

Towards safer cars in Malaysia

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ABSTRACT

This article discusses the framework of safer cars in Malaysia based on the Vehicle Type Approval (VTA) and New Car Assessment Program (NCAP). The new era of automobile safety is presumably come at the right time for Malaysia after the two important milestones i.e. local assembly initiative in 1960's and the national car project in 1980's. The maturity of VTA exercise in Malaysia and the inception of ASEAN NCAP are contributing to direct and indirect pressure to car manufacturers to progressively produce safer cars. Since car pricing is driven by market competitiveness and not affected by safety upgrades, the consumers eventually would enjoy more values for their money through safer cars. In terms of car safety, the automotive ecosystem in Malaysia could as well explain the impact of NCAP in other ASEAN countries' automotive layout. It is expected that there will be growing demand for safer vehicles and also positive response from OEMs in Malaysia and the region.

Keywords:

Car safety, Vehicle Type Approval (VTA),

New Car Assessment Program (NCAP),

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1. Introduction

Since its independence in 1957 from the British colonial, Malaysia has been experiencing a rapid growth in its economy over the span of half a century [1]. Started with tin-mining industry, the country then has experienced significant progress mainly in industrialization and also in many aspects of its socio-economic, including motorization [2]. Besides the growing road network based on the number of road kilometres, there is also modernization of road infrastructures. It is now more common to see dual carriageway roads, network of highways and road viaducts as examples of the said advancements in Malaysia's road infrastructure. On another note, the country also keeps producing a sizeable number of new drivers every year [3], as well as clocking among the highest annual car sales among ASEAN countries [4,5]. As a consequence, the country's road traffic system is becoming more complicated. This creates more challenges to the responsible parties i.e. traffic

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congestion, high speed environment, mix of transport modes particularly private cars and motorcycles, etc.

It is worth to note that the discussion in this article is mostly centred on 'cars'. This include the Sports Utility Vehicles (SUVs) and Multi-Purpose Vehicles (MPVs) i.e. the private passenger vehicles segment. For some reasons, anything related to car industries in Malaysia gets more attention than those related to motorcycles although in terms of volume the motorcycles recorded about the same magnitude of sales as cars each year. The 'safer vehicles' in road safety as a whole should be viewed in a bigger picture that includes all modes of transportation but the issue on motorcycles and heavy vehicles require different points of views (socio-economic and socio-technical). Therefore, from here on, the discussion in this article will revolve around car's safety perspectives.

2. Car industry in Malaysia

2.1 The beginning

Retrospectively, the use of motorized vehicles in Malaysia dated back to the beginning of the 20th century when Singapore was still part of the Federation of Malaya under the British administration. However, due to some political circumstances, Singapore separated from Malaysia in 1965. Hence, the purely Malaysia's modern history of motorized vehicles started after that timeline [6]. If Singapore was taken into consideration, the history of auto industry in the British colony of Malaya could be traced back to the small scale vehicle assembly operations in Singapore by Ford. However, available publications mostly discuss about the two important milestones of post-colonial Malaysia, which were the 1960s 'local assembly initiative' and the so-called 'national car project' in 1980s.

Inspired by the Colombo Plan experts' recommendation in 1963 [6], the Malaysian government had introduced a policy in May 1964 to change the status quo of its vehicle industry by imposing high import duties to encourage domestic assembly industries. Swedish Motor Assemblies (SMA) of Volvo was among the pioneers in that era, followed by other foreign automakers such as Peugeot and Mazda by Asia Automobile Industries Sdn. Bhd., and Nissan (then known as Datsun) by Tan Chong Motors [2,6]. Until the early 1980s, this endeavour was deemed as rather unsuccessful since importation was still based on CKD (Completely Knocked-Down) form due to low technology transfer and expertise in the automotive industry [6].

The second wave of automotive industry development started when the former (fourth) Prime Minister, Dr. Mahathir Mohamad mooted the idea of National Car Policy in 1979; with the key ingredient was the National Car Project. He, then the Deputy Prime Minister and Minister of Trade and Industry, was responsible to the inception of Proton. The first Malaysian car brand, Proton started with a humble beginning with a donor car, the Lancer of Mitsubishi (Figure 1 (a)). The first model, Proton Saga, was launched in 1985. It was made possible through a joint-venture with Japan's Mitsubishi Motors Corporation (MMC) by virtue of the 'Look East' policy [7]. The same formula was repeated in 1990s, when another venture called Perodua was established in partnership with Daihatsu of Japan. It was also started with a donor car (Daihatsu Mira) that was launched as Perodua Kancil in 1994 (Fig. 1 (b)).

2.2 Fast forward: The industry today

Today's vehicle industry layout has become more complicated, especially in the company's structure due to ownership policies, merges and takeovers [7]. Nevertheless, the setups will fit into any of the stages shown in Table 1 [7,8].



