systems on vehicles. Brussels, CITA.

RTD (2019). Statistik Pengangkutan Malaysia 2019. Road Transport Department. Retrieved from https://www.mot.gov.my/my/media/annual-report/yearly-statistic

Rumar, K. (1985). The role of perceptual and cognitive filters in observed behavior. In Human Behavior and Traffic Safety (pp. 151-170). Springer, Boston, MA.

Sarani, R., & Hashim, H. H. (2014). Vehicle age and accident severity study. ICR-14-66, Proceeding of International Crashworthiness Conference 2014.

Solah, M. S., Hamzah, A., Ariffin, A. H., Paiman, N. F., Abdul Hamid, I., Abdul Wahab, M. A. F., Mohd Jawi, Z., Isa M. H. M., & Abu Kassim, K. A. (2019). Public perception of private vehicle periodical inspection. Journal of Science & Technology, 4(2), 35-41.

Statista (2020). Estimated worldwide automobile production from 2000 to 2019. Retrieved from https://www.statista.com/statistics

Treat, J. R., Tumbas, N. S., McDonald, S. T., Shinar, D., Hume, R. D., Mayer, R. E., Stansifer, R. L., & Castellan, N. J. (1977). Tri-level study of the causes of traffic accidents: Final report (Volume 1: Casual factor tabulations and assessments) (DOT HS-805 085). Washington, DC: NHTSA.

WHO (2015). Global Status Report on Road Safety 2015. Geneva, Switzerland: World Health Organization (WHO).

Zainal Abidin, A. N. S., Faudzi, S. A. M., Lamin, F., & Manap, A. R. A. (2012). MIROS crash investigation and reconstruction: Annual statistical report 2007–2010. MIROS Research Report.