

Executive Summary Report

1 Introduction

1.1 Background

On 29th June 2010, the Cabinet passed a resolution approving the adoption of Moscow Declaration calling for “The Decade of Action for Road Safety 2011-2020” to integrate and align implementation of all parties with an aim to achieve RTF reduction at the rate less than 10 per 100,000 populations in 2020.

In 2015, the World Health Organization (WHO) ranked Thailand as the nation with the second-highest RTF rate of the world, recording 24,237 number of fatalities or equivalent to RTF rate of 36.2 per 100,000 populations, after Libya. The economic loss was estimated at over 350,000 million Baht (3 percent of GDP). Without implementation to resolve the problems, number of accidents and fatalities statistics may increase. Among all types of transport, road transport has a higher number of accidents, accounting for over 90 percent, followed by rail transport and water transport as the fewest.

The government has acknowledged the problems and initiated policies and strategic plans to provide guidelines and measures for prevention and resolution. However, such plans still lack the integration. As such, there are opportunities of duplications in planning and budget soliciting, splitted plans, and road safety problems still continue. Therefore, Master Plan for Road Accident Reduction under the Ministry of Transport is needed to provide agencies with guidelines of efficient prevention of road accidents. Consequently, The Ministry of Transport, by Office of Transport and Traffic Policy and Planning, has studied and developed the Master Plan for Road Accident Reduction under the Ministry of Transport with an objective to be used as an implementation framework for its agencies and relevant parties to work in alignment and achieve sustainable implementation.

1.2 Objectives

1) Develop master plan and action plan for road accident reduction under the Ministry of Transport as well as determine road safety strategies for road transport and traffic. All these will be used as an implementation framework for the agencies under the Ministry and relevant organizations to work in alignment with an aim to sustainably reduce road accidents.

2) Develop monitoring and evaluation manuals of master and action plans for road accident reduction under the Ministry of Transport for involved officials to use as a standard to monitor and evaluate performance in further years.

3) Develop road accident database system and manual, ranging from acquiring process, data collecting, data processing, and data analysis with an aim to determine accidents resolution measures.

1.3 Scope of Study

The scope of study cover 5 areas:

- 1) Literature reviews and data collection for cause analysis of accidents;
- 2) Develop road accident database system and manual;
- 3) Develop master plan for road accident reduction under the Ministry of Transport for 10 years (2018-2027);
- 4) Develop action plan for road accident reduction under the Ministry of Transport for 3 years (2018-2020);
- 5) Develop monitoring and evaluation manuals of master and action plans for road accident reduction under the Ministry of Transport.

Project procedures are presented in Figure 1.3-1. The 5 major procedures are; literature review and data collection, development of database system and manual, development of 10-year master plan, development of 3-year action plan, and development of monitoring and evaluation manuals.

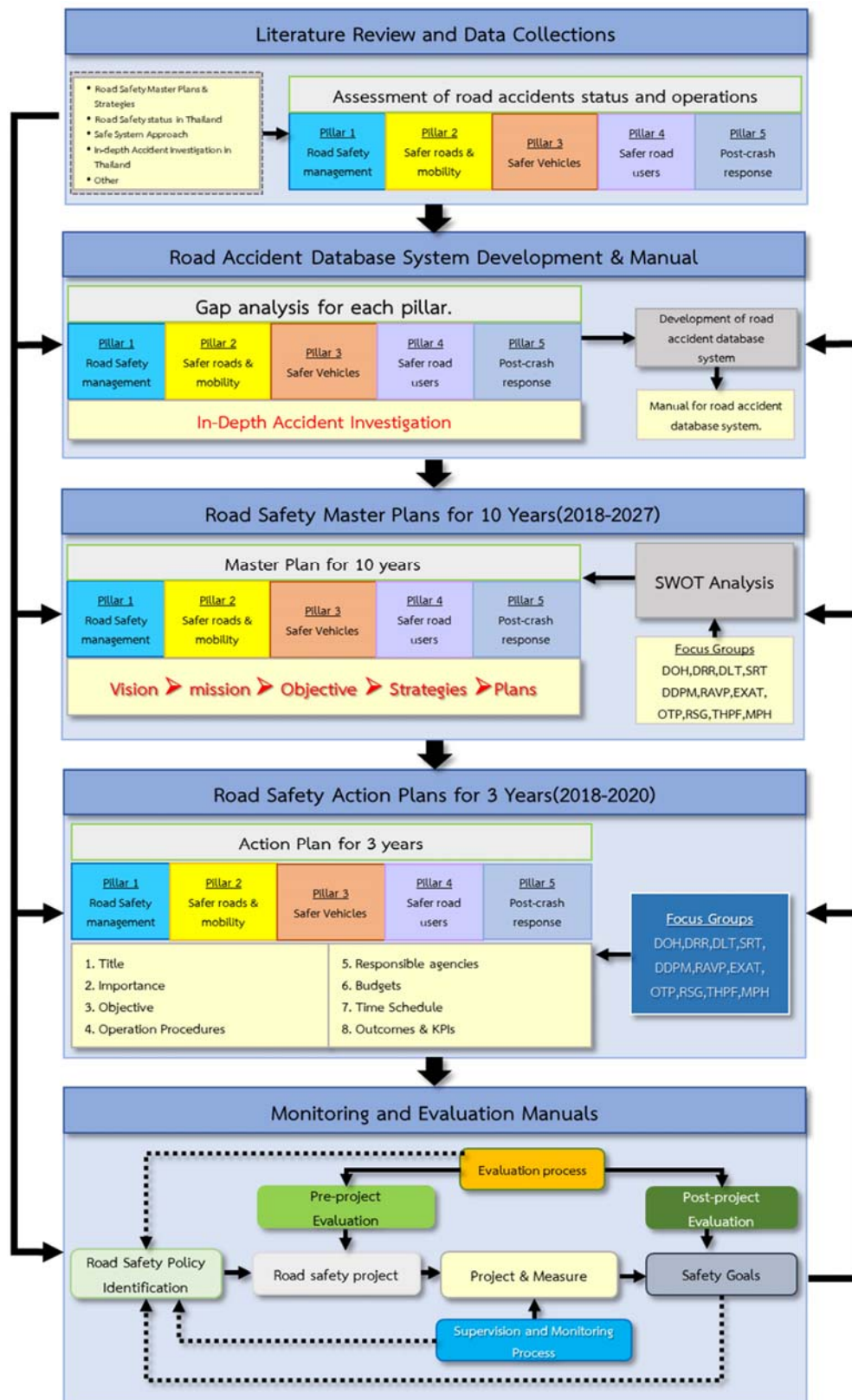


Figure 1.3-1 Project Procedures

2. Study Results and Road Accidents Implementation

2.1 Road Accident Status in Thailand

In Figure 2.1-1, RTF rate per 100,000 populations among various agencies; the Ministry of Public Health (MPH), the National Police Bureau (NPB), and WHO tends to be highly different. From the three-source data, it can be concluded that data of RTF per 100,000 populations of Thailand is problematic. The most trustworthy RTF data is that of the three-source which is close to WHO reports (2008, 2013, and 2015). In the Figure, RTF rate per 100,000 populations tends to decrease. The forecast of RTF rate per 100,000 populations in the year 2020 shows that RTF rate shall be 29.48 per 100,000 populations, which is three times higher than the target RTF rate reduction.