Fig. 1. (a) Left: Proton's first model based on Mitsubishi Lancer codenamed as 'Saga'; (b) Right: Perodua's first model based on Daihatsu Mira codenamed as 'Kancil'

Table 1

Auto industry development stages

National Auto Industry Development Stages	
Stage 1	Import of completely built-up (CBU) by local distributors
Stage 2	Assembly of semi/completely knocked-down (CKD) by subsidiaries/licensed/franchised domestic ventures
Stage 3	Assembly of CKD with certain percentage of local content; Multi Sourcing Parts (MSP)
Stage 4	Full scale manufacture of automobiles – full local manufacture (FLM) unit

The country has the likes of NAZA, Tan Chong Motor Holdings (TMCH) and DRB-HICOM to explain the above mentioned stages. NAZA is a domestic brand owner of various makes including Peugeot and Kia (Stage 2/3; also Stage 1 under NAZA Group of Companies for luxury cars), Tan Chong Motor owns the brand of Nissan and Subaru (Stage 2/3) and DRB-HICOM is the current owner of Proton (Stage 4) and several other brands, just to name a few different kind of setups in Malaysia's automotive industry. For example, Figure 2 shows the ownership structure of today's Perodua (as of 2013), which comprises of seven major shareholders [9].

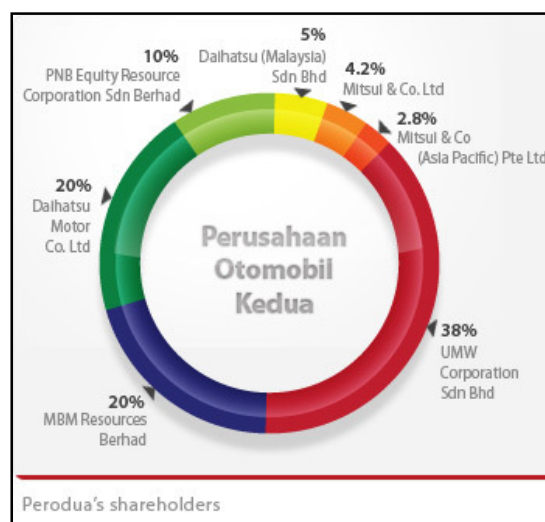


Fig. 2. Perodua shares ownership as of 2013

Today, Proton that started at Stage 2 and 3 has reached Stage 4 in the post Year 2000 era, with the introduction of fully home-grown models (FLM) such as the Waja, Gen-2/Persona, Saga BLM, Exora (MPV), Prevé/Suprima S, Iriz and the new Persona (Iriz-based). Meanwhile, Perodua maintains at Stage 3 with the Japanese-based models such as Myvi (Daihatsu Sirion/Passo) and Alza (Toyota Passo Sette/Daihatsu Boon Luminas) with both models become among the best-selling cars in their respective segment [10]. These models also contribute to Perodua's leading position in terms of sales to overtake Proton [11] – Proton and Perodua dominates approximately 60 percent of Malaysia's market share or the Total Industry Volume (TIV) [4,12].

As national car makers, Proton and Perodua dominated the market for many years mainly due to the factor of price affordability and tax structure. However, the domination that was once at 80% in the year 2000 has dropped significantly to 47% in 2014 [13], and remained the same in 2015 [14]. The decline in the market share was mainly due to the poor sales of Proton cars. Perodua, on the other hand, took over the first place from Proton for best-selling brands since 2006 until today [15]. The year 2014 was even more historical for the domestic automotive industry whereby the non-national makes' overall sales (TIV) had surpassed the 50% mark and thus had the lion's share [15].

Among the non-national makes, the Japanese manufacturers dominate the market as compared to makes from other origins. The 'Big 3' players – Toyota, Honda and Nissan – managed to clock 26.4% in 2007 and 27.4% in 2013 [4,12]. In 2015, the market shares of Toyota, Honda and Nissan was about 35% of the total TIV, including the commercial vehicles for Toyota and Nissan [14]. This is why these three brands are termed as the 'Big 3' (with regard to non-national makes). It is also worth to note that Honda had overtaken the first position from Toyota in the non-national category; and based on 2015 TIV, Honda was actually far ahead of Toyota in private passenger car sales. Moreover, in the first quarter of 2016, Honda sales was just few hundreds away from Proton and is set to make another record if Proton sales trend continues in 2016 [16].

The European makes, on the other hand, typically offer what is often regarded as luxury cars including sports and super cars. The likes of Mercedes, BMW, Volvo and Porsche cars usually bear the price tag of over MYR 200,000 (approx. USD 44,000 with exchange rate of 1USD = MYR4.5 in November 2016). Volkswagen has recently penetrated the middle range segment (below MYR 100,000) to join Peugeot of France (NAZA), with the introduction of CKD version of Polo Sedan and Hatchback [17,18].

3. Car safety

In a rather straightforward theory on road accidents, the more the number of vehicles on the road will hypothetically contribute to higher chances for road accidents to occur. The same goes for the factors such as number of kilometres travelled (VKT) and number of road users (usually the country's population), as portrayed in the world's comparable road safety indices (Table 3) [19].

