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Embedding Automobile Safety Rating in Malaysia's E-Hailing Policy – An Analysis of NCAP-Rated Fleet

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ABSTRACT

The New Car Assessment Program for Southeast Asian Countries, or ASEAN NCAP, is tasked to assess the safety level of private passenger vehicles (PPVs) in the ASEAN region by providing the consumers with a quick-to-consume star rating. This is part of the move to elevate the road safety situation as well as to bring automotive consumerism to another level. In Malaysia's context, this endeavour complements the Vehicle Type Approval (VTA) by the Road Transport Department (RTD/JPJ), which conceptually acts as the gatekeeper before PPVs are entering the market. Other than educating the consumers directly, e.g. through many media outlets as well as safety labelling effort in car showrooms, there is also another approach to optimize the impact of safety rating, i.e. to set several policies that make ASEAN NCAP rating as a statutory requirement for: (1) public transports; (2) rental fleets; and, (3) government fleets. This paper discusses the recently proposed policy to embed ASEAN NCAP's safety rating into Malaysia's e-hailing regulation. The results show that the cut-off of 3-star can be immediately brought to 4-star, and finally to only allow 5-star cars as an eligibility factor to obtain e-hailing Vehicle Permit (eVP). It is hoped that this initiative can be expanded to rental and government fleets in the near future.

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1. Introduction

Uber cars, or specifically the premium Uber Black, were the first e-hailing fleet to "officially" plying the road in 2013, which took about three years after its San Francisco's debut in 2010 (Izham, 2018; Jais & Marzuki, 2020). However, prior to that in 2012, Malaysians had witnessed the birth of today's home-grown e-hailing powerhouse, Grab, which took a safer route to the establishment within the traditional taxi operation (Grab, 2015).

Branded among the most significant "disruptive technologies" related to the Industrial Revolution 4.0 (IR4.0), e-hailing services had caused an uproar among the traditional passenger-car-based operators, namely the taxis (generic name used here to represent various segments as per domestic classifications) (Todd et al., 2018). The government is the one in the dilemma (NST Online, 2018); however, at the same time is seemingly supporting the presence of such service, e.g. investment made by the government agencies (Zainul, 2016). This perhaps, at that time, the best opportunity for the government to improve or revolutionized what is regarded as the weaker (if not the weakest) part in the public transport ecosystem in Malaysia, especially in the first-and-last-miles segment (Keong, 2015).

Nevertheless, accepting an e-hailing system to operate means there are a lot of changes that need to be done to the decade-long rules and regulations in the passenger-car-based public transport segment, e.g. in driver and vehicle licensing. The currently defunct Land Public Transport Commission (LPTC; locally known by the Malay abbreviation – SPAD), as the caretaker of land public transportation in Malaysia was tasked to "accept" and to police the birth of e-hailing, as many countries in the world have largely erupted with the presence of Uber and several other similar services. Whether or not it is a coincidence, SPAD at the same time was also tasked with what is called the Taxi Industry Transformation Programme or TITP (Hafriz, 2016). The TITP initiative got the nod from both the Economic Council and Cabinet in 2016 (Hafriz, 2016). Table 1 compiles several notable events concerning e-hailing in Malaysia.

1.1. The 'New Norm' that Pleases the Public

The term 'new norm' nowadays becoming somewhat popular among Malaysian folks, especially referring to the fight of coronavirus pandemic (COVID-19) and the adjustment that all citizens have to adopt for breaking the infection chain (Prasetijo et al., 2021). Thus, what is brought by e-hailing to the system is basically the same – a

new norm – but the impact was crystal clear among the taxi operators (individual operators included), as well as among the users. In fact, TITP itself was a reflection that "transformation" is the only way out to answer the public transport users on the many weaknesses of taxi services in Malaysia for many years (Keong, 2015; Jais & Marzuki, 2020).

Table 1: Important timelines of e-hailing in Malaysia

Date	Event
2010	• SPAD was established, and one of the important duties was to solve public transportation issues, especially the bus and taxi services (Jawi et al., 2016a)
Jul 2011	• MyTeksi was founded to revolutionise taxi industry (Grab, 2015) • The proposed system was the runner-up in the 2011 Harvard Business School (HBS) Business Plan Contest (Grab, 2015) • The core idea was the GPS-enhancements in taxi-dispatch service, for passengers to catch the nearest taxi
2012	• Taxi was elevated into its own work stream in the Urban Public Transport (UPT) in National Key Result Areas (NKRA) under Government Transformation Programme (GTP) 2.0
Jun 2012	• Anthony Tan & Tan Hooi Ling launched MyTeksi app and thousands of taxi drivers began to use smartphone-based technologies to receive bookings (Grab, 2015; Kamarul Azhar, 2020)
Jul 2013	• Easy Taxi app makes debut in Malaysia (The Malaysian Reserve, 2017)
Oct 2013	• Uber started its operation in Singapore (Feb. 2013), and had its soft launch in Kuala Lumpur in October 2013 (Millward, 2013; Goh, 2014) • Alex Yoong and Felina Cheah appeared as the first customers
Apr 2014	• Grab (now also being the app name that previously known as MyTeksi) moved its HQ from Kuala Lumpur to Singapore (Kamarul Azhar, 2020)
Dec 2015	• SPAD organised Special Taxi Lab (under Taxi Transformation Lab) to solve taxi service's problems • It was an important component of the Greater Kuala Lumpur/Klang Valley Land Public Transport Master Plan
Jan 2016	• MyTeksi that later known as GrabTaxi regionally, was officially rebranded as Grab (Lee, 2016; Kamarul Azhar, 2020) • This encompassed all the company's products (GrabCar, etc.)
Aug 2016	• Economic Council and Cabinet approved 11 initiatives under Taxi Industry Transformation Programme (TITP) to resolve long-standing structural issues, and this includes the initiative to regulate e-hailing • TITP is underpinned by four key principles: (1) leveraging on technology, (2) encouraging healthy competition, (3) creating a level playing field for the taxi industry, and (4) providing equitable opportunities to taxi drivers
Jun 2017	• Beginning 16th of June 2017, e-hailing operators are required to submit records of their drivers to SPAD to enable stringent background checks in synergy with other enforcement agencies, including the police (PDRM) and Road Transport Department (JPJ).
Jul 2017	• The Parliament approved the bill for e-hailing services to operate in Malaysia, and SPAD is the agency to regulate this new service
Mar 2018	• Grab took over Uber's operations in Southeast Asia (Rahman et al., 2020)
Jul 2018	• The government gave one year for e-hailing operators (EHO) to comply with the conditions under the Intermediary Business License (IBL) (Izham, 2018; Todd et al., 2018) • Main regulatory conditions: o Vehicles need to be inspected by PUSPAKOM o Drivers need to obtain Public Service Vehicle (PSV) license o To obtain an e-hailing Vehicle Permit (eVP) from SPAD (now APAD), once the previous conditions met

Continued on next column.

