New Car Assessment Program for Southeast Asian Countries (ASEAN NCAP) – A New Paradigm Shift in the ASEAN's Automotive Ecosystem

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Abstract: This paper discusses the inception of the New Car Assessment Program for Southeast Asian Countries (ASEAN NCAP) which is expected to create a new paradigm shift in the region's automotive ecosystem. The discussion encompasses several key topics concerning NCAP in the region: (1) the rationale of having a proactive approach to cater the issues other than casualties for the Vulnerable Road Users (VRUs); (2) an overview of the ASEAN NCAP history and rating structure; (3) the role of NCAP in the automotive ecosystem; (4) the status quo of users' perception on vehicle safety from a public survey in four ASEAN countries; and (5) the key challenges in materializing the objective and future undertakings of NCAP in the ASEAN region.

Keywords: New Car Assessment Program (NCAP), ASEAN NCAP, Vehicle Safety, Automotive Ecosystem, United Nation's Decade of Action for Road Safety 2011-2020

1. INTRODUCTION

The countries in Southeast Asian region, or the ASEAN[1] community, are experiencing growth at variable rate that created large socioeconomic disparities (APEC, 2006; Prabnasak et al., 2011). A considerable proportion of ASEAN population are still far from owning private car and therefore opting for low-cost private transportation i.e. motorized or non-motorized two-wheelers. Motorcycles and scooters become so popular in the region due to low ownership cost and many other ease-of-use advantages (Mohd Hafzi et al., 2011). A report by the World Health Organization (WHO) (2009) estimated that motorcycles dominate more than half of the registered vehicle population in Malaysia, Indonesia, Vietnam, Thailand and the Philippines, with the highest is in Vietnam at 95%.

On the other hand, the ASEAN region today is regarded as one of the emerging economies globally and becoming the developing countries in Asia (Prabnasak et al., 2011). This development is also changing the landscape of the people activities gradually, including the mobilization. Transportation modal change is one of the issues concerning mobilization, whereby more people are now capable to demand for the comfort of four-wheeler private vehicles. Frost & Sullivan, as quoted by Motor Trader (2012) and The Star Online (2012), estimated that the vehicle sales in the region will be clocking at 4.7 million units in 2018 as

[1] The Association of Southeast Asian Nations; A geo-political and economic organization of 10 countries – Brunei Darussalam, Cambodia, Indonesia, Laos, Malaysia, Myanmar, the Philippines, Singapore, Thailand and Vietnam.

compared to 2.4 million units in 2011. Consequently, this will put ASEAN at the sixth place of the global biggest automotive market by 2018. The big three ASEAN automotive powerhouses – namely Thailand, Malaysia and Indonesia – dominate the production (Total Industry Production – TIP) as well as the sales volume (Total Industry Volume – TIV) with the combined value of 90% and 86%, respectively (Deutsche Bank Research, 2011). The average car density in the ASEAN region, even though this figure is not necessarily resembling the actual geographical distribution, is 44 cars per one thousand inhabitants (by way of comparison: Germany - 509; China - 30; and India - 12) (Deutsche Bank Research, 2011).

The above fact explains the future challenges that ASEAN countries' governments have to face despite the current problem in road safety per se is revolving around motorcycle issues. With the expansion of road networks, increase in the domestic and inter-country mobility, and the growing number of private cars, it is projected that the number of accidents involving four-wheeler motorized vehicles will slowly be more numerous than today's situation. WHO (2009) reported that the majority of fatalities due to road mishaps in the region dominated by the Vulnerable Road Users (VRUs) – primarily pedestrian, bicycle and motorcycle users. The high density of VRUs population in the land transportation environment accounts for the death of almost 90% VRUs in the middle-income countries (MIC) and nearly 60% in the low-income countries (LIC). However, taking into consideration of the above mentioned fact on considerable transport modal change, the risk on the ASEAN road might reach at a new paradigm shift. This can be explain by several road safety issues such as increase in exposure (distance travelled), high-speed environment on highways, road sharing conflicts between the two and four-wheeled vehicles, and crash compatibility issues. These issues will be more obvious in the densely populated and highly developed areas i.e. in the urban environment. This may result in more severe road crashes as well as be the reason for more killed or severely injured (KSI) victims for both road user categories.

Therefore, Malaysia has led a proactive approach concerning the vehicle safety by introducing a crashworthiness rating program that famously known as New Car Assessment Program (NCAP). This two-pronged initiative is meant for both the consumers as well as car manufacturers in the effort to promote vehicle safety i.e. specifically for four wheelers such as cars, Multi-purpose Vehicles (MPVs) and Sport Utility Vehicle (SUVs) – from here will be referred to as "cars". The NCAP for Southeast Asian countries, or also known as ASEAN NCAP, is targeted to elevate motor vehicle safety standards and encourage a market for safer vehicles (GNCAP, 2011). Thus, the ultimate purpose of the program is to provide ASEAN consumers with the information on cars' safety level in a systematic and understandable manner, and consequently to recognize efforts of manufacturers in producing safer vehicles beyond current legislation. Thus, consumers will be guided in terms of safety performance prior to buying their cars i.e. how the cars could protect them in road crashes. This, however, limited to the most common real-world crash configurations since road crashes could happen in many possible ways. NCAP will also create direct and indirect pressure for the car manufacturers (from here will be referred to as Original Equipment Manufacturers – OEMs) to embed the current best practice for occupant protection and accident avoidance technologies in their products (Lie & Tingvall, 2002).