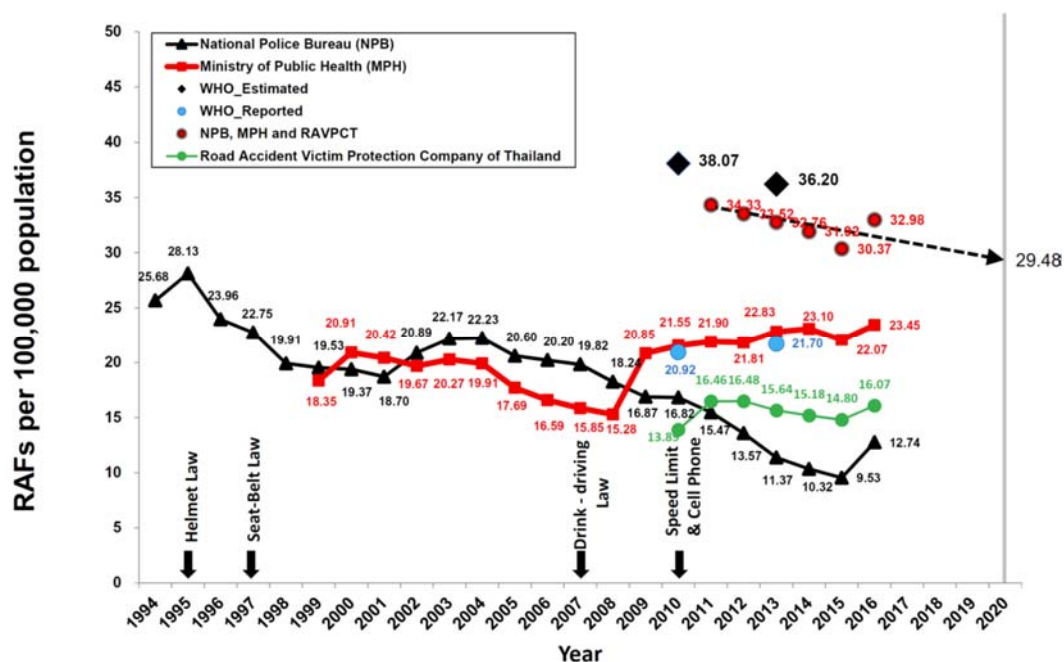


Figure 2.1-1 Number of RTF in Thailand during 1989-2013

The review of relevant documentation shows that road safety status can be categorized into five major pillars according to the UN Decade of Action for Road Safety as presented in Figure 2.1-2 and summarized here below:

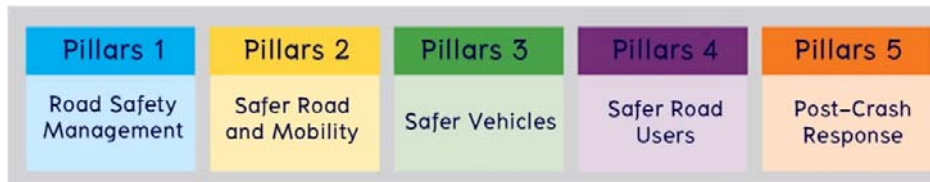


Figure 2.1-2 Categories of Five Major Pillars of the Decade of Action for Road Safety

2.1.1 Road Safety Management

(1) Road Traffic Fatalities (RTFs)

Nowadays, Thailand is ranked by WHO as the second-highest RTF nation of the world, with over 20,000 deaths annually, or average 60 deaths daily. As such, road safety management should be implemented to reduce RTFs. Law enforcement should be emphasized throughout the year instead of merely on festivals. The target and direction of RTFs reduction should be clear in order to be used as KPIs for efficiency of all policies.

(2) Severity of Road Accidents

Most of RTFs are caused by severity of accidents which tends to increase in an overview of the country. Particularly, severity index of highway accidents in 2008-2015 is concerningly high. Physical environments on roadsides are also major factors contributing to severity. It is also found that many factors altogether contribute to RTFs; speed, risk behaviors, road conditions, hazard on roadsides, boards and electricity polls, and omission of safety gear.

(3) Road Accidents during Festivals

According to Road Safety Information Center (2017), severity index during festivals such as Song Kran festival during 2008-2017 increased every year, with 12.8 deaths per 100 accidents. Factors contributing to fatality are mostly from a sudden pass in front of vehicles, illegal overtaking, exceeding speed limit, drink-driving, roadside hazard, drowsiness, omission of safety gear. Motorcycles are vehicles with the highest accident records (Road Safety Directing Center, 2013).

Road Safety Management in Thailand has problems on legislative gaps and law enforcement; for example, 1) lack of harsh punishment, 2) a compromise between offenders and law enforcers, 3) law enforcers themselves offending the laws, 4) lack of monitoring and evaluation, 5) inefficiency in driving license test (Thai Roads Foundation, 2017). Consequently, Thailand needs to adjust her strategies and measures leading to tangible and more efficient actions than in the past.

2.1.2 Safer Roads and Mobility

(1) Risky and Black Spots

Risky and blackspots on highways are a road span or spots on roads where accidents often occur and the incidents have great losses. Thus, the agencies directly responsible for road construction; the Department of Highways and the Department of Rural Roads should be equipped with knowledgeable and well-trained audit body. The design and construction phases should be inspected by means of Road Safety Audit to prevent or lessen opportunities for accidents including severity arising from road defects. After accident occurrence, black spot treatment should be conducted at the accident locations by making physical improvement, provided with improvement budget, monitoring and evaluation (Report on Road Accident Status in Thailand, 2012-2013, 2013).

(2) Roadside Hazards

Accidents caused by roadside hazards are severe and still occur continually. This is due to improper installation and selection of traffic devices which do not suit with road conditions. They, therefore, fail to reduce severity of crash impact against the objects. In addition, the devices may not be ready to function properly or short of maintenance. Therefore, international standards should be adopted and implemented on safety road and roadside design to always provide safety for road users, for example, the design of barriers.

