Pedestrian Protection Assessment in ASEAN NCAP: Future Consideration

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Abstract – Pedestrian protection is a significant road safety problem globally. Many related regulations and countermeasures have been introduced and implemented, especially in developed countries to reduce pedestrian casualties resulting from road accidents. However, this pedestrian safety issue is rarely highlighted in the Southeast Asia (SEA) region though its associated road accident statistics is alarming. Even with the establishment of a New Car Assessment Programme (NCAP) for the region, pedestrian protection is yet to be fairly addressed. Thus, this paper is prepared to discuss the issue of pedestrian protection in terms of: magnitude of the problem in SEA region, current established crashworthiness assessment programmes and regulations, related countermeasures through provision of Safety Assist technologies, and future consideration for its inclusion in the New Car Assessment Programme for SEA region.

Keywords – Pedestrian protection, ASEAN NCAP, crash testing, safety assist.

I. INTRODUCTION

Almost half of the estimated 1.24 million people who died in road accidents annually were vulnerable road users (VRUs), with pedestrians constituting more than one fifth of the reported statistics [1,2]. Pedestrian casualties, even though are more apparent in most low- and middle-income countries, high-income countries such as European countries, the United States (12%), Australia (13%), Japan (35%) and South Korea (38%) also suffer considerable losses in road accidents involving this road user [1].

The high numbers of fatally and severely injured pedestrians in road accidents have led to the development of several regulations and test methods pertaining pedestrian protection in countries such as Europe and Japan. Pedestrian protection has also been incorporated in several crashworthiness rating programmes worldwide as part of their assessments. European New Car Assessment Programme (Euro NCAP) was initiated to evaluate the risk of pedestrian injury when impacting a vehicle’s front side in 1997 [3]. Works related to evaluation of pedestrian injury risk were initiated in 2000 and 2003 for Australasian and Japan NCAP, respectively [4,5]. Currently, there are no related regulations being implemented in SEA countries, particularly Malaysia, to minimise the risk of injury to pedestrian when impacted by vehicle.

Unlike occupants commuting inside vehicles (e.g. cars, trucks, buses), VRUs, or in particular pedestrians are usually unprotected while in traffic [6]. Generally, the severity of injuries sustained by pedestrians during collision is higher than the ones sustained by vehicle occupants. Nonetheless, pedestrian issue to some extent is rarely highlighted in the SEA region since most of the countries often face more alarming problems concerning motorcycle riders. In the effort to comprehensively (potentially) reduce fatalities and injuries due to road accidents, situation of pedestrian casualties should also be fairly addressed in the region.
A. Magnitude of Pedestrian Fatalities in Southeast Asia

The situation of pedestrian casualties in SEA countries is significantly alarming, as shown by the road accident statistics in Table 1. The proportion of pedestrian deaths accounts for more than 20% of total reported road accident fatalities for Indonesia, Myanmar and Singapore. The scenario in Malaysia is also worrying, with pedestrian deaths constituting 9% of all road fatalities. Of all road accidents involving pedestrian in 2006-2008, approximately 90% are events involving a single pedestrian struck by a single vehicle [7]. As seen from this figure, passenger cars are the most frequently involved. However, in this study, similar statistics of accidents in Malaysia could not be obtained for other SEA countries due to limitation of data.

Table 1: Pedestrian deaths according to country in Southeast Asia [1]

<table>
<thead>
<tr>
<th>Southeast Asia Country</th>
<th>Frequency of Reported Road Accident Fatalities (Year)</th>
<th>Proportion of Deaths by Pedestrian Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laos DPR</td>
<td>790 (2010)</td>
<td>6.0 %</td>
</tr>
<tr>
<td>Malaysia</td>
<td>6,872 (2010)</td>
<td>9.0 %</td>
</tr>
<tr>
<td>Myanmar</td>
<td>2,464 (2010)</td>
<td>26.0 %</td>
</tr>
<tr>
<td>Philippines</td>
<td>6,941 (2008)</td>
<td>-</td>
</tr>
<tr>
<td>Singapore</td>
<td>193 (2010)</td>
<td>28.0 %</td>
</tr>
<tr>
<td>Thailand</td>
<td>13,786 (2010)</td>
<td>8.0 %</td>
</tr>
<tr>
<td>Vietnam</td>
<td>11,029 (2010)</td>
<td>-</td>
</tr>
<tr>
<td>Cambodia</td>
<td>1,816 (2010)</td>
<td>12.0 %</td>
</tr>
<tr>
<td>Brunei</td>
<td>46 (2011)</td>
<td>-</td>
</tr>
<tr>
<td>Indonesia</td>
<td>31,234 (2010)</td>
<td>21.0 %</td>
</tr>
<tr>
<td>Timor-Leste</td>
<td>76 (2010)</td>
<td>-</td>
</tr>
</tbody>
</table>

Note:
1. Data Not Available
2. Proportion of pedestrian deaths per reported road accident fatalities
3. Non-ASEAN member countries

