Road Traffic Crash Data Management in ASEAN: 3-5-2 Perspective

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Abstract – *Every year approximately 1.3 million people are killed on roads around the world. Without new and effective actions, deaths in low to middle-income countries are forecasted to rise steeply, as the level of motorization is increasing. The availability of road safety data is fundamental to improving road safety outcomes, tracking progress, and achieving the road safety targets set by each country. With consistent and standardize collection and management, these data will provide beneficial and accurate insights for trends monitoring, future and time series prediction, and ultimately a reliable review of currently implemented programs. However, managing the data is a challenging aspect especially when it involves multiple agencies with different focuses and requirements and countless bureaucracy. By continued adoption of the "3-5-2" concept from football strategies, this paper will review the status-quo conditions of road crash data collection and management in the middle-income tier ASEAN countries. These shall be one of the core values for effective road safety management and improvement stipulated under the Decade of Action for Road Safety.*

Keywords: ASEAN, road safety, crash investigation, road crash data, crash data management, national crash database

1.0 INTRODUCTION

The Association of Southeast Asian Nations (ASEAN) consists of ten country members which are Myanmar, Cambodia, Laos, Vietnam, Thailand, Malaysia, Singapore, Brunei, The Philippines, and Indonesia. Though geographically close and sharing almost similar cultures, disparities and similarities exist. These either exist between countries or among regions in each country. Besides socioeconomic, one of the disparities may also apply to road safety situations.

As reported in World Health Organization (WHO) report (WHO, 2009; WHO, 2018), road traffic injuries remain an important public health issue either globally, or at the regional and national level. While steps are being taken in many countries to improve road safety, much still needs to be done to stop the increase in death and even to reverse the trend. One of the key elements to improve road safety under the United Nations Decade of Action for Road Safety 2011–2020 issued by the Commission for Global Road Safety is pertaining to road safety data management.

The availability of road safety data is fundamental to improving road safety outcomes, tracking progress, and achieving the road safety targets set by each country. Reliable road safety data are essential to understand, assess and monitor the nature and magnitude of the road safety problem and the related solutions, to set ambitious and achievable safety targets, to design and implement effective safety policies and measure their effectiveness. Thus, countries need to establish policies that ensure reliable road safety data by having effective data collection, archiving, and sharing processes of relevant parts of the data for the purpose of improving road safety performance. Moreover, this information also provides valuable insights in terms of real-world vehicle performance during the crash which can benefit the regions' vehicle safety advancement program, the New Car Assessment Program for Southeast Asian Countries (ASEAN NCAP) (Abu Kassim et al., 2019).

2.0 ROAD SAFETY CONDITIONS IN THE ASEAN 'TEAM'

Fatality rates due to road crashes in ASEAN are relatively high and in certain countries currently all above the global annual average of 17.4 per 100 000 people (ITF, 2020a). Given that 90 percent of global road crashes occur in low- and middle-income countries and road traffic injuries remain relevant to high-income countries as well, improving road safety in Southeast Asia will also help meet the targets set under the United Nations Decade of Action for Road Safety 2011–2020 and the Sustainable Development Goals (SDGs), which include goals relevant to road safety and sustainable transport.

When discussing ASEAN, the ten countries can be categorized into three categories, referring to socioeconomic which is based on the Income Level (Gross National Income). The previous study has looked into the macro situation of road safety situations in these countries with a specific perspective on New Car Assessment Program (NCAP) contributions towards their performance (ITF, 2020b). Vulnerable road users (VRUs) which include motorcyclists, cyclists, and pedestrians are the main category of road users in the region and are the highest fatality group in most of the countries, except Brunei and Myanmar (Table 1).

The previous study used an interesting metaphor in describing the different tiers as "3-5-2" in a typical football strategy (Jawi & Abu Kassim, 2013). The comparison refers to "2" as the high-income countries or the 'Forwards', "5" denotes the middle-income countries or the 'Midfields', while "3" refers to the low-income countries which are the 'Defenders'.