Table 3
Comparable road safety indices among countries in the world

Road Safety Fatality Index	
Index 1	Road fatalities per 10,000 registered vehicles
Index 2	Road fatalities per 100,000 population
Index 3	Road fatalities per 1 billion vehicle kilometer travelled (VKT)

The above fact is highly related to exposure and risk, in which both factors must be well-understood by the vehicle-related professionals in the country i.e. lawmakers, government officers, automotive engineers, and also most importantly the car owners as a whole. It is rather impossible

to halt the exposures from growing since the number of vehicle sales (TIV) in the last ten years suggest that the country's economy is able to create such a consistent demand for cars [20]. Therefore, the effort ought to be centred into minimizing the danger posed by vehicles. It is also important to note the fact that besides technological approach, human factors also play a big role in the safety of vehicles – in both stationary (maintenance) and while in motion.

When a vehicle is purchased, the owner is responsible to maintain the vehicle condition and most importantly to drive it safely. The former would simply refer to vehicle maintenance, and the latter is all about operating it safely. Both factors are equally important in minimizing the risks of accidents and injuries. Every measure and countermeasure in road safety must be treated equally as important though in reality it may not serving the intended purpose. For example, the fitment of airbags will help to reduce the injury severity; however, data from various studies show that there are vehicle occupants who ignore seatbelts, which then write off the function of airbags.

Since human factors are something tricky to be solved in an objective manner, the other avenue to raise the bar of minimum safety standard of cars can be achieved through the Vehicle Type Approval (VTA) process and also the New Car Assessment Program (NCAP). Improved VTA and the introduction of NCAP are perhaps the new paradigm in the country's automotive layout, since the previous efforts are merely focusing on establishing and strengthening the car industry.

3.1 Vehicle type approval (VTA)

When a vehicle rolls out of the factory heading to the showroom, its default roadworthiness and performance levels are based on the Vehicle Type Approval (VTA). The level of performance and roadworthiness requirements being set in the VTA's mandatory compliance list must be met by the applicants (OEMs, domestic brand owners or traders) before the product can be marketed in Malaysia. In other words, the level set in the present version is the minimum requirement to be complied with.

This 'minimum' is bound to be increased over time due to many reasons such as: (1) to accommodate new or latest technologies; (2) to upgrade to a new or revised performance level; and (3) to response to latest safety/roadworthiness concern rising from real-world accident investigation or normal/daily usage analysis. Therefore, each country has to be responsible of the 'minimum' requirements being set in its VTA, in which Job *et. al* described as "a politically acceptable" situation if no improvement is made [21].

"... many fatalities occur not because of driver error but because of driver error combined with a negligent designed road system and a politically acceptable but technically substandard vehicle. Most of us would not condone a legal system which handed out the death penalty (or permanent disability) for "crimes" such as the misjudging of the camber of the road or driving when slightly drowsy, so we should not accept a politically determined traffic system which metes out such penalties – Job et al., 1989"

VTA process in Malaysia is led by the Road Transport Department (RTD), an agency under the Ministry of Transport (MOT) [22]. VTA basically assesses any vehicle that is about to be introduced in the market and to be used on and off road. VTA covers all range of vehicles, from motorcycles to heavy vehicles. The process will take minimum twenty days including the VTA Committee meeting as the final approval in the procedure, in which the meeting is held once a month – committee members comprised of representatives from RTD, SIRIM Berhad, Malaysian Institute of Road Safety Research (MIROS), Ministry of Transport (MOT), Ministry of International Trade & Industry (MITI), Customs, Department of Environment (DOE), PUSPAKOM Berhad, Ministry of Trade, Co-operatives &

Consumerism (KPDNKK), Ministry of Science, Technology & Innovation (MOSTI), Standards Malaysia and Malaysia Automotive Institute (MAI) [23]. The legal references for VTA in Malaysia are as follows:

Table 3
VTA legal references

Malaysian Laws for VTA
Road Transport Act 1987 (Sect. 10,12 and 66(1)(pp))
Road Transport Rules (Construction & Use Rules)
Environmental Quality Act 1974 (Department of Environment)
Weight Restriction Order 1989 (Amendment 2009) (Public Work Department)

VTA in Malaysia is in the process of upgrading the minimum level by implementing the United Nations Regulations' standard (previously known as UN ECE Regulations), in which one of the important milestones was the inclusion of Malaysia in the World Forum for Harmonization of Vehicle Regulations (WP29) on 4th of April 2006 [23,24].

3.2 New car assessment program (NCAP)

As the business requires making the most profit while reducing cost, the car production in the Southeast Asia region may have to reduce the specifications to meet the cost-reduction target. This can be seen in what is called the general overseas market (GOM), whereby the car is made available without certain functions or gadgets as compared to the original specifications for other developed countries' market (Fig. 3).



