

ASEAN 3-5-2 in Road Crash Data Management: Turning Midfields into Forward

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ABSTRACT

A recent development shows that road traffic deaths have risen to 1.35 million per year on the roads of the world. Middle-income countries bear the brunt of most road traffic fatalities. Today, road traffic data is more readily available and in greater quantity. Although works involving data, are divided among various agencies specialising in specific focus appears to be quite a difficulty. Recognising short comings of each countries crash data management in the ASEAN region proves beneficial to improve overall road safety. This paper will examine the current state of road crash data collection and management in ASEAN's middle-income tier countries by continuing to use the "3-5-2" concept borrowed from previous papers. Discussing the possibility of turning the 'Midfields' into forwards' by observing trends of data where further improvement can be implemented using high-income countries as reference.

Keywords:

MIROS; Road Crash; Road Traffic; ASEAN

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1. Introduction

Decade of Action for Road Safety 2011-2021 developed by The UN Road Safety Collaboration revealed several initiatives, to meet the ambitious goal of reducing traffic fatalities by half in low- and middle-income countries by 2020. However, a worrying trend shows road traffic deaths increased to 1.35 million death each year on the world's road [1] which are still unacceptably high. The difference in each region and countries socioeconomic development closely impacts road safety advancement shown by the ASEAN 3-5-2 concept. Rapid motorization occurs in countries around the world that are experiencing quick population growth, where the progress in road safety is not in sync. The focus of this literature will be on the Association of Southeast Asian Nations (ASEAN) region consisting of ten countries, i.e., Myanmar, Cambodia, Laos, Vietnam, Thailand, Malaysia, Singapore, Brunei, Philippines, and Indonesia.

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The formation of “3-5-2” explains the ASEAN situation not only in terms of road safety, but also in terms of automotive consumerism [2]. The variety of income levels of each countries meant progress is not uniform, therefore can be contextualize into the original ASEAN 3-5-2 model [3]. Nevertheless, the original 3-5-2 metaphor since has been updated with the current years data and situation. While the original concept is still in use, changes are made to modernise it. ASEAN countries such as Singapore and Brunei with relatively smaller land size and high-income per capita, experiences the lowest road fatalities. The initial ‘Big five’ contributes the majority of death related road accident at 95% in 2016. Indonesia as one of the most populous country globally and including the other 4 (Malaysia, Thailand, Philippines, Vietnam) dominates the automotive market in the region, where domestic car manufacturers are also present. On the year 2013, Laos has joined the middle-income country category [7].

With multiples factors in play, the overall data of road safety on the ‘Big Five’ will show the majority upcoming trends in the ASEAN region. Furthermore, countries with low income designated as 3 in the ASEAN 3-5-2 concept are Cambodia, and Myanmar. These two countries encounter low death count caused by the country respective economic situation. Although can be extreme at per vehicle per rates. Because of the constant changes in the automobile industry of several ASEAN nations, the regional road safety strategy must address both current and future challenges. In this paper, discussion of the possibility for middle income country “Midfields” turns into “Forwards” is conducted, with the appropriate approach provided with available information.

2. Road Safety Conditions in the ASEAN ‘Team’

The 3-5-2 concept is a derivation from a football game strategy where each number represent the total count of the relative players positions. By applying this model to the ASEAN team where 3 is referred as the low-income countries ‘Defenders’, 5 as the middle-income countries ‘Midfields’, and 2 refers to low-income countries ‘Defenders’. This unique description of the ASEAN progression on road safety was presented in previous study [3]. Countries denoting the term ‘defenders’ are low-income countries Cambodia and Myanmar. Meanwhile the ‘Midfields’ consists of Malaysia, Indonesia, Philippines, Vietnam and Thailand and Laos. ‘Forwards’ are Brunei and Singapore because of the respective high-income level. Low and middle-income countries bear the heaviest burden of traffic fatalities and injuries according to the data collected. ASEAN’s road crash fatality rates are relatively high, with certain nations currently exceeding the global yearly average of 17.4 per 100,000 inhabitants [4]. Road traffic injuries remains to be present in high income countries even though relatively smaller scale compared to middle- and low-income countries.