(3) Accidents at U-Turns

More than 90 percent of accidents on highways are from driving at high speed with a sudden pass in front of vehicles on straight ways. Mostly, motorcycles are involved in U-turn accidents due to a sudden pass. In order to reduce number of U-turn accidents, it needs to focus on measures dealing with behavior of road users, including physical road condition improvement to ensure safety in compliance with traffic engineering. Furthermore, public relations on the risk at U-turns should be implemented including giving recommendations for safety drive suitable with each particular location. In addition, there should be management system for the entry of new drivers as well as serious law enforcement (Report on Road Accident Status in Thailand, 2015).

2.1.3 Safer vehicles

(1) Safety for Motorcycles

According to WHO reports (2009, 2013 and 2015), 2/3 wheelers are the largest proportion of vehicles in Thailand, followed by cars and 4-wheeled vehicles respectively. The reports also said that 2/3 wheelers are the largest group contributing to RTFs, followed by cars and 4-wheeled vehicles, as presented in Figure 2.1-3.

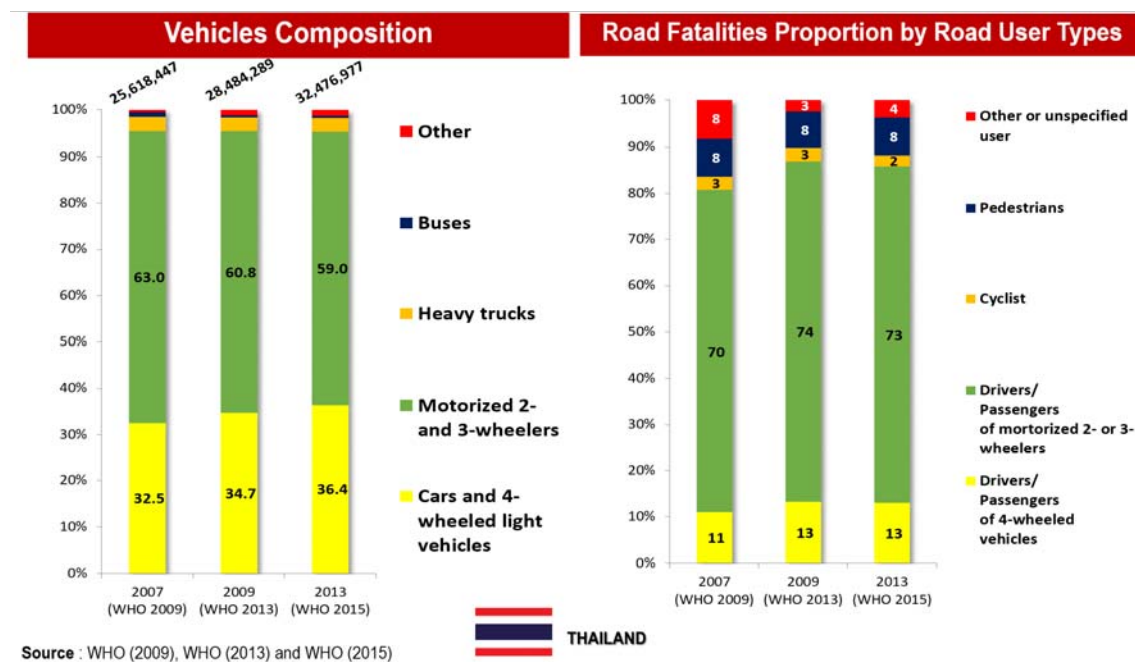


Figure 2.1-3 Vehicle Composition and RTFs Proportion by Road User Types in ASEAN

Source: Pongrid Klungboonkrong (2017)

(2) Safety for Public Transport Vehicles

With consideration on trend of public transport vehicle accidents, it was found that for the past 10 years public vans have experienced accidents for over 400 occasions, and were 2 times more likely than 1-floor buses to have accidents/fatalities, while 2-floor buses were 6 times more likely than 1-floor buses to have accidents/fatalities, as presented in Figure 2.1-4 (Accident Analysis Center of Thailand, 2015).

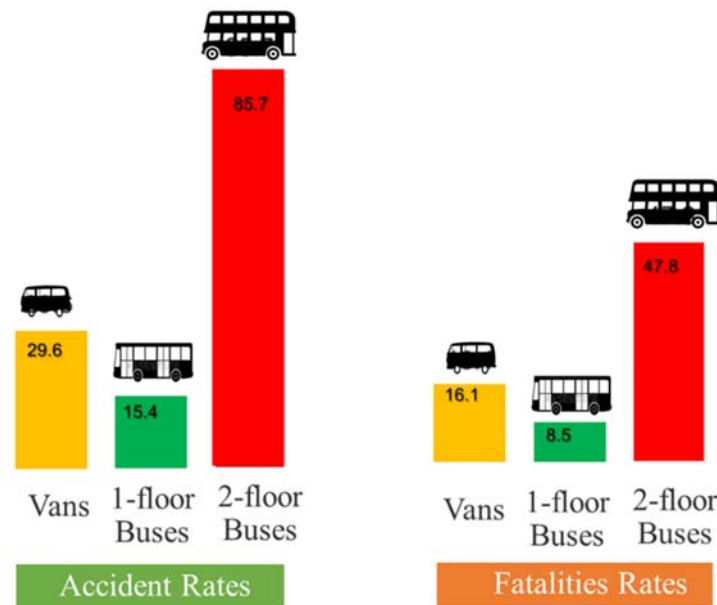


Figure 2.1-4 Accidents and Fatalities Rates per 10,000 Registered Vehicles of Public Transport Vehicles in 2015

Source: Report on Road Accident Status in Thailand, 2014-2015

2.1.4 Safer Road Users

(1) Speed Driving

Speed driving behavior is the most important problem of road accidents in Thailand. This issue needs tangible corrections. According to statistics of highway accidents in 2001-2015, two thirds of highway accidents and fatalities are assumingly due to high speed driving (Figure 2.1-5). The cause for severity of accidents due to high speed driving is that drivers have shorter time for controlling and making decisions. In addition, when accidents occur, human body shall sustain heavy impact, leading to opportunities for injury and fatality.