Fig. 3. Example of 'design protect' for passenger airbag of Proton Saga (all Proton Saga variants in Malaysia today are equipped with double airbags)

Like it or not, the cost-reduction exercise often compromises safety. For instance, the airbags and the accident avoidance systems such as the Antilock Braking System (ABS) and Electronic Stability Control (ESC) are taken out for general overseas market. Therefore, the main function of crash tests and other evaluations for automobile safety rating program, or usually known as the New Car Assessment Program (NCAP), is to set another standard above VTA to ensure that safety is not being compromised [25]. The evidence of such claim can be seen for a certain car models that are supposed to be the so-called global car but having arguable strength between two market origins i.e. scored excellent rating in developed country's market but had poor results in the general overseas market [26,27]. Although NCAP may not necessarily be embedded in the legislative framework, it is to a certain extent fairly robust especially to the manufacturers. The results of crash tests, whether or not match the acceptable safety performance in NCAP, are made public through various medium of publications. The result may influence the consumers' perception of how good or bad a car is.

Furthermore, the standard in NCAP is usually progressing faster as compared to VTA. Process of changes in NCAP is generally less complex relative to VTA, thus the upgrades usually take shorter time. The quicker progress also will encourage the inclusion of latest technologies available in the market that can benefit the road users in either avoiding a collision or minimizing the injuries in road crashes [24,28]. MIROS in collaboration with Global NCAP has materialized an NCAP program in the Southeast Asia region with the first test conducted in 2012 (Figure 4 (a)). The New Car Assessment Program for Southeast Asian Countries (ASEAN NCAP) was established from a meeting point of two separate agendas i.e. the dream of Malaysia to have its own independent automobile safety rating, as well as the special mention of such initiative in the United Nation's Decade of Action (DOA) for Road Safety 2011-2020 [28].

The establishments of MIROS in 2006 and Road Safety Department (JKJR) in 2004 under the framework called "Malaysia's Road Safety Plan 2006-2010" shows the country's commitment for road safety [19]. One of the strategic projects for MIROS to initiate was initially called MyNCAP (Malaysia New Car Assessment Program). Since 2008, major fundamental works have begun that include benchmarking process around the world, designing the crash test laboratory and introducing the Malaysian Vehicle Assessment Program (MyVAP) as a precursor program for NCAP [24]. In December 2011, MIROS and Global New Car Assessment Program (Global NCAP) had signed the Memorandum of Understanding (MoU) to establish NCAP for Southeast Asia region (Figure 4 (b)), which is a greater initiative than Malaysia's initial target.



Fig. 4. (a) Left: Ford Fiesta produced by Thailand in ASEAN NCAP first phase test at MIROS PC3 crash lab; (b) Right: MoU signed between MIROS and Global NCAP in Delhi, India for ASEAN NCAP project

3.3 VTA versus NCAP

In sum, VTA can be regarded as regulatory approach, whereas, NCAP is vice versa. Figure 6 portrays the function of VTA and NCAP in the automotive ecosystem in Malaysia (Figure 7) – the term ecosystem here refers to the interaction between the industry and users/consumers in the life cycle of cars [20].

When both VTA and NCAP efforts are working in tandem, the car owners as end users would enjoy the best options in terms of safety because VTA has secured the 'minimum' safety level a car should have while the NCAP pushes for better safety specifications. Besides, the NCAP also acts as a shield or giving the impression as 'the auto-safety police' so that the manufacturers accord to the acceptable standard in the market. As a result, starting from year 2013, all new cars in Malaysian market were equipped with a minimum of two airbags. These applied even to the cheapest small hatch (Perodua Axia) and small sedan (Proton Saga). This is a positive trend that is believed to have

been influenced by VTA and ASEAN NCAP, though the fitment only may not directly mean compliance to the intended safety definition.