Table 1 – *Continued from previous column.*

Date	Event
Oct 2018	• SPAD issued a guideline (*Garis Panduan Perkhidmatan E-Hailing di Bawah Perniagaan Pengantara Bil. 2, Tahun 2018*) • Effective as of 31st of October 2018
Jul 2019	• The government allocated 3 months to abide by the PSV requirement (ended 12th of October 2019) (Tan, 2019)
Oct 2019	• New requirements introduced by the Ministry of Transport (MOT): o A printed copy of the eVP o Vehicle code AH (for private e-hailing) – must have PSV license, car grant (ownership), eVP, and insurance (PPV insurance + e-hailing insurance)

Technically speaking, the e-hailing concept that we know today has not much different from the previous system since telephone-based orders were readily available for quite some time (Santos & Xavier, 2015). The most glaring difference is the so-called smartphone, which normally is connected to the Internet and regarded as a game-changing material in IR4.0 that caused a huge societal impact (Keong, 2015; Anggriawan, 2019).

A more generic idea to e-hailing is the ride-sharing concept, in which the encroachment into the taxi business ecosystem was technically "illegal" according to the prevailing legal framework. It has been long discussed about the wastefulness of one-car-per-person on the road, parking charge especially in the city, congestion issues, the practicality of car ownership, and many other reasons that car-sharing or ride-sharing will win over the traditional method (Litman, 2000) – not to mention the issues of the then Malaysia's taxi services (Keong, 2015). For the innovator, the ride-sharing concept is just one of the solutions by developing apps, concepts, algorithms, and bringing the idea of "everyone" can participate to generate extra income, i.e. the gig economy (Kassim et al., 2020). From a road traffic and safety perspective, this concept is also the answer to exposures on the road, i.e. to reduce the number of vehicles on the road since passengers can share a ride to the same location (Charles & Kline, 2006).

The ride-sharing service has gradually gained popularity and acceptance among the public, and one of the apparent advantages is the users will know the fare prior to boarding the vehicle, which is arguably among the most problematic things with taxis though they have metered charging system. The ride-sharing users also able to track the movement, get discount, and rate the service that increases the transparency of the service (Todd et al., 2018). According to Santos & Xavier (2015), this taxi-alternative has been swiftly accepted by city dwellers as an effort that directly benefits them through costs reduction and waiting time since at most times the provision of public transportation (taxis and buses) is not enough to cater to the large demand especially in big cities, such as in the Klang Valley.

As mentioned earlier, the government had given its support to the ride-sharing initiative and heard the wishes of the people who want changes in the taxi industry – in view of change management theory, of course, the taxi industry was by and large had refused to the changes. The right thing about the taxi industry argument is that not "everyone" is allowed to operate a public service vehicle under e-hailing including the vehicle itself, which is under private use registration. Thus, these two major things – driver and vehicle licensing – simply made the ride-sharing concept rightfully illegal, though widely welcomed by the public (Jais & Marzuki, 2020).

1.2. E-hailing Services under the Intermediary Business License (IBL)

E-hailing service has eventually enforced in Malaysia on the 12th of July 2018, under the Land Public Transport Act (Amendment) 2017 that fall under the jurisdiction of the Land Public Transport Agency (LPTA; locally known by the Malay abbreviation – APAD), which assumed the function of the defunct SPAD. The management had also changed from Prime Minister Office (PMO; for SPAD) to the Ministry

of Transport (MOT; for APAD). The new term for ride-sharing provider was also coined, i.e. E-hailing Operator (EHO) (e.g. Izham, 2018). The issuance of the EHO license, and the Guidelines for E-hailing Services Under the Intermediary Business (from here will be referred to as the "guideline") had also been introduced in the same year. As of April 2020, the country has 46 registered EHOs and more than 100,000 registered drivers. However, the more recent APAD's data, as of November 2020, shows that the number of EHOs has reduced to just 33.

Generally, there are eight main items in the EHO guideline: (1) Eligibility criteria for applicant (i.e. the IBL); (2) Minimum apps specification; (3) Vehicle specification; (4) Operations area; (5) Operation model; (6) Commission and fare; (7) Insurance requirement; and (8) Responsibility of the licensee.

Since this study will be focusing on vehicle factor, these are the main rules about vehicle specifications for operating under EHOs (Jais & Marzuki, 2020; RTD, 2021):

i. All vehicle models must meet the minimum 3-star rating ASEAN NCAP (the New Car Assessment Program for Southeast Asian Countries) or equivalent (NCAP rating from other regions).
ii. Vehicles not meeting ASEAN NCAP (or equivalent) minimum rating and have been registered by EHO before 1st of November 2018 are allowed to continue, but only until 31st of December 2022 or up to the age limit of 10 years (whichever comes first).
iii. The determination of the age limit is based on the original status of the vehicle, i.e. if the vehicle has Completely Knocked Down (CKD) status is not more than 10 years from the date it is registered at JPJ and if the vehicle has Completely Built-Up (CBU) status is not more than 10 years from the year it was made by vehicle manufacturers.
iv. Vehicles registered on and after the 1st of November 2018 need to fully comply with e-hailing vehicle model guidelines.
v. E-hailing vehicles must have more than two (2) doors and four (4) wheels under the category of the compact, sedan, Multi-Purpose Vehicle (MPV), and Sport Utility Vehicle (SUV).
vi. E-hailing vehicle must have four (4) to eleven (11) seat loads including the driver.
vii. EHO shall ensure that the licensed e-hailing vehicle undergoes a PUSPAKOM inspection once a year when the vehicle reaches the age of three (3) years from the date it is registered with JPJ.
viii. EHO shall ensure that the licensed e-hailing vehicle displays the e-hailing vehicle identification sticker specified by JPJ.