Thus, this paper's main intention is to recapitulate the establishment of ASEAN NCAP, as well as explaining the effect of its presence towards uplifting the road safety status in the Southeast Asia region. This includes the transformation brought into the automotive ecosystem layout and most importantly how it will benefit the ASEAN road users.

2. NCAP FOR ASEAN COUNTRIES – AN OVERVIEW

2.1 The Journey to NCAP for ASEAN

NCAP for the ASEAN region was inspired by the original intention of the Malaysian Institute of Road Safety Research (MIROS) to establish a crashworthiness rating program for Malaysia. It was one of the MIROS' key performance indicators besides the other large scale road safety interventions such as the Automated Enforcement System (AES), Road Safety Education (RSE), road safety advocacies by mainstream media, enhancement in drivers' licensing program and road safety audit (Malaysia RSD, 2006). MIROS set several ambitious milestones in pursuing this particular target in which the initiative was originally codenamed as Malaysia NCAP or MyNCAP. The milestones, among others, were to have a competent team of crash test professionals, to perform crash tests by its own crash test laboratory, and finally to materialize MyNCAP in the country.

This road map has been worked out by MIROS through the foundation of the specific-purpose team coined as Crash Safety Engineering Unit (CRASE), under the administration of MIROS' Vehicle Safety & Biomechanics Research Centre (VSB). CRASE in the period between 2008 until 2011 had initiated three main activities to achieve the objective: (1) Introduced Malaysia Vehicle Assessment Program (MyVAP); (2) Conducted series of outdoor crash test; and (3) Worked out the crash test laboratory design and construction.

MyVAP main intention was to be the catalyst to the introduction of NCAP program in Malaysia, especially for the OEMs to be prepared for higher requirements than those set in the Vehicle Type Approval (VTA) exercise (Aqbal Hafeez et al., 2009). MyVAP assessment is based on the non-destructive approach in which secondary crash test data, provided by the participating OEMs, is used in the passive safety assessment. Other pillars of MyVAP assessment are active safety, compliance of safety product against UNECE regulations and conformity of production (Mohd Hafzi et al., 2011). MyVAP awards the assessed car model with star-rating (max. 5-star), based on the final weighted scores from the said pillars.

In the period between January 2010 and November 2011, CRASE had conducted several outdoor crash tests in the effort to strengthen the competencies in conducting full-scale crash test (Table 1). These exercises benefited the team in terms of integrating the crash test system as well as to mastering crash test protocols. Meanwhile, the development of MIROS crash laboratory project had been conducted since 2008 in which the benchmarking activities, design and construction was funded solely by MIROS. The project, which is codenamed as MIROS PC3, was completed in May 2012 with the inaugural NCAP crash test conducted during the "Automotive Safety Week: Southeast Asia 2012" event in Melaka, Malaysia (GNCAP[a], 2012).

Table 1. MIROS outdoor crash test programs prior to establishment of MIROS PC3 crash laboratory

Year	Project Name	Highlights
2010	Motorcycle Crash Test	• Underbone motorcycle crashed onto a stationary car. • To simulate motorcycle side impact crash and to highlight the importance of buckling-up the helmet. • To evaluate the usage/effectiveness of motorcycle airbag jacket. • Non-instrumented dummy used. • Motorcycle propelled by gravity.
2010	First Passenger Car Outdoor Crash Test	• An MPV crashed onto the rear of a semi-trailer to replicate one of the common crash configurations in Malaysia (i.e. rear underride crash involving heavy vehicle). • Two Hybrid III adult dummies and one fully instrumented child dummy were used.

2011	Car-2-Car Crash Test	• Two car-to-car crash tests in 40% offset frontal crash position.
		• A non-instrumented dummy, two Hybrid III adult dummies, and a P6 dummy were used.
		• Two set of crash tests conducted:
		  o Old car vs. old car
		  o Old car vs. new car

2011	The Inaugural MATD[2] Crash Test	• Underbone motorcycle crashed onto the side of a stationary car. • Two set of crash tests conducted – experimenting the motorcycle retrofitted with and without airbag. • Motorcycle dummy (MATD) was used.

The tremendous economic growth, high demand for mobility and emerging initiative for road safety in the South East Asia region has attracted Global NCAP to support the establishment of ASEAN NCAP by MIROS – a greater initiative as compared to the original target. A Memorandum of Understanding (MoU) between the two entities to materialize ASEAN NCAP was signed-off during the FIA[3] Annual General Assembly in New Delhi, India in December 2011. Through MoU commitments as well, ASEAN NCAP has also received important recognition from the consumers by the membership of automobile associations from Malaysia (AAM), the Philippines (AAP) and Singapore (AA Singapore). In addition to that, the program has recently begun to draw interests of other ASEAN countries such as Cambodia, Vietnam and Brunei.