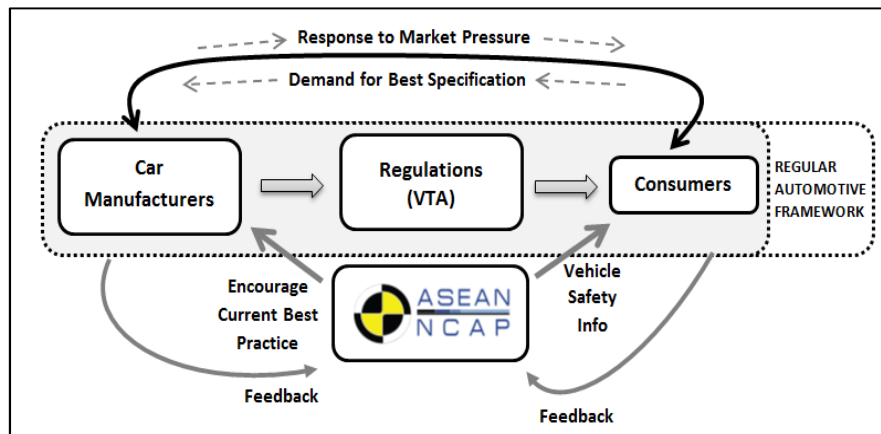


Fig. 6. Roles of ASEAN NCAP and VTA

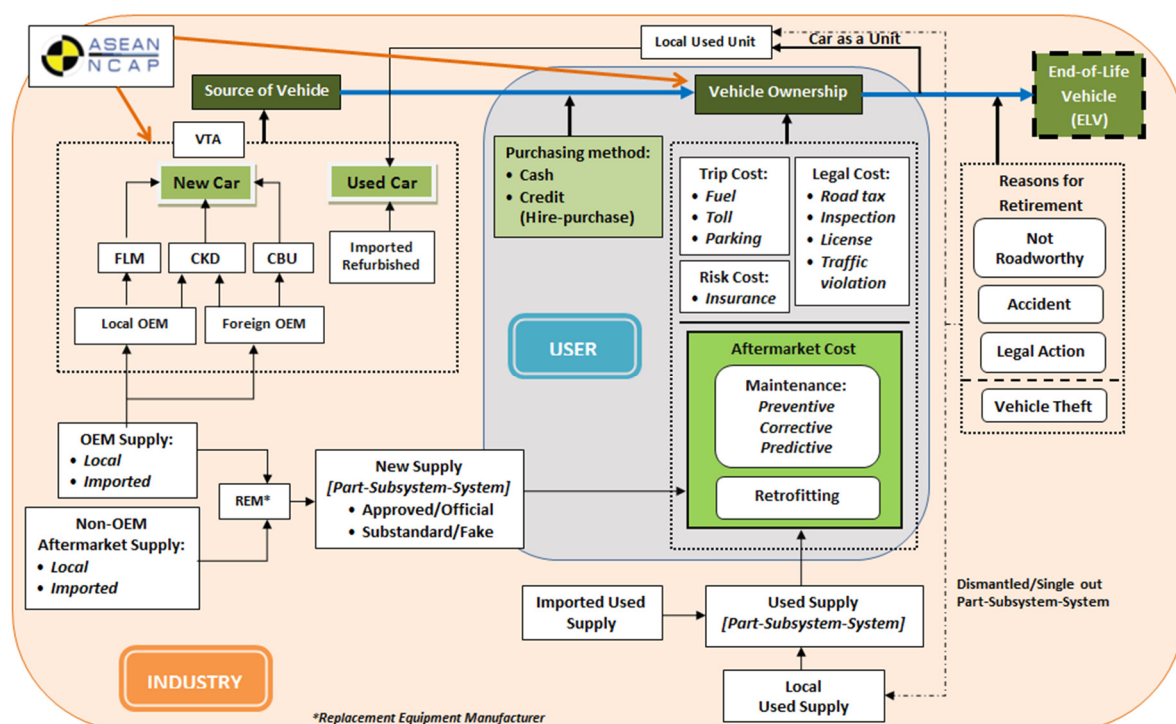


Fig. 7. Malaysia's automotive ecosystem

The term 'compliance' brings different definitions to VTA and NCAP. It is simply because VTA is under the umbrella of government (RTD of MOT), in which the situation can be described as 'a compromised situation' due to government-industries economic bonding [8]. This perhaps due to many factors such as: (1) readiness in product planning and buying time to finish the projected sales order; (2) non-compliance due to different regulations at the origin country (whether the rules are at par, superseding or using different methodology in testing); and (3) small volume in terms of sales in the country. This can be seen on a list of exempted cars from meeting the crashworthiness element in UN Regulations – R94 (frontal impact protection) and R95 (side impact protection) [29].

On the other hand, NCAP can expedite the improvement by pinpointing which element of safety that should be highly considered by the OEMs. For example, two Proton Saga variants were tested in

the first phase of ASEAN NCAP, in which the lowest version with single airbag suffered a great loss of scores by the front passenger dummy – scored 1-star in ASEAN NCAP (Figure 8 (a) and (b)). However, the version with double airbags gives better protection for the occupants and able to achieve a comfortable score of 3-star in ASEAN NCAP [30]. Therefore, both tests showed how an element of safety really affects the protection for serious injuries – in this case provided by an additional airbag (front passenger). Following the crash test results, Proton has terminated the sales of the 1-star version of Saga and replaced it with the 3-star Saga FLX+ (in the market known as Saga SV) since June 2013.

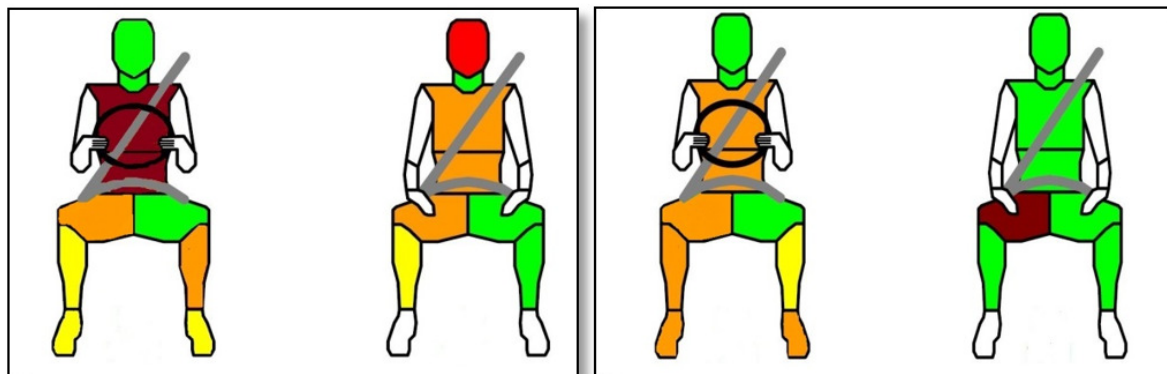


Fig. 8. (a) Left: Dummy's injury map for Proton Saga; (b) Right: Dummy's injury map for Proton Saga FLX+
[Note: Green-Good, Yellow-Adequate, Orange-Marginal, Brown-Weak, Red-Poor]