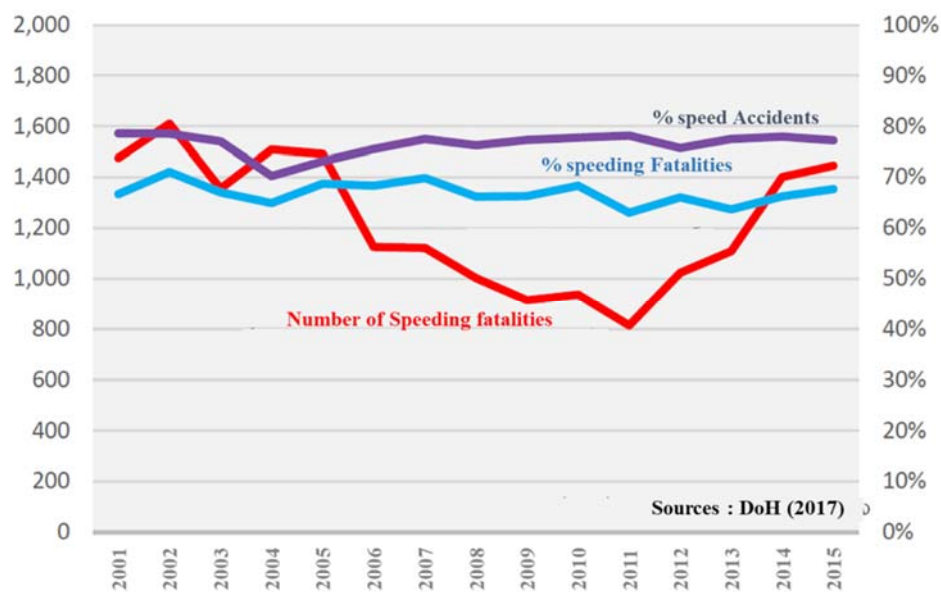


Figure 2.1-5 Traffic Speeding Accidents Statistics on National Highway 2001-2015

Source : Report on Road Accident Status in Thailand, 2014-2015

(2) Drink-Driving

An overview of drink-driving status has a tendency to improve, with proportion of seriously injured drivers in road accidents declining continuously from 45 percent in 2005 to merely 33 percent in 2013. However, drink-driving behavior in private car group still needs to be closely watched. The proportion of injuries from drink-driving of this group tends to increase continuously in the past several years, in contrary to the proportion drink-driving of motorcycle group which steadily decreased (Reports on Road Accident Status in Thailand, 2012-2013, 2013).

(3) Helmet Wearing

According to the surveys of Thai Roads Foundation and Road Safety Watch Network in 2013 (Reports on Road Accident Status in Thailand, 2012-2013, 2013), helmet wearing rate of motorcycle riders was at 51 percent, and motorcycle passengers at 19 percent. It was also found that helmet wearing rate of teenage motorcycle users tended to decrease from 34 percent in 2011 to merely 23 percent in 2013, while that of children group was at 7 percent. In consideration of an overall helmet wearing status of the country, the status is not quite satisfactory. Most of the reasons for not wearing safety helmet was that traveling distance was short and it was not a travel on main roads (Road Safety Group Thailand, 2017).

(4) Seat Belt Wearing

In comparison of wearing safety belt rate and law enforcement between Thailand and the globe, Thailand is at the moderate level. According to WHO reports, only 52 developed countries give themselves scores at “good” level for law enforcement on wearing safety belt. In addition, WHO 2015 report enhances promotion of child restraints, which should help reduce RTFs rate by 90 percent, and by 54 to 80 percent for infant. At present, only 53 countries have child restraint laws, basing on age, height or weight, determining age and height of children allowed to sit in front seat. Even though laws play an important role in promotion of more using child restraints, it was found that there were problems to comply with the laws. These same problems were also found even in high income countries. This was due to problems on access to and prices of child restraints which need to be addressed to bring about more compliance with the laws.

The above-mentioned problems on driving behaviors, safety laws could help better behavior of road users and reduce accidents, injuries and RTFs. Particularly, laws in relation with the five risk factors; speed, drink-driving, safety helmet, safety seat belt, and child restraints. At present, 17 countries have addressed the issues by making law amendment involving such risk factors in the past 3 years, to ensure compliance with good practices.

From Figure 2.1-6, law enforcement in Thailand was given scores by WHO. It was found that speed limits laws were scored 3, drink-driving, motorcycle helmet, and seat belt laws were each scored 6. In particular, Thailand still does not have child restraint laws.

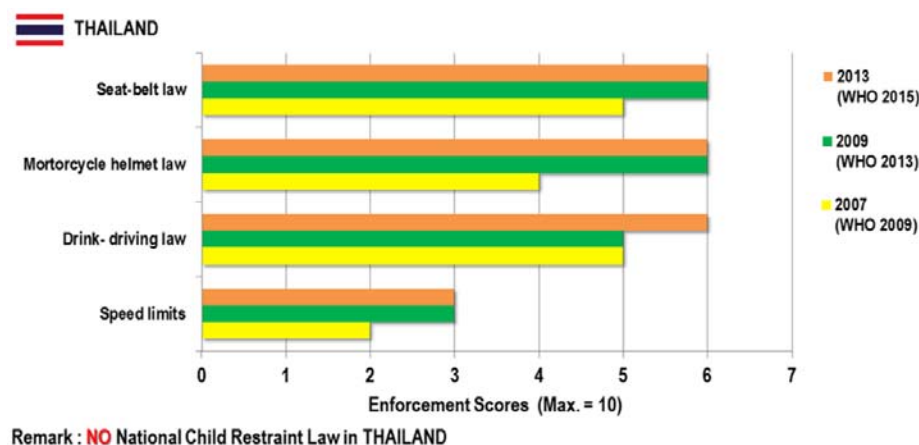


Figure 2.1-6 Road Safety Law Enforcement Scores

Source: WHO (2015), WHO (2013) และ WHO (2009)

For Thailand, even with various measures imposed currently, these measures are not enough and cannot sustainably change driving behavior. It was found that Thailand has gap in every risk factor except for motorcycle helmet. More other laws are needed, for example, urban speed limit law, restriction of alcohol content in blood law for teenage or new drivers, safety belt for back seat passenger law, and child restraint law. Figure 2.1-7 shows legislative gaps of Thailand in 5 risk factors.

Speed	National speed laws in place	Speed limits on urban roads ≤ 50 km/h	Local authorities have the power to modify national speed limits		
Drink-driving	National drink-driving law in place	Drink – driving based on BAC or equivalent BrAC	BAC limit for general population ≤ 0.05 g/dl	BAC limit for young/novice drivers ≤ 0.02 g/dl	
Motorcycle helmets	National motorcycle helmet law in place	Law applies to motorcycle drivers and adult passengers	Law applies to all road types	Law applies to all engine types	Law requires helmet to meet a national or international standard
Seat-belts	National seat-belt law in place	Law applies to front seat passengers	Law applies to rear seat passengers		
Child restraints	National child restraint law in place	Law is based on age-weight-height or a combination of these factors	Law restricts children under a certain age-height from sitting in front seat.		