1.3. ASEAN NCAP's Role in Malaysia's Automotive Ecosystem

Malaysia's automotive ecosystem framework was graphically explained based on the life cycle of a product (LCP) by Jawi et al. (2012). The first three stages of LCP are grouped together as the "source of vehicle", so that more focus will be given to the interaction in the usage stage or the vehicle ownership phase – later coined by the authors as automotive consumerism. Based on Figure 1, the NCAP endeavour is visualized as the "external party" outside the car manufacturer-regulator-consumer regular framework (car manufacturers from here will be referred to as OEMs) (Jawi et al., 2013; Abu Kassim et al., 2016). The Vehicle Type Approval (VTA), which is carried out by the Road Transport Department (RTD; locally known by the Malay acronym – JPJ) (Abdul Wahab et al., 2017), acts as the 'gatekeeper' of vehicles' roadworthiness and crashworthiness based on the Malaysian legal framework (Jawi et al., 2016b). As of today, the ASEAN NCAP rating is still optional but able to attract many OEMs to obtain the safety rating (Abu Kassim et al., 2019).

ASEAN NCAP supplements that regular automotive framework's role with more focus on the power of consumers by educating them on safety, as well as encouraging OEMs to embed the latest automotive technologies (Isa et al., 2015). As of today, ASEAN NCAP has assessed more than 80 models (and variants) of over 25 OEMs (Abu Kassim et al., 2019). Also, the NCAP-rated market coverage is about 90% of the market share – in other words, nine out of ten cars sold in the ASEAN region are rated by ASEAN NCAP. One of the notable facts about the safety rating effort is a whopping 90% of the cars are rated minimum 4-star. This means that embedding a safety rating policy for the e-hailing vehicle is practically about time since it is not hard to find any car that meets the guideline especially for the case of Malaysia (Abu Kassim et al., 2017; Abu Kassim et al., 2019). This also applies to the so-called national car makes, Proton and Perodua, in which their most recent models are rated minimum 4-star.

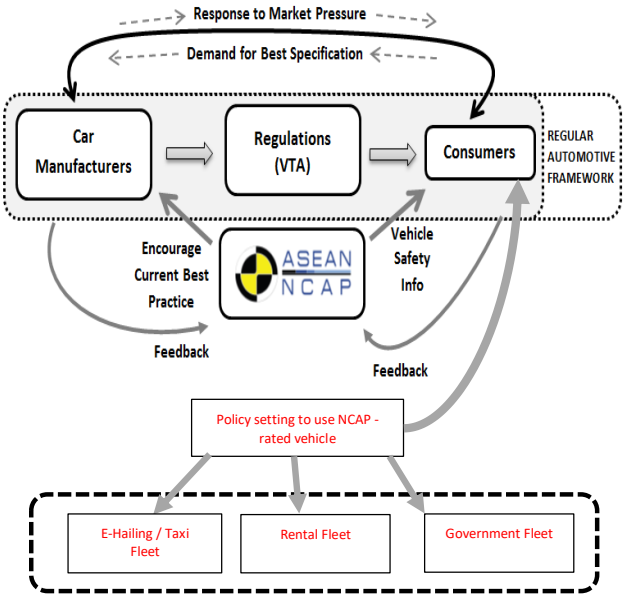

Figure 1: ASEAN NCAP's role in automotive ecosystem (Jawi et al., 2013; Abu Kassim et al., 2016), and the concept of NCAP-rated fleet policy

1.4 Safety Rating Policy for Fleet

In order to increase the impact of safety rating, it must first start at the purchasing stage, especially in the context of NCAP is not mandatory to pass VTA – and VTA is viewed as the minimum requirement to enter the market (Abdul Wahab et al., 2017). In this context, Australia is perhaps showing the best example of placing the importance of safety rating, as per the following cases:

i. **Government fleet** – starting 1st of July 2011, the Australian government had implemented the fleet vehicle selection policy through the Department of Finance. In the procurement of the Australian Government fleet, procurement officials must ensure that vehicle has a 5-star ANCAP rating (Australasian New Car Assessment Program) (Australian Government, n.d.).
ii. **E-hailing** – starting 1st of October 2019, new Uber vehicle must meet a five-star ANCAP rating, and Uber give two years' grace period to all driver or partner to change their vehicle to meet 5-star ANCAP rating until 1st of October 2021 (ANCAP, 2019). Uber is one of four major ride-sharing operators in Australia, alongside Didi, Indian-based Ola, and Estonian company Bolt (Taxify).

Furthermore, the International Association of Oil & Gas Producers (IOGP) is encouraging its members to purchase, lease or contract new light vehicles that have a five 5-star NCAP rating from 1st of January 2019 (IOGP, 2018). IOGP is the world's petroleum industry forum, in which members can identify and share the best practices to achieve and improve safety, health, environment, security, social responsibility, engineering, and operation matters (IOGP, 2019). As of now, it has 84 members across the world that cover 40% of oil and

gas global production – and the home-grown Petronas is one of the IOGP members (IOGP, 2019). In their record, BHP (previously BHP Billiton; Australia-related) is already committed to using 5-star rating vehicles since 2012 (IOGP, 2018).

As mentioned earlier, the effort to embed NCAP rating into the e-hailing fleet has started in Malaysia through the EHO guideline. Nevertheless, it started with a lower cut-off (3-star) and a grace period is given until 2022 or 10-year vehicle age, whichever comes first. On another note, ASEAN NCAP (through the Ministry of Transport - MOT) together with the Ministry of Domestic Trade and Consumer Affairs (KPDNHEP; Malay acronym) had introduced the compulsory NCAP labelling system on all display vehicles in OEMs' showrooms and roadshows under the Trade Descriptions Act 2011 (Act 730) starting 1st of March 2020 (Lim, 2020). The Malaysian Institute of Road Safety Research (MIROS), as the operator of ASEAN NCAP, will verify the safety specification provided on the label is matched and complied with ASEAN NCAP Labelling Guideline.

1.5. Study's Objective

This paper aims to understand the trend of e-hailing vehicles used in Malaysia according to the ASEAN NCAP rating – the focus is on private passenger vehicles (PPVs). The short (or perhaps the medium) term vision of the authors is to propose a higher safety rating requirement, i.e. 5-star, as shown by Australia's case. It is also in the thought of the authors to only consider ASEAN NCAP as a reference in e-hailing vehicle's ruling, as that will ensure the chain of production-supply is within the watch of ASEAN NCAP.

2. Method

This study employs two sets of secondary data, namely vehicle registration data from the Vehicle Licensing Division of Road Transport Department (JPJ) that maintain all Malaysia's vehicle registration data, and the data from ASEAN NCAP that contains all the assessment results based on the model, variance and year of rating (publicly available on website and app).

In the JPJ system, e-hailing PPVs are coded as AH, which means the vehicles are first privately owned and subsequently registered for e-hailing eligibility known as e-hailing Vehicle Permit (eVP). This is a notable move since previously passenger vehicles will be registered as either for private use or public transport (taxis; coded as EA, EB, EC, etc.) (Zulkipli et al., 2019). The JPJ's vehicle registration data contains vehicle code, license class, vehicle make, model, year manufactured, and year of registration as e-hailing vehicles.