Economic standpoint and general information of the listed ASEAN countries are recorded in Table 1 to better demonstrate the annual data. The categorisation of income level of the countries perfectly fit the 3-5-2 concept. Singapore and Brunei with GNI per capita greater than US\$12,000 categorise as high-income countries. Both countries experience low fatalities (<10) per 1000,000 population. Singapore was found to be in par with some of the world’s best performing nation with road fatality rate at 3.6 while Brunei achieves 5.8 in 2014 [6]. As expected, the ‘Midfields’ consist of countries that have large population will encounter a large portion of traffic deaths. This is resulted from a rapid growth of motorization and economic development. As shown in Table 1, road traffic deaths are majorly concentrated in the ‘Midfields’ because of the larger volume of registered vehicle where road crashes are relatively high. The highest being Indonesia at 31,282 cases during the year 2016.

Table 1
General road safety data for ASEAN countries [1,5,7]

Country	Year	Population numbers for 2016a	GNI capita per for 2016 in US	Income level	Registered Vehicles	Reported number of road traffic deaths	Point estimate (Estimated Road traffic death)
Singapore	2016	5,622,455	51,880	High	933,534	141	155
	2013	5,411,737	54,040	High	974,170	159	197
	2010	5,086,418	39,410	High	948,829	193	259
Malaysia	2016	31,187,264	9,850	Middle	27,613,120	7,152	7,374
	2013	29,716,965	10,430	Middle	23,819,256	6,915	7,129
	2010	28,401,017	7,760	Middle	20,188,565	6,915	7,085
Laos	2016	6,758,353	2,150	Middle	1,850,020	1,086	1,120
	2013	6,769,727	1,450	Middle	1,439,481	908	971
	2010	6,200,894	1,010	Middle	1,008,788	767	1,266
Indonesia	2016	261,115,456	3,400	Middle	128,398,594	31,282	31,726
	2013	249,865,631	3,580	Middle	104,211,132	26,416	38,279
	2010	239,870,944	2,500	Middle	72,692,951	31,234	42,434
Thailand	2016	68,863,512	5,640	Middle	37,338,139	21,745	22,491
	2013	67,010,502	5,340	Middle	32,476,977	13,650	24,237
	2010	69,122,232	4,150	Middle	28,484,829	13,365	26,312
Myanmar	2016	52,885,224	1190	Middle	6,381,136	4,887	10,540
	2013	53,259,018	-	Low	4,310,112	3,612	10,089
	2010	47,963,010	-	Low	2,326,639	2,464	7,177
Vietnam	2016	94,569,072	2,050	Middle	50,666,855	8,417	24,970
	2013	91,679,733	1,740	Middle	40,790,841	9,845	22,419
	2010	87,848,460	1,160	Middle	33,166,411	11,859	21,651
Philippines	2016	103,320,224	3,580	Middle	9,251,565	10,012	12,690
	2013	98,393,574	3,270	Middle	7,690,038	1,469	10,379
	2010	93,260,800	2,060	Middle	6,634,855	6,739	8,499
Cambodia	2016	15,762,370	1,140	Middle	3,751,715	1,852	2,803
	2013	15,135,169	950	Low	2,457,569	1,950	2,635
	2010	14,138,255	750	Low	1,652,534	1,816	2,431
Brunei	2016	-	-	-	-	-	-
	2013	-	-	-	-	-	-
	2010	398,920	31,800	High	349,279	46	27

Table 2

Type of road user fatalities [1,5,6,7]