Table 2: Pedestrian protection evaluations in NCAPs

<table>
<thead>
<tr>
<th>NCAP</th>
<th>Test (Year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Euro NCAP</td>
<td>Headforms EEVC Legform Upper Legform FLEX PLI AEB Pedestrian</td>
</tr>
<tr>
<td>JNCAP</td>
<td>Headforms Flex PLI</td>
</tr>
<tr>
<td>KNCA</td>
<td>Headforms EEVC Legform Upper Legform FLEX PLI</td>
</tr>
<tr>
<td>ANCAP</td>
<td>Headforms EEVC Legform Upper Legform</td>
</tr>
</tbody>
</table>

Note:
EEVC – European Enhanced Vehicle Committee
FLEX PLI – Flexible Pedestrian Legform Impactor
The followings are related regulations which are applied specifically to protection of motor vehicle for pedestrian in the event of a collision [8,9,10].

i. 2009/78/EC (EC 2003/102; EEVC WG17)

ii. Global Technical Regulation No. 9

iii. United Nations Regulation No. 127

iv. TRIAS 63-2004 (Japan)

v. GB/T 24550-2009 (China)

B. Vehicle-Related Protection Systems

Efficient vehicle design at the front side is important to alleviate the injury risk experienced by pedestrians during impact. A deployable or “pop-up” hood is an example of vehicle protection systems meant for mitigating pedestrian injury risk by automatic lifting of the hood itself to create more space to absorb the head impact energy during a collision with a pedestrian. The systems generally comprise of contact sensors (at vehicle front side) that will detect a pedestrian during impact [3,4]. Other systems include deformable bumpers, external hood airbags and double layer hood with lowered-position of whole engine system to achieve clearance (e.g. Toyota Verso in Euro NCAP’s 2010 assessment).

More advanced systems involve pedestrian detection and identification via safety assist technologies, for example, Intelligent Speed Assistance (ISA), Automated Emergency Braking (AEB), laser radars, infrared rays, blind spot mitigation for reversing vehicles, and etc. [11]. All these technologies are developed as a result of stringent vehicle regulations pertaining to pedestrian safety. The role of NCAPs, on the other hand, is by working with manufacturers to improve vehicle designs through testing.

III. ASEAN NCAP

The newly established crashworthiness rating programme, ASEAN NCAP was introduced in 2012 to elevate vehicle safety standard, raise consumer awareness and hence encourage a market for safer vehicles in the Southeast Asia region. The current crashworthiness evaluation in the programme is merely based on frontal offset crash test results [12]. Next in line will be to implement side impact evaluation for the programme in the near future. Nevertheless, pedestrian protection evaluation is yet to be included in the ASEAN NCAP’s future plan. The rating item which might benefit to protection of pedestrian is possible through inclusion of safety assist evaluation such as AEB and other collision avoidance systems.

V. DISCUSSIONS

It is known that the safety features of specific models car manufacturers sell in their region and those exported to or assembled in the SEA countries are different. Such situation may have encouraged manufacturers, assemblers and traders to capitalize on by providing lesser safety equipment vehicles for countries in the foreign marketing region, relative to what is available in their origin country and other developed markets. The establishment of ASEAN NCAP, which has already completed its second phase, it is noted that safety has improved (but not entirely as it requires time) for automobile market in the ASEAN region as compared to previous years. Nevertheless, in term of pedestrian protection for vehicles, progress is yet to be realized since ASEAN NCAP is yet to be included for future consideration.

According to ANCAP estimation, good performance in NCAP pedestrian protection test could save 8% and 2% of all pedestrian fatalities and severe injuries, respectively. Besides that, the benefits are estimated to exceed costs by at least 7 to 1 [13]. It is shown that implementation of technologies could benefit in pedestrian safety. For example, the European Transport Safety Council (ETSC) estimated that approximately 20% of pedestrian casualties could be reduced on urban through ISA [14]. Studies overseas also support that lives and serious injuries of pedestrian in car-to-pedestrian collisions can potentially be saved and mitigated, respectively through AEB [16,17].

However, the technologies are unlikely to be implemented through market forces alone. The implementation can potentially take place through vehicle regulations and crash test programme – ASEAN NCAP to encourage uptake of technology. Thus, there is a need to
consider pedestrian evaluation; but further studies on related real-world crashes and statistics are required to further understand the severity of pedestrian safety and pedestrian safety programme practicality in the SEA countries.

VI. CONCLUSION

Safety is not standard and advanced system is optional for current automobile market in the Southeast Asia region. Since its inception in 2012, ASEAN NCAP has been shown to have important influence in improving vehicle safety in the region. Results of its second phase revealed that most tested vehicles performed well and achieved minimum of 4-star rating in frontal offset crash test.

There are plans to include other evaluations such as side impact and full frontal in the ASEAN NCAP’s future plan; however pedestrian protection is yet to be included in the big picture. Though collision avoidance technologies are becoming popular, injury mitigation is also as important and needs to be considered especially for the safety of pedestrians. In other words, safety assist alone is insufficient; pedestrian protection test should also be looked into for ASEAN NCAP future assessment, considering its alarming problem in the SEA region, similar to the safety of “protected” vehicle occupants.

The views expressed in this paper are from the authors and do not necessarily represent the views or policy of ASEAN NCAP or any other organization.

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REFERENCES