The next process was to match the profiling of e-hailing vehicles, namely the make and model against ASEAN NCAP results in terms of star rating. The latter was tabulated from the information published on the ASEAN NCAP website. The final step was to analyse the proportion of e-hailing vehicles according to their ASEAN NCAP ratings. Figure 2 briefly explains the steps taken in this study.

A study by Jawi et al. (2017) had classified passenger cars in Malaysia into four big groups, primarily based on the sales figures (or referred by the industry as Total Industry Volume – TIV), i.e. (1) Proton; (2) Perodua; (3) Big Three (consists of Toyota, Honda and Nissan); and (4) Others. In general, all four were roughly evenly distributed, or 25% each. The first two makes are considered as the national car and that explains the market domination by virtue of certain advantages given to the companies (Jawi et al., 2017). Their cars are normally at the entry-level or the most affordable cars in Malaysia. Previously, Proton topped the chart of TIV in Malaysia before the position was taken over by Perodua in 2006 until these days (Jawi et al., 2017). Moreover, the combined yearly TIVs of Toyota, Honda, and Nissan is about roughly 25%. Previously, Toyota was the first among the so-called non-national makes before Honda took over the position in recent years (Jawi et al., 2017). The rest of the carmakers or OEMs have a total market penetration of single-digit or even less than 1%, and thus all of them totalled about the remaining 25%. Nevertheless, this categorization is not razor-blade sharp for any specific year, but more to decade-long observation and for easy understanding of car market proportion in the country.

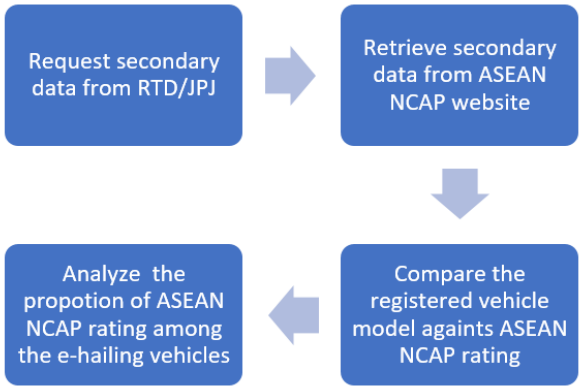

Figure 2: Methodology of the study

On another note, few models have been tested more than once by ASEAN NCAP (Jawi et al., 2020a). Myvi as the most successful model by Perodua, dubbed by many as "king of the road" for some good and bad reasons, had been assessed three times. The car was able to reach 5-star status in 2017, after a poor start of 3-star in January 2013 and 4-star in the second assessment in November 2014. The assessment by ASEAN NCAP also had changed over time, especially the rating system for the consumption of the consumers. For example, the previous approach had separate results for Adult Occupant Protection (AOP) and Child Occupant Protection (COP) – in which the AOP result will be primarily advertised, and dual-rating method that allowed different results for model's variants (less safety and less technology equipped get lower star rating) (Abu Kassim et al., 2017). Today's ASEAN NCAP final result will use a single rating that consolidated all assessments into it.

3. Results and Discussion

The results from the analysis can be divided into three subsections, i.e. the general overview of e-hailing cars by make and the ASEAN NCAP results; the non-rated and non-ASEAN-NCAP-rated vehicles; and the breakdown of car models according to ASEAN NCAP results. The fourth subsection will be dedicated to the overall discussion.

3.1. Overview of E-hailing Cars by Make and ASEAN NCAP Results

First of all, it is worth looking at the additional data obtained from APAD on the total eVPs and the associated EHOs in order to better understand the situation. As mentioned earlier, the number of EHOs keeps changing over a short period of time due to the dynamic change in business model (e.g. merging), as well as the survivability factor for newcomers in the e-hailing business. Table 2 describes the total number of eVPs as per APAD's database in November 2020, as well as the top EHOs based on the number of taxis and PPVs.

As of November last year, there are 120,556 eVPs cumulatively produced by APAD, in which the PPVs hugely dominating the fleet with 88.52% and the remaining are taxis. Grab is without a doubt the only powerhouse in Malaysia's e-hailing business (87% of total eVPs), in both PPV (94% among all PPVs) and taxi (36% among all taxis) categories.

Furthermore, the first result of the analysis explained the percentage of e-hailing cars, coded AH to identify that they are also PPVs, according to the vehicle makes (Table 3). It is obvious that the e-hailing fleet among the PPVs is overrepresented by Perodua cars (56%), and followed by Proton (22%), Big 3 (19%), and Others (3%). It is worth noting that the cars from the "Others" category also consist of medium-priced to luxury segment (close to MYR 100,000 price tag, and above), and are less likely to be driven as e-hailing cars.

Table 2: Total eVPs and EHOs that topping the chart among taxis and PPVs

Total eVP (as of Nov. 2020)	**120,566**
• Taxis	13,843 (11.48 %)
• PPVs	106,723 (88.52 %)
Top 3 EHO – All eVP (n = 120,566)	
1. Grab	104,928 (87.03 %)
2. MyCar	6,148 (5.10 %)
3. MULA	2,500 (2.07 %)
Top 3 EHO – PPVs (n = 106,723)	
1. Grab	99,930 (93.63 %)
2. MyCar	2,925 (2.74 %)
3. MULA	2,500 (2.34 %)
Top 5 EHO – Taxis (n = 13,843)	
1. Grab	4,998 (36.10 %)
2. MyCar	3,223 (23.28 %)
3. EzCab	2,586 (18.68 %)
4. PICKnGO	1,516 (10.95 %)
5. TeksiKu	1,012 (7.31 %)

Table 3: Percentage of AH-coded e-hailing cars by make obtained from the Vehicle License Division, Road Transport Department (JPJ)

Make/Brand	**Percentage of AH-coded car (e-hailing)**
Perodua	56 %
Proton	22 %
Big 3 (Toyota-Honda-Nissan)	19 %
Others	3 %
Total (n = 109,819)	**100 %**