No	Country	Year	Reported number of road traffic deaths	% Death Drivers/Passengers of 4-wheeled vehicles	% Death Drivers / Passengers of 2- or 3-wheelers	% Death Cyclists	% Death Pedestrians	% Death Other or unspecified users
1	Singapore	2016	141	7.8	44	14.2	33.3	0.7
		2013	159	17.5	45.6	9.4	26.9	0.6
		2010	193	8.8	46.1	8.3	28.5	8.3
2	Malaysia	2016	7,152	–	–	–	–	–
		2013	6,915	23.7	62.1	2.2	6.6	5.5
		2010	6,915	26.0	58.7	2.8	9.1	3.4
3	Laos	2016	1,086	–	–	–	–	–
		2013	908	18.7	66.9	2.7	9.6	2.1
		2010	767	14.6	74.4	1.3	6.3	3.4
4	Indonesia	2016	31,282	4.9	73.6	3.2	15.5	2.7
		2013	26,416	6.0	36.0	2.0	21.0	35.0
		2010	31,234	6.1	35.7	1.7	21.1	35.4
5	Thailand	2016	21,745	12.3	74.4	3.5	7.6	2.3
		2013	13,650	13.0	72.8	2.3	8.1	3.8
		2010	13,365	13.3	73.5	3.0	7.8	2.5
6	Myanmar	2016	4,887	10.8	64.8	3.1	14.2	7.1
		2013	3,612	26.0	23.0	9.0	26.0	16.0
		2010	2,464	26.2	22.9	8.6	26.5	15.9
7	Vietnam	2016	8,417	–	–	–	–	–
		2013	9,845	-	-	-	-	-
		2010	11,859	-	-	-	-	-
8	Philippines	2016	10,012	0.3	4.7	0.1	1	93.9
		2013	1,469	25.3	52.5	0.7	20.7	1.1
		2010	6,739	-	-	-	-	-
9	Cambodia	2016	1,852	6.2	73.5	2.3	9.6	8.4
		2013	1,950	8.5	70.4	2.3	12.7	6.1
		2010	1,816	11.8	66.6	4.0	12	5.7
10	Brunei	2016	–	–	–	–	–	–
		2013	–	–	–	–	–	–
		2010	46	–	–	–	–	–

3. THE ASEAN 'MIDFIELDS' & 'DEFENDERS'

Table 2 clearly illustrate the highest death by road user among the ASEAN region is riders for motorized 2-3 wheelers. Since its major advantages in congested cities and relatively low cost. Situation for low-income countries is identical where high case of death per 100,000 are reported according to its population size. National-level measures are required to protect VRUs as their vehicle fleet grows.

The 'Midfielders' and 'Defenders' have a similar trend. Both have a rather large population and land size compared to the forwards. The 'Big Five' will continuously achieve higher recorded road fatalities compared to low-and high-income countries. Comparing the road traffic death per 100,000 population, 'Midfielders and 'Defenders' are more in common with the lowest being 12.2 and highest at 32.7 on the year 2016. Although the annual rate can be reduced significantly, the 'Big five' contributes the majority of death related road accident at 95% in 2016 based on WHO's data. All countries considered the "Big 5" of ASEAN's automotive market; they are also the only five countries, except for Laos, that produce domestic cars (CKD). The 'Midfielders' all have different agencies collecting different types of information that in relation to road crash data. Only in some countries such as the Philippines, an integrated database known as the Data for Road Incident Visualization Evaluation and Reporting System (DRIVERS) was adopted as the national crash database system in 2014[8]. Countries like Malaysia and Thailand also possess their own respective national crash databases, although is not integrated within agencies.

Most countries institutional capacity for road safety is led by a national agency, and the strategy is partially funded by the national budget. The socioeconomic plays an important role in the progress of road safety standards of each country. Low-income countries require development of systems to produce accurate counts of fatalities and, where possible serious injuries. Improved relationships with health authorities, government agencies and stakeholder to improve data on accidents and their outcomes are also desirable. Due to the nature of their national economies. these two countries Cambodia and Myanmar have a high fatality index based on 100,000 people despite having low death rates (between 750 and 4,900). Despite the lack of a domestic automobile industry, fatalities from four-wheeler accidents are disproportionately high between 6 and 26 percent amongst the three years as stated in table 2.