Representatives from the above mentioned organizations are also participated in the ASEAN NCAP Steering Committee (SC) meetings, which is the main platform where all the important decisions in ASEAN NCAP are discussed. At its development stage, ASEAN NCAP has also received support and guidance from other NCAP bodies (e.g. Australia NCAP, Euro-NCAP, Latin NCAP, and Japan NCAP), technical partners (e.g. Japan Automobile Research Institute – JARI) and other global road safety players (e.g. FIA Foundation). Therefore, the launch of ASEAN NCAP's first phase crash test in November 2012 (GNCAP[b],

[2] Motorcycle Anthropomorphic Test Device; instrumented motorcycle dummy specially enhanced from Hybrid III 50th percentile male dummy for motorcycle crash test purposes.

[3] Fédération Internationale de l'Automobile; a non-profit association to represent the interests of motoring organizations and motor car users.

2012) has marked a new era in the ASEAN's automotive ecosystem that placed this endeavor on the NCAP's world map (Figure 1 and Table 2).

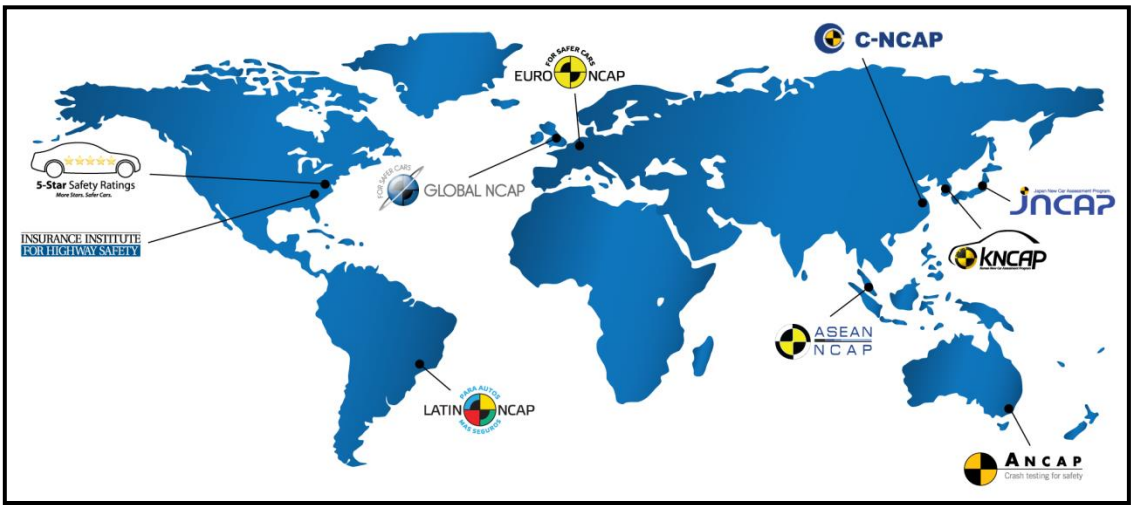

Figure1. Automobile safety rating program (NCAP) on the world's map

Table 2. List of automobile safety rating program (NCAP) around the world

Continent	Program Name	Label	Countries
Asia	China New Car Assessment Program (C-NCAP) – *Est.* 2006	C-NCAP www.c-ncap.org .cn	China
	Japan New Car Assessment Program (JNCAP) – *Est.* 1991	Japan New Car Assessment Program JNCAP	Japan
	Korean New Car Assessment Program (KNCAP) – *Est.* 1999	KNCAP Korean New Car Assessment Program	Korea
	***New Car Assessment Program for Southeast Asian Countries (ASEAN NCAP) – Est.* 2011**	ASEAN NCAP	***ASEAN Countries***
Australia	Australasian New Car Assessment Program (ANCAP) – *Est.* 1992	ANCAP Crash testing for safety	Australia & New Zealand
Europe	European New Car Assessment Program (Euro-NCAP) – *Est.* 1997	FOR SAFER CARS EURO NCAP www.euroncap.com	France, Germany, Italy, Spain, Sweden, The Netherlands & United Kingdom (European region as a whole)

Table 2. List of automobile safety rating program (NCAP) around the world (continued)

Continent	Program Name	Label	Countries
North America	Insurance Institute for Highway Safety – Vehicle Ratings (US IIHS) – *Est.* 1959	INSURANCE INSTITUTE FOR HIGHWAY SAFETY	USA
	New Car Assessment Program (NHTSA[4]) (US NCAP) – *Est.* 1978	5-Star Safety Ratings More Stars. Safer Cars.	USA
South America	Latin American & Caribbean New Car Assessment Program (Latin NCAP) – *Est.* 2010	LATIN NCAP PARA AUTOS MAS SEGUROS	Latin America and Caribbean region as a whole

2.2 Assessment Method & Rating System

ASEAN NCAP performs only one crash test for each selected model, namely frontal offset test, which produces two separate rating schemes – Adult Occupant Protection (AOP) and Child Occupant Protection (COP). This approach is similar to its newly-established counterpart, Latin NCAP, as compared to other NCAP programs that produce single rating scheme based on several weighted tests' scores e.g. other crash test configurations (full-wrap frontal test; side impact test; pedestrian protection test); safety assist equipment with/without its performance (also known as active safety), etc.