3.4 Other efforts

VTA and NCAP are meant for better automotive consumerism without the need for consumers to get involved in the implementation process. For NCAP, the challenge is at the latter stage whereby car buyers are recommended to consider the best safety performance especially when buying new cars. Safety is an additional factor for them to consider apart from fuel consumption, design, gadgets, etc. Therefore, as shown earlier in Figure 6, the pressure for consumer will make the loop 'closed' in the ideal form of NCAP framework. However, human factor is the challenging part for the policy makers and traffic safety implementers. The educating and campaigning process will take a longer time, and most importantly commitment and persistency are very much needed to ensure the information on safer cars is widespread and well-understood by consumers.

4. Safer cars in Malaysia: The way forward

"What's next?" for safer cars in Malaysia is basically a similar concern of other countries in the ASEAN region. Any effort available so far to increase the safety level of cars in the country, is not yet a total solution to the main problem for Malaysia and most ASEAN countries i.e. the motorcycle-related issues. Both VTA and NCAP are giving more attention to passenger car segment, and the basis of such assessment and testing standard are originally sourced from the developed countries, namely the European countries and the United States. Thus, in the longer term, we need something that can solve our core problems while having a good control on other rising issues.

First of all, let's see where we are now according to the United Nation's Decade of Action for Road Safety 2011-2020 – a global plan that supposed to guide preventive efforts in road safety [31] (Table 4):

Table 4

Malaysia effort in safer vehicles

Pillar 3: Safer Vehicles >> Encourage universal deployment of improved vehicle safety technologies for both passive and active safety through a combination of harmonization of relevant global standards, consumer information schemes and incentives to accelerate the uptake of new technologies.

Activity 1: Encourage Member States to apply and promulgate motor vehicle safety regulations as developed by the United Nation's World Forum for the Harmonization of Vehicle Regulations (WP 29).

Discussion: *Malaysia already embedded UN Regulations into its VTA.*

Activity 2: Encourage implementation of new car assessment programmes in all regions of the world in order to increase the availability of consumer information about the safety performance of motor vehicles.

Discussion: *The establishment of ASEAN NCAP serves this particular recommendation.*

Activity 3: Encourage agreement to ensure that all new motor vehicles are equipped with seat-belts and anchorages that meet regulatory requirements and pass applicable crash test standards (as minimum safety features).

Discussion: *Related to Activity 1 and 2, and Malaysia had implemented rear seat-belt law in 2009 – yet to consider for all vehicles especially the buses. Nevertheless, the compliance among the users is still very low for rear seat-belt and quite good for front occupants [32].*

Activity 4: Encourage universal deployment of crash avoidance technologies with proven effectiveness such as Electronic Stability Control (ESC) and Anti-Lock Braking Systems (ABS) in motorcycles.

Discussion: *ASEAN NCAP encourages the fitment of ESC or similar technologies through the pre-requisite in its rating scheme. It needs a different approach or initiative to have advanced braking technologies installed for motorcycles, as well as blind spot detection (in cars) that can also benefit motorcyclists [33].*

Activity 5: Encourage the use of fiscal and other incentives for motor vehicles that provide high levels of road user protection and discourage import and export of new or used cars that have reduced safety standards.

Discussion: *Not yet materialized via the tax system, but the latest National Automotive Policy (NAP) development is about to consider safety as tax determination (currently more into fuel/engine efficiency called the Energy Efficient Vehicle – EEV).*

Activity 6: Encourage application of pedestrian protection regulations and increased research into safety technologies designed to reduce risks to vulnerable road users (VRUs).

Discussion: *This can be divided into two parts: First, on the pedestrian, ASEAN NCAP in its road map will also include pedestrian protection at later stage [34]. Second, on the VRUs, ASEAN NCAP regards the inclusion of more Safety Assists Technologies (SATs) or active safety features in passenger cars will also help VRUs [33]. This is because VRUs themselves are prone to danger on the roads unless necessary infrastructures are provided, e.g. motorcycle lanes.*

Activity 7: Encourage managers of governments and private sector fleets to purchase, operate and maintain vehicles that offer advanced safety technologies and high levels of occupant protection.