Figure 2.1-7 Legislative Gaps of Thailand in 5 Risk Factors

Source: Save LIVES - A road safety technical package, WHO, 2017

2.1.5 Post-crash Response

Emergency treatment for the injuries is the core issue of post-crash response. Efficient treatment must be fast, starting from activation of emergency medical system, followed by medical treatment at the accident spot, mobilization, and medical treatment at hospitals. According to accident statistics, pre-medical treatment prior to arrival at hospital can reduce fatality risk by up to 25 percent (WHO, 2015).

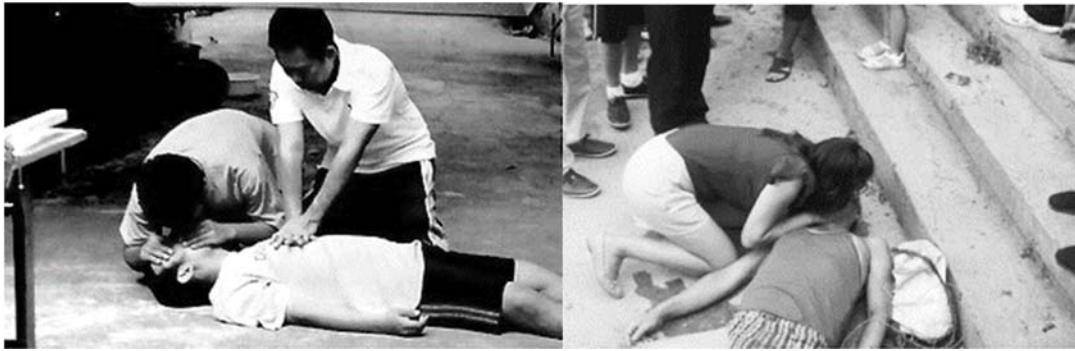


Figure 2.1-8 First Aid before Medical Staff Arrival

Source: Office of Transport and Traffic Policy and Planning

2.2 UN Minimum Vehicle Safety Standards and New Car Assessment Program (NCAP)

2.2.1 International Standards and Car Tests

For active safety, brake system efficiency to reduce speed as desired by drivers is very important. Therefore, UNECE Safety Standard NO. 13 of United Nations Economic Commission for Europe shall be implemented for test and assessment of brake system (UNECE, 2008). In the 24th meeting of ASEAN Consultative Committee for Standards and Quality (ACCSQ), the determination on vehicle standards and certifications was set up and the Automotive Product Working Group (APWG) worked out draft standards as an annex to MRA in 19 items (ASEAN MRA, 2011).

Furthermore, Electronic Stability Control (ESC) to avoid accidents due to sudden lane change has been determined as a basic system for vehicles in the decade of action for road safety (WHO, 2011). The system shall help avoid major crash by continuously censoring vehicle stability. When vehicles lose stability, the system shall correct slipping by reducing engine torque and brake power, and creating centrifugal force to bring back stability and keep vehicles under control of drivers.

2.2.2 International Standards for Motorcycles

Brake system of motorcycle is one of technologies capable of preventing accidents to motorcycles. For example, Combined Brake System (CBS) was designed to make the front wheel work in relation with the back wheel, with shorter brake distance, determining proportion of brake power between front and back wheels in relation with weighted rate, wheel length, and friction with road surface, provided with proper design of brake power and each wheel control.

3. Safe System Approach

At present, Safe System Approach has been widely adopted in many countries, including Sweden and the Netherlands, which are the model countries, Australia, New Zealand, the United Kingdom, and many European countries. The system recognizes that people will always make mistakes and may experience road crashes – but the system should be forgiving and those crashes should not result in death or serious injury. The important publication by OECD in 2008, “Towards Zero: Ambitious road safety targets and the safe system approach”, has summed up the principles as follows:

1. Road users will always make mistakes; therefore, transport system shall accommodate human errors so that those crashes from human errors shall not result in death or serious injury.

2. Human bodies have a limited ability to withstand crash forces before being seriously injured or killed.

3. The system shall forgive drivers by making design to ensure that the forces in collision shall not lead to death or serious injury.

4. System designers, system controllers and operators need to take into account the limitation of human body to impact forces in designing and maintaining roads, vehicles and speed limits.

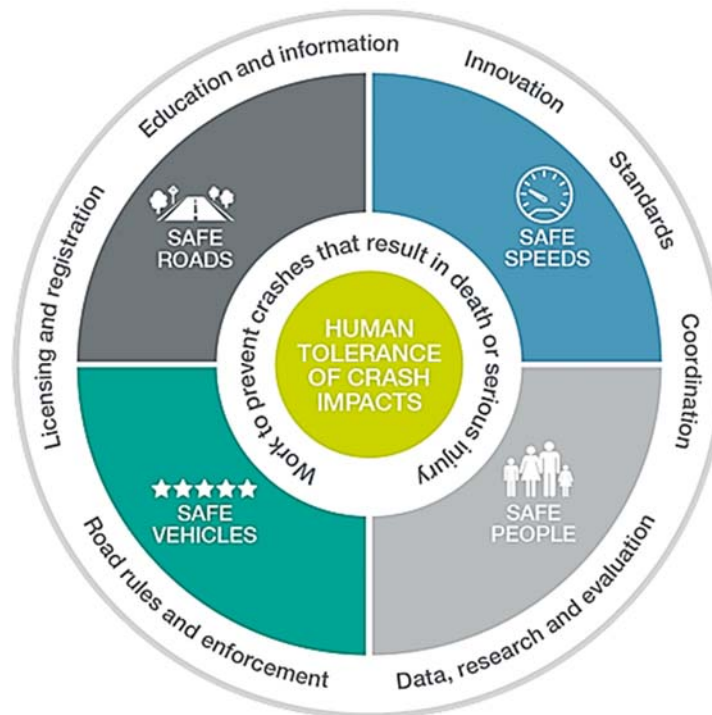


Figure 3-1 Safe System Approach

Source: adapted from Safer Roads, Safer Queensland: Queensland's Road Safety Strategy 2015–21

By the safe system approach, road safety shall be recognized and road users' behaviors shall comply. However, one must accept that human errors are inevitable. The target of results and mistakes allowed for road transport, in particular death or serious injury, was towards zero. The safe system aims to alert and provide road users in 4 issues as follows:

1. **Safer Roads** This includes risk reduction of being hit; for example, provide walkways separately from road ways. It also covers identification and improvement of black spots, and road maintenance.
2. **Safer Speeds** Enforce laws on speed limits and determine speed limits to suit with road characteristics and functions. Efficient speed limits shall help prevent collision and reduce injury severity.
3. **Safer Vehicles** Adopt technologies such as alcolocks, speed limiters, stability control, automatic braking systems as well as encourage buying and maintaining safer vehicles.
4. **Safer Road Users** Enhance education and raise awareness on safer road usage for all road users, including children and VRUs.