ASEAN NCAP frontal offset crash test is conducted by having two dummies (**Hybrid III 50th percentile - male**) at the driver and front passenger seats, and two child dummies (**P3 and P1.5**) inside the Child Restraint System (CRS), in the test car that moves at the closing speed of **64 km/h** when it hit a barrier (crushable aluminum barrier) to a complete stop (Figure 2) (ASEAN NCAP, 2013). The test speed of 64 km/h basically represents a car to car collision with each car travelling at around 55 km/h which is based on real-world accident analyses (Hobbs and McDonough, 1998). The ASEAN NCAP current rating system is explained as follows:

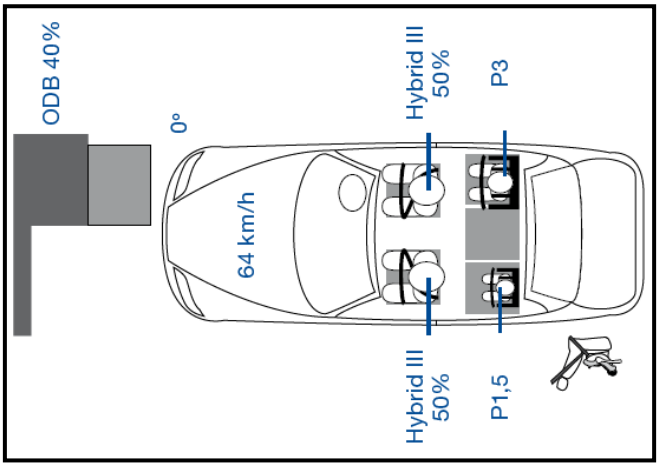

Figure 2. Test configuration in ASEAN NCAP frontal offset test
(Source: Carhs' Safety Companion 2013)

[4] National Highway Traffic Safety Administration of USA

2.2.1 Adult Occupant Protection (AOP) – Driver & Front Passenger

The result from sensors installed in the dummies and at the body of the car will be analyzed according to human's body region i.e. head, neck, chest, femurs, knees, lower legs and upper legs. To sum up, the worst result from each region (compared between two adult dummies; implying level of injuries) is considered and accumulated ***(A)***. The assessment on the vehicle is also carried out to consider real-world situation known as "modifier" assessment ***(B)***. Any "penalty" ***(B)*** will reduce the previous score ***(A)*** to the final score ***(C = A – B)***. It is to be noted that this modifier assessment is meant to avoid misleading result i.e. the score (by body region) provided by the sensors will be deducted if it is found contradicting to the real-world situation according to the modifier assessment guidelines (ASEAN NCAP, 2013).

2.2.2 Child Occupant Protection (COP) – 3-year-old and 18-month-old Infant

The result for child occupants will be based on the child restraint system (CRS) used in the test as well as the injury level read by the in-dummy sensors. Both P3 and P1.5 dummies represent 3-year-old and 18-month-old infant, respectively. By the test definition, the COP result can be read as "*the level of protection for the child occupant by using the stated CRS model in that car with specified (available) CRS attachment method e.g. by using ISOFIX, top tether or solely seatbelt*" (ASEAN NCAP, 2013). In the case of ASEAN NCAP, OEMs have the option to suggest which CRS to be used in the testing depending on certain condition mentioned in the test protocol.

2.2.3 ASEAN NCAP Rating Scheme & Plate

As the result of the test is primarily for public consumption i.e. for consumers to consider safety protection offered by the car model by NCAP definition, they can simply refer to the star rating for AOP and percentage-based for COP, in which the former is marked by ***5-star as the best*** and the latter with ***100% as the best***. Table 3 describes the scoring scheme for both AOP and COP, and Figure 3 explains the ASEAN NCAP rating plate for publications and advertising purposes (ASEAN NCAP, 2013).

Table 3. Scoring scheme for Adult & Child Occupant Protection

<table>
<tr><th colspan="2">AOP</th><th colspan="2">COP</th></tr>
<tr><th>Final Score</th><th>Star Rating</th><td>Dynamic Test</td><td>24/24</td></tr>
<tr><td>14.00 - 16.00</td><td>☆☆☆☆☆</td><td rowspan="2">CRS Based Assessment</td><td rowspan="2">12/12</td></tr>
<tr><td>11.00 - 13.99</td><td>☆☆☆☆</td></tr>
<tr><td>8.00 - 10.99</td><td>☆☆☆</td><td rowspan="2">Vehicle Based Assessment</td><td rowspan="2">13/13</td></tr>
<tr><td>5.00 - 7.99</td><td>☆☆</td></tr>
<tr><td>2.00 - 4.99</td><td>☆</td><td>TOTAL</td><td>49/49</td></tr>
<tr><td>0.00 - 1.99</td><td>Zero-Star</td><td>Compliance (%)</td><td>100%</td></tr>
</table>

Figure 3. ASEAN NCAP Rating Plate

2.3 Current Progress & Publication of Results

ASEAN NCAP has recently published the result of the first phase with mix of ratings. The first phase involved seven popular models (eight cars) in the ASEAN market that were manufactured in Malaysia (six) and Thailand (two). Table 4 summarized the result of the ASEAN NCAP first phase test (ASEAN NCAP, 2013; www.aseancap.org):