Discussion: *It's about time for implementing this since the country has developed the most important base in VTA and ASEAN NCAP.*

As explained earlier, cars are available to the consumers once they are approved based on VTA. However, standards set in VTA can be considered as a minimum requirement concerning roadworthiness and crashworthiness aspects. In fact, crashworthiness criteria set in certain

countries' legislation is inferior as compared to NCAP requirement even for the case of Malaysia, which has adopted and enforced car manufacturers to comply with United Nations (UN) regulations for crashworthiness test (e.g. Regulation No. 94 – frontal offset test at 56 km/h; UN R94). Passive safety that generally involves various crash test configurations (pedestrian protection, pole impact, etc.) is a rather straightforward effort (especially financially) since the first and greatest hurdle had already overcome by Malaysia through the establishment of MIROS PC3 crash laboratory [28]. The remaining challenge is to include more tests into the rating scheme.

Again, the main concern in road safety for ASEAN region should be given to motorcycle issue as most of the fatalities involved motorcyclists. Therefore, this pushes the intriguing mind to the question of 'how relevant is NCAP for ASEAN now?' The ASEAN NCAP movement is important for two obvious reasons: (1) NCAP and crash test for passenger cars are established programs in which the assessment is more objective and widely accepted to improve the safety standard; and (2) the same initiative for motorcycles is 'a long way to go' since the vulnerability of motorcyclist on the road is totally a different issue as compared to car occupants. Therefore, the medium-term plan in ASEAN NCAP should also look into giving the safety benefits to motorcycle users through NCAP [33]. With so many new technologies have been introduced for passenger cars, NCAP should further promotes these active safety elements in new cars. These safety technologies, or also known as Safety Assist Technologies (SATs), will not only benefit car users, especially in minimizing the risk of getting involved in road crashes, but also protecting motorcyclists from certain risks.

In addition, the ASEAN NCAP may face multitude of challenges with regards to various regulations standard in all ten ASEAN countries. Also, the unique industry environment in each country, namely the automotive industry, may undermine the NCAP benefits. For example, certain countries are less developed and do not have heavy industry such as automotive; and therefore, totally rely on imported cars. The similar situation (importation) is also valid in small but rich countries such as Brunei and Singapore. This creates a different scenario regarding the automotive industry and government policies in setting the regulations standard and controlling vehicle ownership. In addition, the star ratings churned out in ASEAN NCAP's pilot phases are only applicable to certain Southeast Asian countries since there are many cases whereby similar car model and/or variant from different countries are equipped with different safety packages. Nevertheless, standardization of safety items in common ASEAN car is hoped to materialize gradually as the direct impact of the program.

5. Conclusion

The maturity of VTA exercise in Malaysia and the inception of ASEAN NCAP for the region directly or indirectly forces car manufacturers to gradually produce safer cars. Interestingly, it is the car buyers who actually emerge as a clear winner as a result of stiffer regulations that come from the government and the safety bar raised by ASEAN NCAP, as well as competition among the manufacturers themselves. For the car manufacturers, equipping their models with better safety would mean business survival, and failure to comply would spell disaster especially when consumers are getting more knowledgeable about safety. On the other hand, the manufacturers could not simply pass the safety cost to customers due to stiff competition; and thus, the consumers would enjoy greater value for their money. It certainly is a relief for Malaysian car buyers that the tougher requirement for car safety standard, to a certain degree, offset their feelings on high car prices set by the government through the existing tax structures. The influence of ASEAN NCAP on automotive ecosystem in Malaysia could also be replicated in other ASEAN countries' automotive layout. However, there will be some degrees of similarities and differences as each ASEAN country is unique

in managing its domestic industry, importation, vehicle licensing, vehicle assessment (VTA), as well as vehicle ownership environment. Apart from the regulations, customers' growing understanding on safety is expected to lead to growing demand for safer vehicles. Similarly, the OEMS is expected to work in tandem with regards to higher safety standard compliance. Therefore, the new era of automobile safety is presumably come at the right time for Malaysia in this new millennium after the two important milestones – the 1960's local assembly initiative and the national car project in 1980's – that without a doubt had changed the country's automotive landscape significantly, particularly on occupants' safety.