The success of road safety is based on the understanding of fragility and viability of human bodies. With an impact above 30 km/hour without any body-coverings could result in death and serious injury even being hit at low speed. Main objective of this approach is to ensure that for any incidents, impact forces to human bodies would not cause death and serious injury or if death and injury does occur, degree of severity would be reduced.

Opportunities to survive drop sharply when impact speed goes up subject to characters of impact, as presented in Figure 3-2

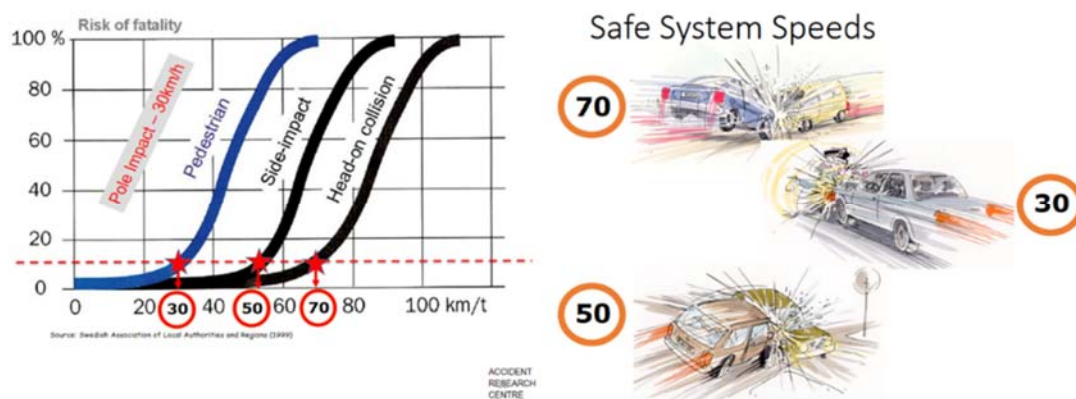


Figure 3-2 Relation between survival from crash at different impact speeds, subject to impact characteristics

The basic of safe system approach is speed management to limit impact force in collision. In almost cases, safety initiations, new or existing practices shall be taken into consideration. By this method, travel rapidity is maintained. The design of roads, roadsides and vehicles should be managed to reduce crash risks and prevent serious injury and death in accidents. Speed limits and rules should be determined to suit road safety and roadside management. Campaign to educate drivers to be aware of and comply with traffic signs as well as law enforcement should be implemented.

4. Public Hearing Meetings and Focus Group Meetings

4.1 SWOT Analysis on Road Safety by Focus Group Meetings

Public hearing meetings and focus group meetings were held in 5 model provinces; Songkhla, Khon Kaen, Chiang Mai, Nakhon Ratchasima, and Chon Buri to mobilize opinions from representatives of road safety relevant agencies in provincial level to make SWOT analysis. So as to ensure better efficient development of action plan for road accident reduction, the meetings were held 9 times altogether, including interview with road accident relevant agencies to gather additional important information outside the meetings. All these lead to determination of road safety direction, projects/ measures to match with the master plan and action plan for road accident reduction under the Ministry of Transport.



Figure 4.1-1 Meetings of Public Hearings and Focus Groups



Figure 4.1-2 Focus Groups in 5 provinces of prototype.



Figure 4.1-3 Interview with Agencies Involved with Road Accidents

4.2 The Result of SWOT Analysis

Public hearing meetings, focus group meetings, and interview with road accident relevant agencies to mobilize opinions for making SWOT analysis were conducted under 5 major pillars; Pillar 1) Road Safety Management, Pillar 2) Safer Roads and Mobility, Pillar 3) Safer Vehicles, Pillar 4) Safer Road Users, and Pillar 5) Post-crash Response. Following SWOT analysis, the determination of vision, goals and strategies were adopted for efficiency in development of master and action plan.

5. Master Plan for Road Accident Reduction

Following SWOT analysis, the determination of vision, goals and strategies. Strategies of master plan based on the vision, goals and objectives were developed into 5 issues for road accident and injury reduction purpose. Policies and plans in response to the strategies were also established. The 5 strategies are; strategy 1- road safety management, strategy 2- safer roads and mobility, strategy 3- safer vehicles, strategy 4- safer road users, and strategy 5- post-crash response. Details of strategies, policies and plans of each strategy are summarized as presented in Figure 5-1 and Table 5-1.

Vision

“Road System with No Accident Fatality”

Goals

The vision set up was intended to achieve the goals in road accident reduction as follows:

RTF reduction rate by year

- 16 fatalities per 100,000 populations In 2012
- 11 fatalities per 100,000 populations In 2032
- 6 fatalities per 100,000 populations In 2042
- 0 fatalities per 100,000 populations In 2057

Objectives

The Objectives were set up to correspond with the vision and goals of RTF reduction purpose as follows:

- Integration of safe system approach in design, operation and maintenance standards for road infrastructures and vehicles for all road user groups, particularly for Vulnerable Road Users (VRUs)
- Integration of road safety operations and cooperation among all responsible organizations
- Promotion of the utilization of advanced technologies and innovations in roads and vehicles for road safety purpose.

Strategies

Strategies of action plan based on the vision, goals and objectives were developed into 5 issues for road accident and injury reduction purpose. Policies and plans in response to the strategies were also established. Detailed descriptions of the 5 strategies are as follows:

Strategy 1 Road Safety Management

- Establish central organization specifically overseeing national road safety;
- Develop national master plan and action plan
- Improve road accident database system to meet international standards;
- Promote in-depth accident investigation for cause analysis and correction methods;
- Improve laws and regulations on speed limits;
- Enforce laws strictly, continuously, and equally, incorporating technologies to support police operations.