Table 4. ASEAN NCAP first phase test results

Make	Model [Model Year]	Country of Production	Specifications	AOP [Score]	COP [%]
Ford	Fiesta [2011]	Thailand	• 7 airbags • 4-door sedan • 1.6 liter petrol	☆☆☆☆☆ [15.73]	66
Honda	City [2012]	Malaysia	• 2 airbags • 4-door sedan • 1.5 liter petrol	☆☆☆☆☆ [15.44]	81
Toyota	Vios [2012]	Malaysia	• 2 airbags • 4-door sedan • 1.5 liter petrol	☆☆☆☆ [13.61]	48
Nissan	March [2012]	Thailand	• 1 airbag • 4-door hatchback • 1.2 liter petrol	☆☆☆☆ [11.66]	48
Proton	Saga FLX+ [2013]	Malaysia	• 2 airbags • 4-door sedan • 1.3 liter petrol	☆☆☆ [10.23]	58
Perodua	Myvi [2011]	Malaysia	• 2 airbags • 4-door hatchback • 1.3 liter petrol	☆☆☆ [8.71]	54
Hyundai	i10 [2008]	Malaysia	• 2 airbags • 4-door hatchback • 1.1 liter petrol	☆☆ [7.31]	48
Proton	Saga FLX [2008]	Malaysia	• 1 airbag • 4-door sedan • 1.3 liter petrol	☆ [4.30]	49

Results of ASEAN NCAP tests are published via several channels i.e. press release, ASEAN NCAP website (www.aseancap.org), and ASEAN NCAP result handbook. ASEAN NCAP also took advantage of the support from the Automobile Associations in the ASEAN region (AAP, AAM, and AA Singapore) in disseminating the information as well as influencing the consumers in their respective countries. In this way, it would overcome certain limitations such as the language barrier and therefore would enhance the understanding on buying safe cars as recommended by ASEAN NCAP.

3. LINKAGE BETWEEN AUTOMOTIVE ECOSYSTEM & NCAP

Automotive ecosystem denotes the interaction between the auto industry and respective users in the life cycle of cars, based on the life cycle of products (Figure 4) (Li Wei et al., 2008). In a broader sense, this life cycle can be regarded as two entities' interaction – industry and users – in which the users become the subset in the ecosystem (Figure 5) (Zulhaidi et al., 2012).

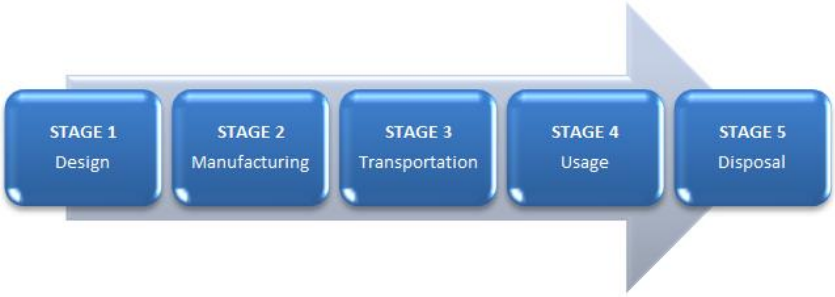

Figure 4. Life cycle of products

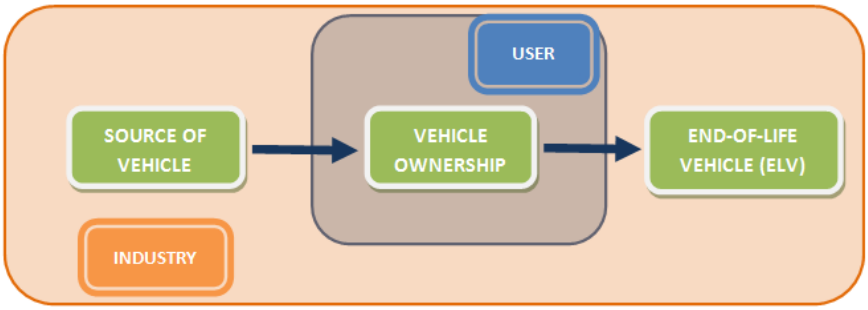

Figure 5. Automotive ecosystem simplified

The first three stages in the products' life cycle are grouped into "source of vehicle" and the usage stage can be alternatively regarded as the "vehicle ownership" period. The disposal stage for the automotive industry is supposedly covering the vehicle's end-of-life (ELV[5]) policies or initiatives, which in reality is not necessarily happening in many countries to complete the cycle. Moreover, cars in the market can be classified as completely built-up (CBU) for imported units, completely knocked-down (CKD) for locally assembled units, and fully local manufactured units (FLM) (Andrew & Shobhana, 1989). Each new car model have to pass a legally required assessment known as Vehicle Type Approval (VTA) before it is

[5] End-of-Life Vehicle (ELV) Directive originating from the European Union's (EU) effort to ensure the disposal of vehicles that reach their end of useful life will be optimized.

allowed to be in the market. This process in Malaysia is conducted by the Automotive Engineering Division of Road Transport Department (RTD). Used car market is another source of cars that come back into the market, in which they can be from the domestic or imported sources. Specifically for Malaysia, the imported used cars are also known as refurbished or reconditioned car. Furthermore, cars are usually purchased on credit or cash, but the latter become the most popular purchasing method in Malaysia, known as hire-purchase (HP) scheme. In the ownership period, users will have to bear related costs that can be further categorized into fixed and variable cost (Table 5).