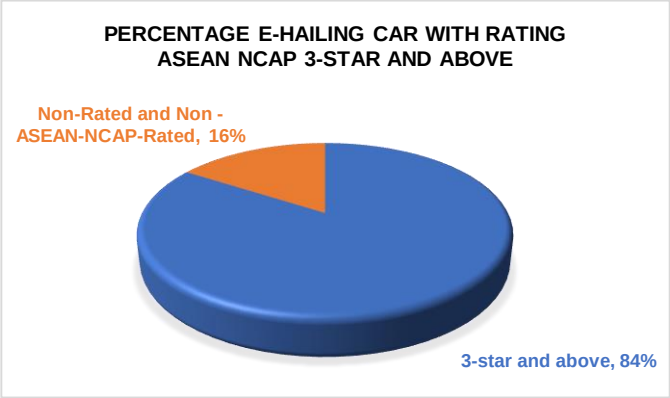

Figure 3: Percentage e-hailing car with rating ASEAN NCAP 3-star and above (n = 109,819)

Moreover, Figure 3 shows the difference between ASEAN NCAP-rated cars, particularly those with 3-star and above, and those with no rating. As mentioned under the vehicle specification in the "Guideline for E-hailing Services Under the Intermediary Business License", all vehicles registered after the 12th July of 2018 must meet three (3) star ratings by ASEAN NCAP or equivalent (with grace period). From the matching of data from AH-coded vehicles and the ASEAN NCAP database, the result shows that 84% of the fleet met the standard.

Table 4 further explained the breakdown of cars according to their makes that had been rated by ASEAN NCAP at a minimum 3-star. Out of 109,819 cars, 84% or 92,258 cars were rated minimum 3-star (Figure 3). According to the main group of OEMs (column A), Perodua cars represent 62% of the fleet and followed by Proton (19%), Big 3 (16%), and Others (1%). The next column (B) explains the percentage of cars among each group that met the safety requirement. Perodua cars are topping the chart with 93% of them met 3-star level, and followed by Proton cars (73%), Big 3 (81%) and Others (20%). The next subsections will further discuss the situation related to these figures.

Table 4: ASEAN NCAP rated cars according to their makes

Make/Brand	**(A) - Percentage of e-hailing cars by brand per entire fleet that obtained ASEAN NCAP 3-star and above**	**(B) - Percentage of e-hailing cars rated by ASEAN NCAP 3 Star and above by specific brand (n = total e-hailing cars per brand)**
Perodua	62 % (57,237)	93 % (57,237 / n = 61,485)
Proton	19 % (17,556)	73 % (17,556 / n = 23,984)
Big 3 (Toyota-Honda-Nissan)	18 % (16,894)	81 % (16,894 / n = 20,983)
Others	1 % (678)	20 % (678 / n = 3,367)
Total	**100 % (n = 92,258)**	

3.2. Non-Rated and Non-ASEAN-NCAP-Rated Vehicle

Since most cars in recent years in the Malaysian market are rated 4-star and 5-star by ASEAN NCAP, the remaining cars were grouped under the "non-ASEAN-NCAP-rated" cars, i.e. 16% of the total fleet (Figure 3). It is to be noted that ASEAN NCAP is still a voluntary assessment in Malaysia. The first method of vehicle selection by ASEAN NCAP is through buying the car directly from the market, and the second method is through the sponsored test (Rahman et al., 2014). Thus, certain OEMs are not interested to invest in testing and rating their cars, i.e. those belonging to "Others", particularly luxury cars.

It is hard to deny that consumers at large will think that luxury cars must or should be at the top in every aspect as compared to entry-level and affordable cars. This, first of all, has a strong influence from car pricing that factored in the tax scheme, branding, etc.; and secondly, the lifestyle factor that owning and driving those so-called luxury cars is a symbol of success in life. ASEAN NCAP, on the other hand, could not "touch" this segment regularly due to the cost of the vehicle from the market, as well as those OEMs seemingly reluctant to obtain domestic star rating. However, on two notable occasions, two car models that people think should score 5-star did not achieve the expected result. Volkswagen Polo was the first car to be relegated to 4-star during the early days of ASEAN NCAP due to non-fitment of Electronic Stability Control (ESC), though the result of the crash test is well within the 5-star region as per the first protocol and rating regime. The BMW 318i, though pricier than VW Polo, had the same fate in 2019 as it was only able to obtain 4-star due to also technology fitment issue. Other luxury cars ever assessed by ASEAN NCAP were through sponsorship method, e.g. Nissan Teana (5-star in 2014 with perfect Adult Occupant Protection score) and Honda Accord (5-star in 2019).

According to the current regulation, cars being rated by other NCAPs are accepted at the same 3-star level. This is why the term "non-rated" and "non-ASEAN-NCAP-rated" is a quite complicated discussion that is driven by many uncertainties. The first issue is regarding the place of manufacturing origin, whereby during that so-called localisation the cars are not built according to the specifications in origin countries and NCAP assessment in their region, e.g. Euro NCAP, Japan NCAP, etc. This will obviously affect the star rating too, especially related to the omission of certain safety technologies (referred to ASEAN NCAP case mentioned above). Even though ASEAN NCAP is always in active discussion with OEMs and "in the know" of the trails of production for cars in the ASEAN market, it is considered "not nice" to "name and shame" any specific models for their safety level without the black and white evidence. This is also the case for any model at entry and affordable level; however, the VTA in

Malaysia is considered more stringent than most ASEAN countries to ensure only "safe" new cars are allowed to enter the market.

The second issue is about the imported used PPV (IUPPV) or known also as the parallel import or grey import PPVs (Jawi et al., 2020b). In the local context, these cars are normally referred to as "recon" cars – from the term "reconditioned"; also known as "refurb" referring to "refurbished" cars (Jawi et al., 2017). The country's most popular IUPPVs are coming from Japan, especially regarded as luxury cars with the likes of Toyota Estima, Toyota Vellfire, and Honda Odyssey. The second most popular are cars from the UK, namely right-hand drive (RHD) cars comprising of popular luxury models of Mercedes-Benz and BMW. What is more interesting, quite a number of these European-based IUPPV cars, or known also as Continental cars, are imported from Japan due to the RHD factor. In the case of safety, it is well understood that the regulations and NCAP assessment from Japan and UK are more stringent than domestic VTA and ASEAN NCAP – not to mention the perceived high build quality as compared to local models. These trails of car origins are quite clear; however, there is another issue regarding the age of the vehicle, in which most of IUPPVs are imported after being used between three to five years before reaching Malaysian users. This a tricky issue regarding safety, as a preliminary assessment by MIROS on vehicle inspection data of PUSPAKOM (Periodical Technical Inspection (PTI) sole concessionaire in Malaysia), showed that roadworthiness of Malaysian cars evidently degraded starting from the fourth year of vehicle age (Solah et al., 2017).