References

- [1] Yusof, Z.A., Bhattasali D. *Economic growth and development in Malaysia: policy making and leadership*. Working Paper No. 27, Commission on Growth and Development, Washington, DC, 2008.
- [2] Retrieved on October 20, 2014, from:
www.livelifedrive.com/news/malaysia-day-special-tracing-origins-malaysias-automotive-industry/24186
- [3] Zulhaidi, M.J., Mohd Khairudin, R., Alhapiz I., M.K., Rasid O., M. *Laporan Status Semasa Institut Memandu di Malaysia*. MRR 01/2011, Malaysian Institute of Road Safety Research, 2010.
- [4] Amelia, L., Wahab, D.A., Che Haron, C.H., Muhamad, N., Azhari, C.H. "Initiating automotive component reuse in Malaysia" *Journal of Cleaner Production* 17, (2009):1572-1579.
- [5] Retrieved on March 20, 2016, from:
malaysia.ahk.de/
- [6] Retrieved on April 1, 2016, from:
unescap.org/
- [7] Retrieved on March 6, 2016, from:
amco.org.my/n-archives/MalaysiaIR-AutoIndustry.pdf
- [8] Andrew H.S. and Shobhana M. "The car in Southeast Asia." *Transportation Research Part A: General* 23, (1989): 425-437.
- [9] Retrieved on December 20, 2014, from:
perodua.com.my/
- [10] Retrieved on January 27, 2015, from:
paultan.org/2014/01/16/perodua-achieves-sales-record-2013/
- [11] Retrieved on January 20, 2015, from:
paultan.org/2006/05/23/perodua-overtakes-proton-in-market-share/
- [12] Retrieved on January 20, 2015, from:
paultan.org/2014/01/22/maa-2013/
- [13] Mashahadi, F., Mohayidin, M.G. "Consumers' Buying Behaviour Towards Local and Imported Cars: An Outlook After the Implementation of ASEAN Free Trade Agreement (Afta) In Malaysia." *OUM International Journal of Business and Management* 1, no. 1 (2015): 44-54.
- [14] Retrieved on January 30, 2016, from:
paultan.org/2016/01/21/2015-malaysia-vehicle-sales-market-review-by-brand/
- [15] Retrieved on January 30, 2016, from:
paultan.org/2015/01/16/proton-perodua-market-share-falls-below-foreign-brands/
- [16] Retrieved on May 1, 2016, from:
paultan.org/2016/04/25/malaysia-vehicle-sales-data-for-march-2016-by-brand/
- [17] Retrieved on March 1, 2016, from:
paultan.org/tags/volkswagen-polo-sedan-malaysia/
- [18] Retrieved on March 1, 2016, from:
thesundaily.my/news/881932
- [19] Road Safety Department. *Pelan Keselamatan Jalan Raya Malaysia 2006-2010*. Ministry of Transport Malaysia, Putrajaya, 2006.
- [20] Zulhaidi, M.J., Fauziana, L., Abdul Rahmat, A.M., Khairil Anwar, A.K., Fuad, A., Wong, S.V. *Review of the National Automotive Policy on Car Maintenance Issues: Malaysia's Automotive Ecosystem Explained*. MRev 02/2012, Malaysian Institute of Road Safety Research, 2012.
- [21] Mooren, L., Grzebieta, R., Job, S. "Safe system-comparisons of this approach in Australia." In *Proc. Australasian College of Road Safety National Conference*, Melbourne. 2011.
- [22] Retrieved on December 1, 2013, from:

- jpj.gov.my/proses-kelulusan-jenis-kenderaan-vta
- [23] Road Transport Department. *Garis Panduan Kelulusan Jenis Kenderaan (Pindaan) 2013*. Automotive Engineering Division, Road Transport Department, 2013.
- [24] Aqbal Hafeez, A., Zulhaidi, M.J., Yahaya, A., Mohd Syazwan, S., Fazli, Y. *Malaysian Vehicle Assessment Programme PROTON EXORA – A 4-Star MPV in Safety*. MER 09/2012, Malaysian Institute of Road Safety Research, 2010.
- [25] Kassim, Khairil Anwar Abu, Lawrence Arokiasamy, Mohd Hafzi Md Isa, and Intan Osman. "Automotive Consumerism towards Car Safety in Malaysia." *Procedia-Social and Behavioral Sciences* 219 (2016): 424-430.
- [26] Retrieved on February 1, 2016, from:
latino.foxnews.com/
- [27] Retrieved on February 1, 2016, from:
www.globalncap.org/crash-tests-show-indias-cars-are-unsafe/
- [28] Jawi, Z.M., Abu Kassim, K.A., Sadullah, A.F. "ASEAN NCAP-The Best Bet for Vehicle Safety in the Region's Safe System?." *International Journal of Trade, Economics and Finance* 4, no. 6 (2013): 358.
- [29] Retrieved on December 12, 2013, from:
www.jpj.gov.my/status-senarai-kenderaan-yang-tidak-mematuhi
- [30] ASEAN NCAP. *Safer Cars for ASEAN Region – ASEAN NCAP Phase 1 Official Result*. New Car Assessment Program for Southeast Asian Countries, 2013.
- [31] Retrieved on October 12, 2013, from:
www.roadsafetyfund.org/UnDecadeOfAction/
- [32] Jawi, Z.M., Md Isa, M.H., Mohamed, N., Awang, A., Osman, M.R. "A Systemic Analysis on the Usage of Safety Items among Malaysian Private Vehicle Users: Where to from now?." In Proc. 3rd International Conference on Recent Advances in Automotive Engineering & Mobility Research, Melaka, 2015.
- [33] Md Isa, M.H., Abu Kassim, K.A., Zulhaidi, Baba, M.D. "Promotion of active safety technologies in automobile safety ratings." In Proc. Conference of ASEAN Road Safety, Kuala Lumpur. 2015.
- [34] Ariffin, A.H., Hamzah, A., Paiman, N.F., Rahman, M.K., Solah, M.S., Md Isa, M.H., Jawi, Z.M., Abu Kassim, K.A. "Pedestrian Protection Assessment in ASEAN NCAP: Future Consideration." In Proc. Southeast Asia Safer Mobility Symposium, Melaka. 2013.