The two countries (the 'Forwards') with the smallest nations by land area (Brunei and Singapore) have the lowest number of road fatalities and index (per 100,000 population) and are very close to the "zero fatalities" target in road safety. For the 'Midfields', the four countries are the most populated in the top 20 world's most populated countries, except Malaysia, and are regarded as the Big 5" in ASEAN's automotive market. Furthermore, according to WHO 2010 data, road fatalities from these five countries contributed to 93% of ASEAN's total death

toll while most fatalities involve VRU's, especially two- and three-wheelers users (Jawi & Abu Kassim, 2013). Nevertheless, the remaining three countries (Laos, Cambodia, and Myanmar) possess rather low death figures (between 700 and 2,500) due to the nature of their economic conditions and with no domestic car industry, the rapid rise in motorization through vehicle volume may be unlikely contrasting to the mid-tier countries.

Table 1: ASEAN road safety data in 2010 – 3-5-2 perspective (Jawi & Abu Kassim, 2013)

Country	Income Level (GNI in USD p.c.) 2010	Pop. (mil.) 2010	Reported Road Traffic Death 2010	Est. Death per 100K Pop. 2010	% Death 4-wheeler (% reg. veh.)**	% Death 2/3-wheeler (% reg. veh.)**	Veh. Sales 2011 ('000)	Veh. Sales 2012 ('000) (Var.)	P.V.*** Sales 2012 ('000)
Singapore	HIC (39,410)	5.1	193	5.1	8.8 (61)	46.1 (17)	39.5	37.2 (-6%)	32.7
Brunei	HIC (31,800)	0.4	46	6.8	76.0* (83)	11.0* (4)	14.5	18.6 (28%)	17.8
Malaysia	MIC (7,700)	28.4	6,872	25.0	26.0 (45)	58.7 (47)	600.1	627.7 (5%)	552.2
Thailand	MIC (4,150)	69.1	13,365	38.1	13.3 (14)	73.5 (63)	794.0	1,436.3 (81%)	694.2
Indonesia	MIC (2,500)	239.9	31,234	17.7	6.1 (15)	35.7 (73)	894.1	1,116.2 (25%)	780.7
Philippines	MIC (2,060)	93.3	6,739	9.1	Not Avail. (17)	Not Avail. (48)	141.6	156.6 (11%)	48.3
Vietnam	MIC (1,160)	87.8	11,859	24.7	Not Avail. (5)	Not Avail. (95)	109.6	80.5 (-27%)	43.7
Laos	MIC (1,010)	6.2	767	20.4	14.6 (2)	74.4 (79)	Not Avail.	Not Avail.	Not Avail.
Cambodia	LIC (750)	14.1	1,816	17.2	11.8 (9)	66.6 (84)	Not Avail.	Not Avail.	Not Avail.
Myanmar	LIC (Not Avail.)	47.9	2,464	15.0	26.2 (26)	22.9 (65)	Not Avail.	Not Avail.	Not Avail.

*2007 data   **All reg. veh. % based on 2007 data   *** Passenger Vehicles

When discussing ASEAN, the focus may need to be given to the 'Midfields', as the largest slice in the cake in terms of the total death toll due to road traffic crashes. This comprises five countries which are Malaysia, Indonesia, Thailand, Vietnam, and the Philippines. The paper will explain the status-quo of road traffic crash data collection and management of the related countries.

3.0 CRASH DATA MANAGEMENT AMONG THE ASEAN 'MIDFIELDS'

Information was gathered from official documents, related articles, and through meetings held between representatives from focal agencies of each country with regards to crash data management. The focus was given to the process of road traffic crash information gathering and archiving of such data which is currently being conducted in each country. These processes are either based on the governmental acts and regulations, or internal procedures possess by relevant focal agencies of the respective countries.