Furthermore, the other issue of non-rated cars is related to the "Others" group, in which ASEAN NCAP did not assess them due to priority being given to most popular cars by the number of sales. These non-rated cars did pass the VTA assessment and thus allowed to be in the market – it is worth noting again that VTA comprises of both roadworthiness and crashworthiness elements, as well as other quality such as environmental element, but ASEAN NCAP is really focusing on the safety of occupants (passive safety) and crash risk mitigation factors (active safety) (Abdul Wahab et al., 2017).

3.3. ASEAN NCAP Rating for Car Models from Specific Group

The following Table 5, 6, 7, and 8 detail out the models from each group that passed the minimum 3-star ASEAN NCAP requirement. It can be learned that, according to the vehicle built in each car group, the sedans are more popular than the hatchbacks – e.g. the case of Bezza against Axia for Perodua, and the Saga-Persona combination (two generations of Saga) versus Iriz for Proton. Perodua Alza also is ahead of Myvi, in which the latter is the most popular in the market. This also can be seen between Mirage and Attrage of Mitsubishi, in which the former has largely outnumbered the latter.

The other notable examples are Honda City, Toyota Vios, and Nissan Almera; however, these cars are actually having a non-comparable number of hatchback versions on the road such as the Jazz (hatch version of City), and the Yaris (Vios). Nevertheless, the key to the most preferred version or characteristics of e-hailing cars goes back to the common-sense, i.e. what can give the most in the gig economy ecosystem – low-powered cars give low fuel consumption, sedan provides more boot space, basic MPVs still offer more seats than 5-seater sedan, and the list continues. On another note, EHOs do capitalize on this variation brought by gig economy participants to create some sort of value-added services to the customers with higher pricing (Table 9).

Furthermore, back to the discussion of safety, only three models were rated at 3-star by ASEAN NCAP, which are Perodua Myvi (assessed in 2013) Proton Saga FLX (assessed in 2013) and Chinese-based Haval M4 (assessed in 2015). The rest were all four- and five-star cars. The recent performance of popular models in the ASEAN NCAP assessment is showing a positive trend, and this can be seen in the country's e-hailing fleet. The models assessed from 2016 and onwards were all four- and five-star cars, in which three models rated 4-star and 22 models rated 5-star.

Table 5: Breakdown of Perodua models rated by ASEAN NCAP that passed 3-star and above

Model	Year Rating	ASEAN NCAP Star Rating	Percentage
Bezza	2016	5	34 %
Axia	2014	4	23 %
Alza	2013	4	20 %
Myvi	2013	3	5 %
Myvi (2015)	2014	4	4 %
Myvi (2017)	2017	5	12 %
Aruz	2018	5	2 %
Total (n = 57,237)			**100 %**

Table 6: Breakdown of Proton models rated by ASEAN NCAP that passed 3-star and above

Model	Year Rating	ASEAN NCAP Star Rating	Percentage
Saga (2016)	2016	4	46 %
Saga FLX	2013	3	21 %
Persona	2016	5	18 %
Iriz	2014	5	6 %
Prevé	2013	5	4 %
Ertiga	2016	4	4 %
X70	2018	5	0.5 %
Suprima S	2013	5	0.5 %
Total (n = 17,556)			**100 %**

Table 7: Breakdown of "Big 3" models rated by ASEAN NCAP that passed 3-star and above

Model	Year Rating	ASEAN NCAP Star Rating	Percentage
Honda			
City	2012	5	3 %
City (2014)	2014	5	24 %
City (2020)	2020	5	0.11 %
Jazz	2014	5	6 %
BR-V	2016	5	5 %
Civic	2013	5	1 %
Civic (2016)	2016	5	2 %
HR-V	2015	5	3 %
CR-V	2014	5	0.36 %
CR-V (2017)	2017	5	0.37 %
Accord	2019	5	0.01 %
Toyota			
Vios	2012	4	19 %
Vios (2018)	2018	5	7 %
Avanza	2013	4	4 %
Corolla Altis	2013	4	0.20 %
Corolla Altis (2014)	2014	5	1 %
Corolla Altis (2019)	2019	5	0.03%
Camry	2018	5	0.1%
Prius	2013	5	0.5 %
Sienta	2016	5	1 %
Innova	2016	5	1 %
Innova (2020)	2020	5	0.02 %
Yaris	2017	5	1 %
Hilux	2015	5	0.4 %
Rush (2018)	2018	5	0.2 %
Rush	2015	4	0.01%
C-HR	2018	5	0.1%
Fortuner	2016	5	0.03 %
Nissan			
Almera	2013	4	19 %
Grand Livina	2015	4	2 %
X-Trail	2016	5	0.5 %
Teana	2014	5	0.4 %
Navara	2015	4	0.02 %
Navara (2016)	2016	5	0.1 %
Total (n = 16,894)			**100 %**

Table 8: Breakdown of "Others" category's models rated by ASEAN NCAP that passed 3-star and above

Model	Year Rating	ASEAN NCAP Star Rating	Percentage
Mitsubishi			
Attrage	2013	4	18 %
Mirage	2013	4	6 %
Triton	2015	5	4 %
Outlander PHEV	2019	5	1 %
Pajero Sport	2013	4	1 %
Kia			
Picanto	2014	4	11 %
Ford			
Fiesta	2013	5	7 %
Ranger	2015	5	2 %
Volkswagen			
Polo	2013	4	18 %
Vento 1.6	2013	4	10 %
Venta 1.2	2013	5	5 %
Chevrolet			
Sonic	2013	4	1 %
Colorado	2014	5	1 %
Hyundai			
Ionic Hybrid	2018	4	2 %
Elantra	2016	5	1 %
BMW			
318i	2019	4	0.1 %
Subaru			
XV	2013	5	7 %
Great Wall			
Haval M4	2015	3	5 %
Total (n = 678)			**100 %**

Continued on next column.

Table 8 – *Continued from previous column.*

Table 9: Pricing based on vehicle classification – example of a ride to KLIA airport (Grab.com)

Distance	JustGrab	GrabCar Plus	GrabCar 6-seater	GrabCar Premium	GrabCar Exec
0-35 km	Between RM30 and RM64	Between RM35 and RM74	Between RM40 and RM104	Between RM50 and RM149	RM180 (up to 80km)
36-66 km	RM65	RM75	RM105	RM150	
67 km and above	Above RM65 (varies by distance)	Above RM75 (varies by distance)	Above RM105 (varies by distance)	Above RM150 (varies by distance)	

3.4. Overall Discussion

As shown earlier in Figure 1, the short-term vision of the authors is to embed safe vehicle policy concerning NCAP safety rating in public transport, rental fleets, and government fleets, or any other segments that the policy can be implemented. This is inspired by several best practices such as the Australian government's fleet policy, Australia's e-hailing policy, as well as the case of IOGP in the oil and gas industry. As of today, the Malaysian government has set the policy to procure vehicles but without mentioning safety factors as a requirement – the related rule is more towards the economic point of view whereby only local manufacture or CKD PPVs are allowed for government fleet (Government of Malaysia, 2019). Therefore, this NCAP-rated policy in the e-hailing industry can pave the way for other segments in the near future.