3. The 'Forwards'

Singapore and Brunei are among the smallest nation in terms of land size, not only in ASEAN but also in the context of the globe. Thus, one of the hypotheses is that the roads infrastructure are well maintained due to its high-income status and smaller road networks. Nevertheless, the population of both countries are miniscule compared to the rest of the ASEAN countries. In year 2010, Brunei road traffic death per 100,000 is 6.8. Meanwhile Singapore achieves its lowest death per 100,000 at 7.8 during the year 2016. Moreover, Brunei and Singapore have a better chance of safeguarding their users by only allowing "safe" cars into the market without having to consider the domestic car industry factor. Singapore has a regulatory framework for formal safety audits of road constructions, as well as a system of regular road inspections. Off-road commuting options such as walking, and cycling are also encouraged in the country. To this end, Singapore is working to expand its cycling network to 700 kilometres across the island by 2020[6]. Both countries continue to benefit from the availability of trained emergency medical personnel and vital registration systems.

4. 'On-The-Field' Challenges

Table 3 summarises the current issues and challenges that each country faces in terms of road crash data. The points deduced in the table are those derived from the authors' knowledge, based on information provided in relevant documents, or informed through meeting platforms. As a result, issues that are not reported in the reference documents or informed by relevant focal agencies are excluded from discussion.

Table 3
Challenges in Current Crash Data Management [8]

Country	Challenges								
	None Centralized	Incomplete/ Inaccurate	Under Reporting	Manual System	Sharing Mechanism	Field & Definition	Technical & Network	Lack Of Data	
Malaysia	✓	✓	✓	✓	✓	✓	✓		
Thailand		✓	✓		✓	✓			
Indonesia	✓	✓	✓	✓	✓		✓		✓
Philippines		✓	✓	✓		✓			✓
Vietnam	✓	✓	✓	✓	✓	✓	✓		

The 'Big five' excluding Laos in Table 3 have similar problems relating to crash data management. These concerns can be split into three main types. Details of data, the exchange of data and how is the crash data maintained. Each middle-income countries have developed their national road accident database. However only a few are centralized. Close collaboration between government and private agencies are necessary to increase efficiency of data usefulness. The national police force is regard as the main source of gathering and storage of crash data in the 'Midfielders'. Coupled with high bureaucracy in the region, adapting to new changes are slow and difficult. Most expenditure dictates the action of a department or an organization. Distribution of data between multiple agencies need a proper channel that is cost-effective and secure to ensure the ever flowing of data to the relevant parties. Manual system of recording information by personnel's, have flawed properties for example data can be simplified or incomplete. A mixture of both automated and manual system can safeguard the quality of crash data.

Singapore and Brunei enjoy a high level of safety on its road network due to several complementary factors. In Brunei agreement between main parties on data collection, template and update frequency allows continuous efforts to reduce fatalities and injuries due to road crashes. The parties are Brunei Insurance and Takaful Association (BITA), Royal Brunei Police Force (RBPF), and Ministry of Health (MOH). Each party only collect and reports their assigned data to the Brunei National Road Safety Council (MKKJR), where the MKKJR acts as a data custodian. MKKJR launched a project in 2019 to create a new, centralised road crash data system. This is expected to improve the coverage, dependability, and efficiency of data compilation and analytics for road safety.

Perhaps, the 'Midfielders' can replicate a more centralized system. A similar structure exists in Singapore, where an investigation officer records an accident in the Traffic Incident Management System (TIMS). Every quarter, the data is sent to the Land Transport Authority (LTA). The data is entered into Traffic Accident Analysis & Management (TAAM), which allows for trend analysis and the reduction of recurrence. The LTA's road safety management and the TP's implementation of numerous road safety measures and tools, such as the Black Spot Programme and road safety audits

and collision data collection, have all contributed to Singapore's success in terms of road safety. A dedicated budget and good data to analyse the most vulnerable locations that require immediate treatment are critical components for the success of a road safety programme. It's a possibility for middle income countries to replicate the success of high-income countries in road safety under consistent and effective programs as demonstrated.

5. Conclusions

Exploration of the possibility of forming partnerships with organisations that should be involved in improving road safety (such as health authorities and large fleet operators) to provide resources for strategic action implementation should be enhanced in the ASEAN region. Another factor to consider when implementing effective road and roadside safety initiatives is that some of them require ongoing resourcing (for example, maintenance), which may be difficult to achieve due to a lack of willingness, cost, or technology or skill availability. Given the varying degrees of sophistication of ASEAN's road safety data systems, a qualitative comparison of road safety performance will provide a feasible mechanism for tracking progress.

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