Based on the data in Table 2, the current crash data situation can be explained as the followings:

Table 2: Current crash data situation among selected ASEAN countries

COUNTRY	AGENCIES COLLECTING CRASH DATA	SOURCES OF CRASH DATA	COVERAGE OF COLLECTION	NATURE OF CRASH DATA	METHOD OF DATA COLLECTION	STATUS OF NATIONAL DATABASE(S)	CURRENT AVAILABLE DATABASES(S)	INTEGRATION AMONG DATABASES?	NATIONAL DATABASE DATA PROVIDER	USERS OF CRASH DATA	TIMELINE FOR DEFINITION OF FATALITY
Malaysia	RMP & MIROS	Government Agency	Nationwide	Authority-based & Research-based	On-the-spot & Retrospective	Available	MROADS CIRD MSEDARS	No	Traffic Police Research Institute	Government Policy Makers Academician	Within 30 days
Thailand	MOT, Royal Thai Police, Road Accident Victims Protection CO, MOPH, MOI & TARC	Government Agency	Nationwide	Authority-based & Research-based	On-the-spot & Retrospective	Available	TRAMS	Yes	Agencies	Government Policy Makers Academician	Within 30 days
Indonesia	Korps Lalu Lintas Kepolisian Republik Indonesia (Traffic Police Corps of Republic of Indonesia)	Government Agency	Nationwide	Authority-based	On-the-spot	Null	IRSMS (Integrated Road Safety Management System)	No	Traffic Police Corps of Republic of Indonesia	Local and Federal Government Agencies	Within 30 days
Philippines	PNP & MMDA	Government Agency	Nationwide & Regional	Authority-based	On-the-spot	Available	DRIVERS	Yes	Traffic Police Local Government Department of Health	Local and Federal Government Agencies	Within 12 months
Vietnam	Ministry of Public Security (Police), MOT, MOH, MO Justice	Government Agency	Nationwide	Authority-based	On-the-spot	Null	Form 45	No	Ministry of Public Security (Police).	Local and Federal Government Agencies	Within 30 days

3.1 Malaysia

In Malaysia, two types of road crash data collection are being conducted; one by the Royal Malaysian Police (RMP) Traffic Division and another conducted by the Malaysian Institute of Road Safety Research (MIROS) for research-based investigation with both having nationwide coverage (Zainal Abidin & Roslan, 2020). Investigations by the RMP are conducted on-the-spot, serves legal purposes grounded by the Road Transport Act 1987 and covers all level of crash severity, thus covering and broader scope and larger data pool. The crash information is filled into a dedicated form known as the Pol27 which consists of 99 variables in total.

Meanwhile, the research-based approach by MIROS identifies crash and injury factors consisting of human, engineering, and environmental aspects of a crash (Zainal Abidin et al., 2012). These in-depth investigations are conducted by certain criteria, namely, crashes involving a minimum of three fatalities, crashes involving a minimum of one fatality involving commercial vehicles, and crashes with mass casualties and concerning national interests. Until 2019, MIROS has been collecting more than 1,000 cases with these criteria and the focus was changed to localized crashes (Jawi et al., 2015). The research-based investigations are performed either retrospectively or on the spot, depending on the level of the case. Although the numbers are not significantly high, the information gathered possesses more depth input on vehicle and road information, kinematics of the crash, and safety recommendations.

Both datasets are currently being kept in separate databases and not integrated, namely the Malaysian Road Accident Database System (MROADS) for the RMP data and the Crash Investigation and Reconstruction Database (CIRD) for the MIROS in-depth investigation data (Zainal Abidin et al., 2015). Both databases are developed and managed by MIROS. Apart from the two databases, another database was recently established by MIROS in 2020

comprising various data i.e. on vehicle registrations and traffic volumes retrieved from other relevant government agencies such as Public Works Department (PWD) and Road Transport Department (RTD). This database is known as MIROS Secondary Data Recording System (M-SEDARS). Currently, the information is kept by MIROS and is used for government and academics used upon request. Furthermore, other types of databases relate to road crash data but are solely administered and managed by focal agencies i.e. vehicle registration database by the RTD and the Trauma Registry that will be developed by the Ministry of Health (MOH) (Jawi et al., 2015).