Based on the data, about 16% of the current e-hailing fleet where the majority are PPVs are not rated by ASEAN NCAP, or rated less than 3-star in ASEAN NCAP. This is primarily due to the grace period given to cars registered before November 2018 that are allowed to operate until the end of 2022 or a maximum of 10 years of vehicle age – whichever comes first. Other than that, a certain domestic situation such as the luxury car segment and grey import (IUPPV) is something that needs a solution in the regulation.

Furthermore, the next agenda is to lift the minimum of 3-star to 4-star, and finally to the 5-star car. Based on the analysis, it is very achievable since only three models (Perodua Myvi (2013), Proton Saga FLX and Haval M4) are rated 3-star among those that met the minimum ASEAN NCAP 3-star and above. Since ASEAN NCAP is a consumer-based program, the results are presented in a transparent manner whereby anyone can have access to the results on the website and app. Thus, all parties, from EHOs and e-hailing drivers, could plan something especially before purchasing vehicles.

4. Conclusion and Recommendations

This study has recapitulated the inclusion of the ASEAN NCAP safety rating into the e-hailing vehicle regulations in the country. The contribution of this study is to provide an overview of the e-hailing current fleet with regard to ASEAN NCAP rating, namely among the PPVs. This is part of the effort to follow the world's best practices, e.g. in Australia, to ensure only safe vehicles are used in large systems such as public transport, rental, and government fleets. Malaysia should take advantage that ASEAN NCAP is operated by Malaysians and the impact of ASEAN NCAP is very significant in the country's automotive ecosystem. The disruptive situation brought by the e-hailing business is rather the best opportunity to start everything "right", right from the beginning. The analysis showed that the minimum 3-star requirement can be pushed further to a maximum 5-star soon. Since the governance of taxis is also within the jurisdiction of MOT (APAD and JPJ), this safe vehicle movement can be expanded to the taxi category. Also, as mentioned above, this regulatory model can also be implemented among rental and Malaysian government fleets in the future.

The number of ASEAN NCAP-rated vehicles that passed minimum 3-star is expected to increase once the grace period ends in 2022 together with the maximum 10 years of vehicle age. The positive trend in ASEAN NCAP that the most recent PPVs (popular models) had achieved at least 4-star in the assessment will also help to increase the numbers, as well as to pave an easy way to upgrade the minimum requirement in the near future. It is also recommended that EHOs will also help to promote safe vehicles ahead of a regulatory requirement, e.g. to make it a company policy to raise the minimum. It also hoped that the consumers, or specifically the current or future e-hailing drivers, will benefit from labelling effort at showrooms when they purchase their cars.

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References

Abdul Wahab, M. A., Jawi, Z. M., Hamid, I. A., Solah, M. S., Latif, M. M., Isa, M. H. M., Abdul Khalid, M. S., Ariffin, A. H., & Hamzah, A. (2017). Automotive consumerism in Malaysia with regard to car maintenance. *Journal of the Society of Automotive Engineers Malaysia, 1*(2), 137-153.

Abu Kassim, K. A., Ahmad, Y., Jawi, Z. M., & Ishak, S. Z. (2019). ASEAN NCAP's success and challenges in promoting safer vehicles in the ESCAP region. *Transport and Communications Bulletin for Asia and the Pacific, 89*, 1-15.

Abu Kassim, K. A., Isa, M. H. M., Ahmad, Y., Osman, I., & Arokiasamy, L. (2016). Consumer behavior towards safer car purchasing decisions. *Journal of Engineering and Technological Sciences, 48*(3), 359-366.

Abu Kassim, K. A., Jawi, Z. M., & Isa, M. H. M. (2017). ASEAN NCAP's contribution to Malaysia's automotive ecosystem. *Journal of the Society of Automotive Engineers Malaysia, 1*(1), 20-32.

ANCAP (2019). *Uber Australia the first ride-share to implement 5 star ANCAP vehicle safety requirement*. Retrieved from https://www.ancap.com.au/media-and-gallery/releases/uber-australia-the-first-ride-share-to-implement-5-star-ancap-vehicle-safety-requirement

Anggriawan, R. (2019). E-Hailing transportation and the issue of competition in Indonesia. *Indonesian Comparative Law Review, 2*(1), 56-66.

Australian Government (n.d.). *Fleet Vehicle Selection Policy*. Retrieved from https://www.finance.gov.au/government/procurement/vehicle-leasing-fleet-management/fleet-vehicle-selection-policy

Charles, K. K., & Kline, P. (2006). Relational costs and the production of social capital: Evidence from carpooling. *The Economic Journal, 116*(511), 581-604.

Goh, G. (2014). *Uber starts its engines in Kuala Lumpur*. Retrieved from https://www.digitalnewsasia.com/sizzle-fizzle/uber-starts-its-engines-in-kuala-lumpur

Government of Malaysia (2019). *Perolehan Kenderaan* (effective as of 15th of July 2019).

Grab (2015). *MyTeksi celebrates taxi drivers*. Retrieved from https://www.grab.com/my/press/consumers-drivers/myteksi-celebrates-taxidrivers/

Hafriz, S. (2016). *SPAD unveils taxi transformation programme (TITP) – Uber/Grab to be regulated, taxi models liberalised*. Retrieved from https://paultan.org/2016/08/16/spad-unveils-plan-to-resolve-long-standing-issues/

IOGP (2018). *The case for Safer Vehicles*. Retrieved from https://www.iogp.org/fivestar/

IOGP (2019). *Global Production Report 2019*. Retrieved from https://www.iogp.org/bookstore/product/global-production-report-2019/

Isa, M. H. M., Kassim, K. A. A., Jawi, Z. M., & Deros, B. M. (2015). *Promotion of active safety technologies in automobile safety ratings*. Presented at the Conference of ASEAN Road Safety (CARS) 2015, Kuala Lumpur.

Izham, M. I. M. (2018). *Regulating e-hailing in Malaysia - Is there over-regulation?* ZICO Law (Zaid Ibrahim & Co.). Retrieved from https://www.zicolaw.com/resources/publications/regulating-e-hailing-in-malaysia-is-there-over-regulation/

Jais, A. S., & Marzuki, A. (2020). E-hailing services in Malaysia: current practices and future outlook. *Planning Malaysia, 18*(13), 128-141.