Table 5. Car ownership cost

Type	Item	Fixed/Variable
Trip Cost	Fuel, toll & parking	Variable
Legal Cost	Road tax & driving license	Fixed; per annum
	Traffic & parking violation	Variable (to users); fixed per offense
Risk Cost	Insurance (Car or specific part)	Fixed; per annum
Aftermarket Cost	Maintenance (preventive, corrective, predictive)	Variable
	Retrofitting (for performance and/or aesthetical value)	Variable

Also, the automotive ecosystem is also made possible by the supply of aftermarket product especially for maintenance and retrofitting. The source of the aftermarket products in the form of cars' parts, subsystems and systems are basically provided by the same manufacturers which are also supplying the car manufacturers, or the by companies which are only producing aftermarket products. These two types of aftermarket supply are also known as the Replacement Equipment Manufacturers (REM), in which their products can be further categorized as the approved or official products, and substandard or fake products. On the other hand, the aftermarket products are also available either from local or imported used sources. These used sources are not certified or approved to be used again as compared to other countries' initiative to carry out used parts certification (e.g. Australia). In addition to that, the high demand for cheaper aftermarket or maintenance cost is also inviting irresponsible and dangerous business (fraudulent mechanics), as well as criminal actions (vehicle theft). In overall, this entire ecosystem can be explained in a conceptual model (Figure 6) in order to understand the interaction in cars' life cycle. The same conceptual model can also explain the role of ASEAN NCAP in the Malaysia's automotive ecosystem, in which the main function is to link the industry and the user in terms of "providing the best values based on the best current practice in car safety technologies". Figure 7 further explains the role of ASEAN NCAP in creating a progressive vehicle safety environment.

As explained earlier, cars are available to the consumers once they are approved based one the regulations in Vehicle Type Approval (VTA). However, standards set in the regulation can be considered as "minimum" requirement concerning roadworthiness and crashworthiness aspects. Roadworthy means a car is fit to be used on the open road while crashworthy means how a car perform in the event of road crash to protect the occupant(s). It is true that this "minimum" is not cast in stone but the progress to uplift the legislation standard is rather slow as compared to NCAP requirement which is the best possible current practice in vehicle safety. 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).