3.2 Philippines

In the case of the Philippines, road crash data collection is conducted by both federal and local government bodies depending on the boundary conditions of the investigation areas. The main investigation works are conducted by Metro Manila Development Authority (MMDA) which covers all levels of crash severity within Metro Manila territory specifically the rest of EDSA, other major highways, and city roads while the Philippines National Police (PNP) conducts investigations in other areas and also Highway 54 (EDSA) in Metro Manila. Both investigations serve as legal purposes thus includes penalizing and issuing summons for traffic offenders with practicing rights stipulated under various government acts among others the Republic Act No. 4136 (Land Transportation and Traffic Code 1964), Republic Act 8750 on seatbelt law, Act 10586 on drunk driving and Act 10054 on motorcycle helmet law. Unlike most of the ASEAN 'midfields', the fatality definition used for road traffic crashes is any fatalities that result in death within 12 months of the crash.

With regards to the crash database, a centralized database known as the Data for Road Incident Visualization Evaluation and Reporting System (DRIVERS) was adopted as the nationwide crash database system in the year 2014 (ITF, 2020b). In continuation to that, regional roll-out and training to local government units and local police of the database has been done in the year 2019. This database is administered by the Department of Transportation. It is a web-based and open-source system with the capability of linking multiple government agencies with geo-spatially recording and analyzing road crashes. The information is provided by three sources which are the PNP, Local Government Unit (LGU) Traffic Management Agencies, and Department of Health (DOH), and the data users comprise of various federal and local government bodies.

3.3 Thailand

In the case of Thailand, many agencies take part in collecting road crash data (APRSO, 2019). The agencies are the Ministry of Transport (MOT), Thai Police, Road Accident Victims Protection Co., Ministry of Public Health (MOPH), Ministry of Interior (MOI), and TFC. However, all of these agencies are collecting different types of information concerning crash data (Meebangkoed, 2020).

In Thailand, the central database system is regulated by the Ministry of Transportation, known as the Transport Accident Management System (TRAMS). The system is an integration of other crash data systems collected by organizations under the Ministry of Transportation. Such as the Highway Accident Information Management Systems (HAIMS), under the Department of Highway (DOH). The system is designed as a decision support tool for road crash prevention systems and blackspot treatment programs (Leelakajonjit et al., 2013). This system focuses on collecting the data of severe accidents and accidents that gather public

interest. The data is collected through on-site data collection by DOH agents and transcribe from police reports. For incidents occurring on expressway networks, the data is collected by Express Way authority of Thailand (EXAT) agents and is kept in the Traffic Control (TFC) system. The last one is the Vehicle Registration Database that is owned by the Department of Land Transport (DLT).

In addition, other crash data is being collected in Thailand which is collected in the E-Claim System that is managed by the Road Accident Victims Protection Company Limited that aims to manage insurance claims from mandatory road accident insurance. In addition, the definition of road crash fatality follows the 30-day definition.

3.4 Vietnam

In Vietnam, the Ministry of Public Security which comprises the police is the responsible agency to collect the crash data in 24 hours since the crash happened (Do et al., 2020). The data will be reported by Community or Local Police, then from Provincial Police to Traffic Police Department. In the general statistic indicator, seven group criteria are reported which are the number of cases, number of deaths, number of injured persons, property losses, routes and areas where road traffic crashes occur, means of crashes, age, causes of road crashes, results of investigation and settlement of the crashes. The traffic crash records in Vietnam follows guideline stipulated under the Circular No. 58/2009/TT-BCA dated 28 October 2009.