Jawi, Z. M., Isa, M. H. M., Mohamed, N., Awang, A., & Osman, M. R. (2016a). A systemic analysis on the usage of safety items among Malaysian private vehicle users. *Journal of Mechanical Engineering and Sciences, 10*(3), 2262-2274.

Jawi, Z. M., Isa, M. H. M., Solah, S., Ariffin, A. H., Kassim, K. A. A., & Wong, S. V. (2013). New Car Assessment Program for Southeast Asian Countries (ASEAN NCAP) - A new paradigm shift in the ASEAN's automotive ecosystem. *Journal of the Eastern Asia Society for Transportation Studies, 10*, 29-44.

Jawi, Z. M., Kassim, K. A. A., Hassan, N. W. N., Tan, K. S., Daruis, D. D. I., Ishak, S. F. A. M., Ahmad, Y., Johari, M. H., & Laili, M. S. A. (2020a). Comparing ASEAN NCAP ratings between editions of the same models. *Journal of the Society of Automotive Engineers Malaysia, 4*(1), 106-118.

Jawi, Z. M., Kassim, K. A. A., Isa, M. H. M., Hamzah, A., & Ghani, Y. (2016b). Towards safer cars in Malaysia. *Journal of Advanced Vehicle System, 3*(1), 1-13.

Jawi, Z. M., Lamin, F., Manap, A. A., Kassim, K. A. 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., & Wong, S. V. (2017). *Automotive consumerism: A study of car user's practices & behaviour in Klang Valley, Malaysia*. MIROS Research Report.

Jawi, Z. M., Tan, K. S., Daruis, D. D. I., Solah, M. S., Abdul Wahab, M. A. F., Ishak, S. A. F. M., Ng, C. P., & Abu Kassim, K. A. (2020b). *A primer on imported used private passenger vehicle in Malaysia*. Presented at the 5th International Conference on Sustainable Mobility (ICSM) 2020, SAE Malaysia (SAEM).

Kamarul Azhar (2020). *2010 > 2019 - Newsmakers: Disrupting public transport in Southeast Asia*. Retrieved from https://www.theedgemarkets.com/article/2010-2019-newsmakers-disrupting-public-transport-southeast-asia

Kassim, M. A., Damio, S. M., & Omar, A. R. (2020). Embedding gig economy in Malaysia higher education: The case of Universiti Teknologi MARA. *Asian Journal of University Education, 16*(2), 226-234.

Keong, W. E. Y. (2015). Factors influencing Malaysian taxi drivers behavioral intention to adopt mobile taxi application. *International Journal of Economics, Commerce and Management, 3*(11), 139-156.

Lee, K. H. (2016). *MyTeksi rebrands into Grab*. Retrieved from https://www.thestar.com.my/tech/tech-news/2016/01/28/grab-rebranding/

Lim, A. (2020). *ASEAN NCAP and KPDNHEP mandatory safety rating labels begin appearing on new cars in showrooms*. Retrieved from https://paultan.org/2020/05/18/asean-ncap-and-kpdnhep-mandatory-safety-rating-labels-begin-appearing-on-new-cars-in-showrooms/

Litman, T. (2000). Evaluating carsharing benefits. *Transportation Research Record, 1702*(1), 31-35.

Millward, S. (2013). *Uber hits yet another Asian city, launches today in Kuala Lumpur*. Retrieved from https://www.techinasia.com/uber-launches-kuala-lumpur-malaysia

NST Online (2018). *Government will not give in to demands to ban Grab*. Retrieved from https://www.nst.com.my/news/nation/2018/11/427115/government-will-not-give-demands-ban-grab

Prasetijo, J., Zhang, G., Jawi, Z. M., Mahyeddin, M. E., Zainal, Z. F., Isradi, M., & Muthukrishnan, N. (2021). Crash model based on integrated design consistency with low traffic volumes (due to health disaster (COVID-19)/movement control order). *Innovative Infrastructure Solutions, 6*(1), 1-7.

Rahman, M. K., Isa, M. H. M., Jawi, Z. M., & Abu Kassim, K. A. (2014). New Car Assessment Program for Southeast Asian Countries (ASEAN NCAP): Vehicle selection and results of Phase II. *Advanced Materials Research 931*, 572-577.

Rahman, N. A., Khan, M. A., Azmi, I. M. A. G., & Zakaria, M. R. A. (2020). E-hailing services: Antitrust implications of Uber and Grab's merger in Southeast Asia. *IIUM Law Journal, 28*(SI), 373-394.

RTD (2021). *Garis Panduan Pelaksanaan Perkhidmatan Kenderaan Persendirian e-Hailing*. Road Transport Department, Ministry of Transport Malaysia.

Santos, D. O., & Xavier, E. C. (2015). Taxi and ride sharing: A dynamic dial-a-ride problem with money as an incentive. *Expert Systems with Applications, 42*(19), 6728-6737.

Solah, M. S., Hamzah, A., Ariffin, A. H., Paiman, N. F., Hamid, I. A., Abdul Wahab, M. A. F., Jawi, Z. M., & Osman, M. R. (2017). Private vehicle roadworthiness in Malaysia from the vehicle inspection perspective. *Journal of the Society of Automotive Engineers Malaysia, 1*(3), 262-271.

Tan, D. (2019). *Govt gives 3-month extension to PSV license deadline for e-hailing drivers, who can continue to operate*. Retrieved from https://paultan.org/2019/07/12/govt-gives-3-month-extension-to-psv-license-deadline-for-e-hailing-drivers-who-can-continue-to-operate/

The Malaysian Reserve (2017). *Easy Taxi app makes debut in Malaysia*. Retrieved from https://themalaysianreserve.com/2017/03/31/easy-taxi-app-makes-debut-in-malaysia/

Todd, L., Amirullah, A., & Xing, C. H. (2018). *E-hailing regulations: striking the right balance*. Institute for Democracy and Economic Affairs (IDEAS), Kuala Lumpur.

Zainul, I. F. (2016). *In bold move KWAP invests RM124mil in Uber, a non-traditional asset*. The Star. Retrieved from https://www.thestar.com.my/business/business-news/2016/09/22/kwap-invests-rm124mil-in-uber/

Zulkipli, Z. H., Sarani, R., Abidin, A. N. S. Z., Solah, M. S., & Osman, M. R. (2019). Periodical Technical Inspection on taxi roadworthiness. *Journal of the Society of Automotive Engineers Malaysia, 3*(4), 41-47.