Strategy 2 Safer Roads and Mobility

- Clearly classify hierarchy of road network taken into consideration safety and operation;
- Manage proper and safe speed of road network;
- Manage through traffic in communities;

- Upgrade safety standards for road design and construction to meet international standards;
- Upgrade standards for road design, installation and operation of safety facilities to prevent and alleviate accident severity, in particular, for Vulnerable Road Users (VRUs), including providing motorcycle and bicycle exclusive lanes;
- Enhance road safety audits for all stages of road infrastructure development (from design stage to operation);
- Improve risky and black spots by applying advanced technologies to determine priority, analyze and correct risky and black spots;

Strategy 3 Safer Vehicles

- Promote advanced technologies and innovations enhancing more safety for all vehicle types, specifically motorcycles and public transport vehicles (public vans and passenger cars);
- Upgrade vehicle audit standards to meet international level (UN International Vehicle Standard); front impact, side impact, seat belt, child restraints, pedestrian protection, Electronic Stability Control (ESC), Antilock Brake System (ABS), and Autonomous Emergency Braking System;
- Develop structural design and stability standards for all vehicle types, particularly trucks, trailer trucks, vans, public transport vehicles and motorcycles.

Strategy 4 Safer Road Users

- Adopt and apply technologies to control driving behaviors for safer purpose, such as speed detector camera, red-light camera;
- Upgrade driving license testing standards, particularly those of motorcycles;
- Campaign to raise awareness about accident problems and how to prevent and resolve them. Enhance serious law enforcement to develop road safety culture in various aspects such as speed limits, motorcycle helmet, seat belt, child restraint, drink-driving, fatigue-driving, bicycles, etc. The campaign and law enforcement should be implemented by integrating operations and cooperation of all parties involved, ranging from policy makers to the locality;

- Attach great importance to issuing driving license to VRUs, such as motorcycles, teenager and elderly drivers;

Strategy 5 Post-crash Response

- Develop the integration of all parties involved with post-crash response to facilitate access to the accident scenes and mobilization to hospitals, both in urban and local areas;
- Use ITS technology to facilitate transport of and access to the injured;
- Quickly arrange for traffic flow and safety at the accident scenes.

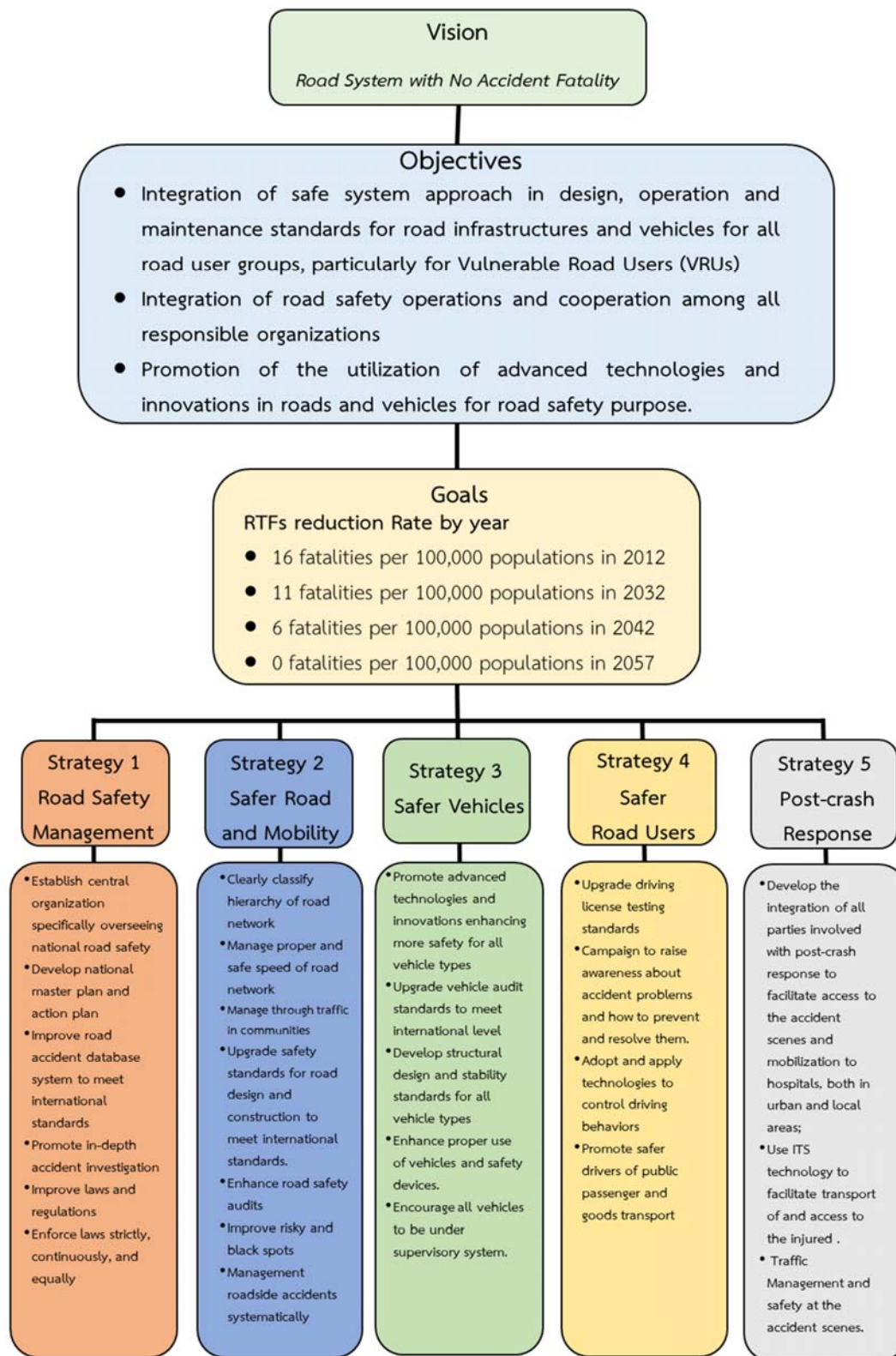


Figure 5-1 Vision, Goals, and Strategies of Master Plan for Road Accident Reduction

Table 5-1 Summary of Master Plan for Road Accident Reduction under the Ministry of Transport 2018-2027 (10 years)