All these gathered data will be reported to the National Transport Safety Committee to be shared with relevant agencies such as the Ministry of Transport, Ministry of Health, Ministry of Justice, and mass media. Reports on the data will then be produced weekly in which comparison will be made with previous weekly data, quarter/half/annual report for all data collected and to be compared with previous data and also quarter/half/annual report by levels of traffic crashes (Le, 2016).

3.5 Indonesia

Indonesia crash data reports are a compilation of statistical data based on information obtained from road traffic crashes submitted by the Regional Police from 34 provinces in Indonesia as part of the Traffic Police Corps of Republic of Indonesia under government regulation Road Traffic and Transportation Law no. 22 of 2009 (Jusuf et al., 2017). Data from crash reports are collected periodically from Regional Police through written crash reports submitted to the Traffic Police Corps of the Republic of Indonesia. All crash information is collected using the worksheet regulated on Indonesia Police Chief Regulation no. 15 of 2013 and referring to Procedures for handling Traffic Accidents.

A wide variety of crash data reporting information and statistical analyses regarding motor vehicle crashes and their contributing factors are available for legal purposes, penalizing, and issuing summons to traffic offenders. All of this information is kept in the Integrated Road Safety Management System (IRSMS). Currently, this database is a non-centralized system and not capable of real-time data entry, collection, storage, and viewing. Thus, the government target to enhance the database to be integrated and accessible with other related stakeholders by 2022.

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4.0 ON-THE-FIELD CHALLENGES

The current issues and challenges faced by each country concerning road crash data are summarized in Table 3. The points deduced in the table are the ones that derive from the knowledge of the authors, based on the information given in the relevant documents, or informed through meeting platforms. Therefore, issues that are not reported in the reference documents or informed by related focal agencies are not included in the discussion.

In general, issues about road crash data management in middle-income ASEAN countries generally revolve around three main issues which are the data per se, sharing of the data, and data-keeping. Although three of the five members possess their nationwide crash databases, only the Philippines model is centralized. The majority of the countries are facing issues on under-reporting, incomplete data, and challenges pertaining to data fields and definitions. This is more or less expected as the traffic police are the main data collector agency in countries thus issues on technicalities and over-tasked could exist. Different countries may have different procedures and bureaucracies, thus sharing the mechanism of the data among multiple agencies is also one of the challenges that seem to hinder any sort of advancement of the nationwide crash database. Moreover, utilization of the manual system is still the on-the-ground practice that affects certain incapacity i.e. real-time data input and information sharing. Furthermore, challenges in the form of technical deficiencies including database functionality, facilities, and network limitation were also reported in some of the countries.

Table 3: Challenges in current crash data management

COUNTRY	CHALLENGES							
	NONE CENTRALIZED	INCOMPLETE/ INACCURATE	UNDER REPORTING	MANUAL SYSTEM	SHARING MECHANISM	FIELD & DEFINITION	TECHNICAL & NETWORK	LACK OF DATA
MALAYSIA	✓	✓	✓	✓	✓	✓	✓	
THAILAND		✓	✓		✓	✓		
INDONESIA	✓	✓	✓	✓	✓		✓	✓
PHILIPPINES		✓	✓	✓		✓		✓
VIETNAM	✓	✓	✓	✓	✓	✓	✓	

5.0 CONCLUSION

Existing road safety challenges that lie within each ASEAN country may vary one another yet some similarities could be drawn, particularly within the same tier countries. Establishing a complete and accurate road traffic crash data system, which could then allow countries to analyze road safety, to understand the magnitude of their respective road safety problems, and to obtain better road safety outcomes is one of the first steps in improvement. This effort may require the integration of work between various government and non-government agencies within each country. Once this has been achieved, the succeeding phase would be to enhance the crash data collection and data sharing mechanism on a regional basis including standardization of protocols and definitions which will benefit road safety initiatives including vehicle safety advancement efforts such as ASEAN NCAP.

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