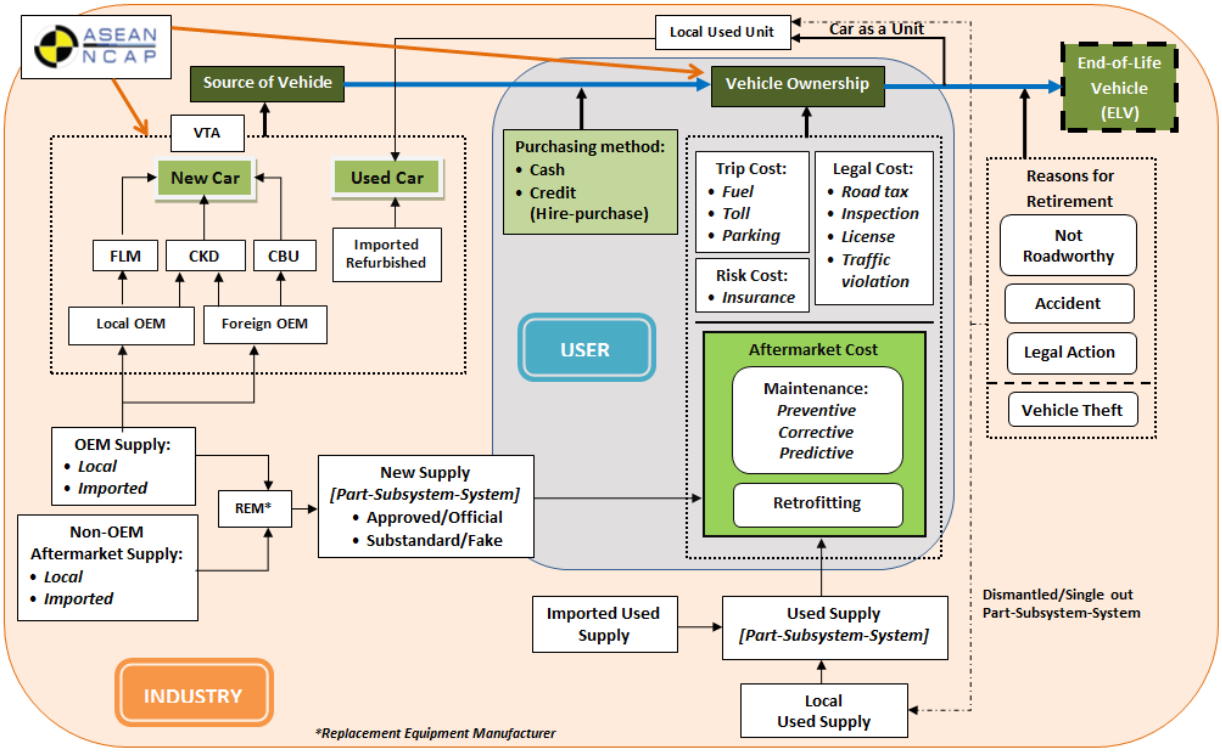

Figure 6. ASEAN NCAP in the automotive ecosystem

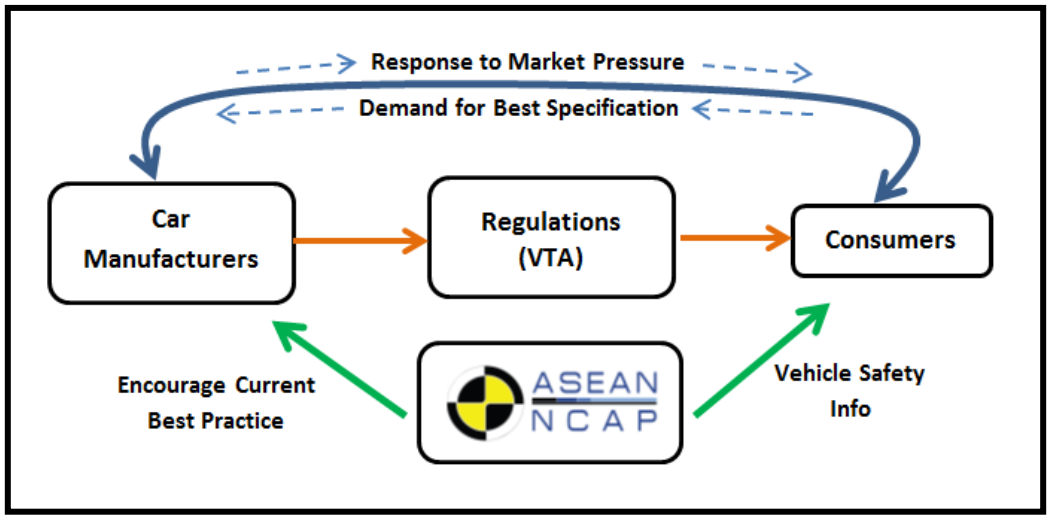

Figure 7. Role of ASEAN NCAP in promoting safer vehicle environment

The inception of ASEAN NCAP, as explained earlier, will give direct and indirect pressure to the car manufacturers to produce safer cars progressively and at the same time maintaining the market competitiveness i.e. car pricing. The automotive ecosystem in Malaysia could as well explain the impact of NCAP in other ASEAN countries' automotive layout. There will be similarities and differences due to each country's unique way in managing the domestic industry, importation, vehicle licensing, vehicle assessment (VTA), as well as vehicle ownership environment. However, it is expected that there will be growing demand for safer vehicles and also positive response from OEMs in the ASEAN region.

4. THE STATUS QUO OF VEHICLE SAFETY PERCEPTION – A PUBLIC SURVEY IN FOUR ASEAN COUNTRIES

4.1 Study Background

A public survey was conducted in 2012 in the effort to seek the status quo of road users' perception, particularly private car owners, towards vehicle safety as well as their opinion on having an NCAP program in the ASEAN region. This study was initiated by MIROS and conducted in four ASEAN countries – Malaysia, Singapore, Thailand and the Philippines – by virtue of Global NCAP (GNCAP) financial aid as well as the support from the respective countries' representatives. The specific objectives of this study were to learn what would be the most important factors considered by the car owners in buying their cars, to determine public knowledge on car safety features and to have an idea on the users' knowledge and perception towards establishing NCAP program in ASEAN. Table 6 below describes the study framework and methodology.

Table 6. Public Survey in Four ASEAN Countries

Public Survey Framework & Methodology			
Financial Sources	MIROS & Global NCAP (GNCAP)		
Study Period	January 2012 – May 2012		
Participation & Coverage Details	***Country***	***Representative***	***Data Collection Area***
	Malaysia	MIROS	Klang Valley (Greater Kuala Lumpur)
	Singapore	Automobile Association of Singapore (AA Singapore)	Singapore
	Thailand	Thai-German Graduate School of Engineering (TGGS)	Bangkok
	The Philippines	National Center for Transportation Studies (NCTS), University of Philippines (UP) & Automobile Association of Philippines (AAP)	Metro Manila
Target Population	Road users who drive cars and hold valid driving license		
Sampling & Data Collection	1. Simple random sampling technique 2. Enumerators were hired and trained 3. Respondents were approached and asked to fill up questionnaire		

Table 6. Public Survey in Four ASEAN Countries (continued)

Questionnaire	***Section A***	• Car info, factors considered and source of information when purchasing present car • New/future car purchasing decision • Perception on vehicle safety and NCAP
	Section B	• Knowledge about vehicle safety features *(Flash card shown to respondents prior to answering)*
	Section C	• Demographic (Age; Gender; Education Level) • Driving experience • Previous motor vehicle accidents
Pre-test	Conducted in each participated country	

4.2 Key Results & Discussion

It is learned from the survey that "replacing an old car" and "purchasing for family members" are the main reasons for respondents to purchase their current cars. They also rely on car dealers/manufacturers, friends, family and web-based resources as their main reference in making purchasing decision i.e. selection of car model as well as specifications that best suit their purpose of buying.

Price becomes the most important factor in their consideration when buying a new car across all countries except for Malaysia whereby "price" comes third after "safety features" and "comfort" (Table 7). For Malaysia, most respondents chose "safety features" as the most important factor (64.4%). It is still a premature fact to be discussed, but the result is quite surprising that safety came first among all the listed factors for Malaysia. This could be attributed to the recent widespread safety information in car brochures and advertisements, the news articles on safety as well as from the government initiatives via improved VTA and independent vehicle rating such as MyVAP (Aqbal et al., 2010).

In terms of knowledge on safety items, most of the respondents knew about airbag and ABS. Relatively high proportion of respondents from Singapore were well aware of ESC (93.2%) in comparison with Malaysia (59.9%), Thailand (47.4%) and Philippines (43.1%). Approximately half of the respondents from Malaysia, Thailand and Philippines were willing to pay extra for all the safety features (airbag, ABS and ESC) in comparison with respondents from Singapore (less than 25%).

Furthermore, the findings of the current study reveals that a relatively high proportion of the respondents would reconsider their decisions if they knew about the safety performance of cars tested in crash test and support the implementation of ASEAN NCAP. This is a positive finding which further strengthens the ASEAN NCAP initiative in providing consumer-based information towards promoting safer cars in this region.

Table 7. Factors affecting car purchasing decision (in %)

Factor	Malaysia (n=1000)	Thailand (n=1000)	Singapore (n=1000)	The Philippines (n=1000)
Style/Design	*35.4*	***49.2***	***39.1***	*30.7*
Comfort	***51.6***	*13.6*	***40.0***	***38.8***
Safety Features	***64.4***	***42.6***	*21.6*	***47.0***
Cost of Maintenance/Service	*26.2*	*33.5*	*23.5*	*32.5*
Performance (inc. power & handling)	*21.9*	*38.7*	*23.6*	*38.0*
Warranty Coverage	*6.4*	*4.1*	*13.6*	*3.8*
Price	***43.9***	***50.4***	***40.0***	***50.5***
Environmental Friendly	*6.1*	*6.0*	*26.6*	*11.0*
Resale Value	*7.1*	*13.1*	*15.6*	*13.7*
Reliability	*13.9*	*23.3*	*18.5*	*24.9*
Brand	*7.6*	*19.5*	*22.3*	*13.3*
Interior/ Luggage Space	*14.3*	*8.9*	*19.1*	*6.3*

** Results must be read per factor, in which the respondents were asked to choose only the top three factors. Thus, the percentage is derived from number of respondents choosing the factor per total respondents in each country.*

5. CHALLENGES AND FUTURE OF ASEAN NCAP

There are several key challenges in ASEAN NCAP in terms of the technicality in conducting the tests as well as in pursuing the objective to create the ultimate impact in road safety, as discussed in the following:

1. **Test Requirement – Expansion of Test Spectrum & Adoption of Domestic Values**
   Depending on the funding and availability of resources, more comprehensive crash procedures will surely take place in ASEAN NCAP in the near future. At present, frameworks are being detailed out to include other configuration such as side impact and pole crash tests in later stage. As a matter of fact, there is several suggestions to adapt domestic road safety issues in the test requirements e.g. to include motorcycle related issues in the NCAP assessment as a way to represent the most vulnerable road users (VRUs) group in the region.

2. **Variation in Industry & Vehicle Regulations**
   ASEAN NCAP may face the challenge of variable 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 i.e. importation is the only source for cars. The similar situation is concerned in small but rich countries such as Brunei and Singapore. This situation creates a different scenario regarding the automotive industry and government policies in setting the regulations standard and controlling vehicle ownership. In addition to that, standardization of safety items in common ASEAN car is hoped to materialize gradually as the "direct impact" of the program. Nevertheless, the star ratings churned out in Phase 1 are 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.

3. **Budgetary Constraint – ASEAN Wide Coverage**
   ASEAN NCAP is currently being carried out by the financial source from MIROS and Global NCAP. Not to mention, ASEAN NCAP has also received non-monetary support from various agencies, technical partners and road safety players from around the globe. Therefore, in ensuring sutainability and progressive test expansion as well as a viable information dissemination framework, ASEAN NCAP has to gain more support in monetary and non-monetary forms in the future.

4. **Language Barrier in Disseminating the Information**
   ASEAN NCAP program is initiated with the intention to propagate the message that vehicle safety in Southeast Asian is a necessity, not a luxury. The safety rating is however presented in English language and could pose some obstacles to optimally spread across diverse ethnics and languages in the region. Therefore, it is high time for road safety players to take part by conveying safety message and information in local language using either printed or electronic media.

5. CONCLUSION

The first phase of ASEAN NCAP marks the beginning of many more efforts to come in elevating vehicle safety standards in Southeast Asian region. This effort is in line with the Global Plan of the United Nation Decade of Action for Road Safety 2011 – 2020, to reduce road accident fatalities and injuries by having such initiative. This report has recapitulated the establishment of ASEAN NCAP, as well as its impact towards uplifting the road safety status in the Southeast Asia region. The discussion include the rationale of the program in the region, the history and overview of ASEAN NCAP, the impact of the program to the current automotive industry layout, the status quo of users' perception on vehicle safety from a public survey, and the key challenges for ASEAN NCAP in its future undertakings.

ACKNOWLEDGEMENTS

The authors would like to thank all contributors of ASEAN NCAP for making the initiative a dream comes true. Special thanks to all Global NCAP management, MIROS management, ANCAP, Euro-NCAP, Latin NCAP, academia of Southeast Asia, and consumers' association (AAM, AAP & AA Singapore) for the sincere help, commitment and support. This paper is based on current and previous research and development (R&D) projects funded by MIROS and Global NCAP.

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