Strategies	Plans	Projects	Agencies	Budget (million Baht)	Years (A.D.)									
					2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Strategy 1 Road Safety Management	1.1 Establish central organization specifically overseeing national road safety.	1.1.1 Road Safety Organization Establishment Project	MOT	70	15	15	5	5	5	5	5	5	5	5
	1.2 Improve road accident database system to meet international standards.	1.2.1 Road Accident Database System Development Project	MOT	150	55	55	5	5	5	5	5	5	5	5
	1.3 Promote in-depth accident investigation.	1.3.1 In-depth Accident Investigation Project	DOH	200	20	20	20	20	20	20	20	20	20	20
			DRR	200	20	20	20	20	20	20	20	20	20	20
			EXAT	100	10	10	10	10	10	10	10	10	10	10
			SRT	100	10	10	10	10	10	10	10	10	10	10
			DLT	100	10	10	10	10	10	10	10	10	10	10
Strategy 2 Safer Roads and Mobility	2.1 Clearly classify hierarchy of roads network.	2.1.1 Study Project for Speed Limit Determination and Road Network Hierarchy Classification	DOH	21	21									
			DRR	9	9									
	2.2 Manage proper and safe speed limits of road network	2.2.1 Traffic Management in Community Areas Project	DOH	540	54	54	54	54	54	54	54	54	54	54
			DRR	230	23	23	23	23	23	23	23	23	23	23
		2.2.2 Promotion of Technologies for Traffic Management Project	DOH	2,150	215	215	215	215	215	215	215	215	215	215
			DRR	930	93	93	93	93	93	93	93	93	93	93
	2.3 Upgrade safety standards for road design and construction to meet international standards.	2.3.1 Study Project for Elevation of Road Safety Design to Meet Global Design Standards	DOH	21	21									
			DRR	9	9									
		2.3.2 Study Project for Design of Infrastructures and Facilities for Motorcycles	DOH	5,600	560	560	560	560	560	560	560	560	560	560
			DRR	2,400	240	240	240	240	240	240	240	240	240	240
		2.3.3 Pedestrian Safety Design and Management Project	DOH	1,620	162	162	162	162	162	162	162	162	162	162
			DRR	690	69	69	69	69	69	69	69	69	69	69
		2.3.4 Safety Devices Standards Elevation and Improvement Project	DOH	70	70									
			DRR	30	30									
		2.3.5 Road Safety Quality Assessment at Global Standards Project	DOH	540	54	54	54	54	54	54	54	54	54	54
			DRR	230	23	23	23	23	23	23	23	23	23	23
	2.4 Improve risky and black spots systematically.	2.4.1 Road Safety Audit Project	DOH	8,870	887	887	887	887	887	887	887	887	887	887
			DRR	6,070	607	607	607	607	607	607	607	607	607	607
			EXAT	60	6	6	6	6	6	6	6	6	6	6
		2.4.2 Black Spots Analysis and Correction Project	DOH	6,250	625	625	625	625	625	625	625	625	625	625
			DRR	750	75	75	75	75	75	75	75	75	75	75
		2.4.3 Cross Roads Improvement and Railroad Crossing Correction Project	SRT	400	40	40	40	40	40	40	40	40	40	40
	2.5 Management roadside accidents systematically.	2.5.1 Study Project for Roadside Hazard Management	DOH	460	46	46	46	46	46	46	46	46	46	46
			DRR	340	34	34	34	34	34	34	34	34	34	34
		2.5.2 Development of Truck and Heavy Vehicle Rest Areas on Main Road Project	DOH	7,060	706	706	706	706	706	706	706	706	706	706

Table 5-1 Summary of Master Plan for Road Accident Reduction under the Ministry of Transport 2018-2027 (10 years) (Cont.)

Strategies	Plans	Projects	Agencies	Budget (million Baht)	Years (A.D.)									
					2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Strategy 3 Safer Vehicles	3.1 Develop safety standards for new vehicles before entering road system.	3.1.1 Development of Safety Standards for New Vehicle Project	DLT	54	20	10	10	2	2	2	2	2	2	2
	3.2 Audit and screen existing vehicles in the system to ensure ability to function in compliance with safety standards.	3.2.1 Existing Vehicle Audit and Screening Project	DLT	110	20	10	10	10	10	10	10	10	10	10
	3.3 Enhance proper use of vehicles and safety devices.	3.3.1 Strong Law Enforcement on using incorrect truck type Project	DLT	50	5	5	5	5	5	5	5	5	5	5
		3.3.2 Development of Laws and Rules about Excessive Passenger Transport Project	DLT	33	10	10	5	5	0.5	0.5	0.5	0.5	0.5	0.5
		3.3.3 Development of Laws and Rules about Overload Transport Project	DLT	43.5	20	10	10	0.5	0.5	0.5	0.5	0.5	0.5	0.5
		3.3.4 Promotion of Suitable Usage of Vehicles and Safety Devices Project	DLT	40	4	4	4	4	4	4	4	4	4	4
		3.3.5 GPS Installation on Public Transport Vehicles Project	DLT	58	15	7	7	7	7	7	2	2	2	2
	3.4 Develop quality and safety license granting system for passenger and goods transport operators.	3.4.1 Development of License Granting System for Passenger and Goods Transport Operation Project	DLT	54	20	10	10	2	2	2	2	2	2	2
	3.5 Encourage all vehicles to be under supervisory system.	3.5.1 Promotion of Supervision for All Vehicles Project	DLT	32	5	3	3	3	3	3	3	3	3	3
Strategy 4 Safer Road Users	4.1 Develop driving license testing standards.	4.1.1 Driving License Test Development Project	DLT	51	20	15	2	2	2	2	2	2	2	2
		4.1.2 Granting Driving Licenses for VRUs Project	DLT	32	15	10	2	2	0.5	0.5	0.5	0.5	0.5	0.5
		4.1.3 Supervision of Lifetime Driving License Holders Project	DLT	12.25	10	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
		4.1.4 Project for Development of Law Offenses Database in collaboration with the National Police Bureau	DLT	36	10	10	2	2	2	2	2	2	2	2
	4.2 Enhance providing education to drivers, riders, passengers, and other road users.	4.2.1 Driving Lessons Formulation and Learning through Social Media Project	DLT	22	10	10	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
		4.2.2 Promotion of Rest Aras with Safety Standards Project	DLT	28	10	2	2	2	2	2	2	2	2	2
		4.2.3 Driving School Standard Audit Project	DLT	31.75	10	10	10	0.25	0.25	0.25	0.25	0.25	0.25	0.25
	4.3 Enforce laws to control risk behaviors systematically.	4.3.1 Enhancement of Serious Law Enforcement Project	DLT.	100	10	10	10	10	10	10	10	10	10	10
		4.3.2 Promotion and Integration of Systematic Checkpoints Installation in Collaboration with the Police and Communities Project	DLT	100	10	10	10	10	10	10	10	10	10	10
		4.3.3 Truck Drivers’ Roles and Behaviors Monitoring Project	DLT	110	20	10	10	10	10	10	10	10	10	10
	4.4 Promote safer drivers of public passenger and goods transport.	4.4.1 Safety Promotion for Drivers of Public Passengers and Goods Transport Project	DLT	50	5	5	5	5	5	5	5	5	5	5
Strategy 5 Post-crash Response	5.1 Develop access to accident scenes for Emergency Medical System.	5.1.1 Traffic Incident Management Project	DOH	280	28	28	28	28	28	28	28	28	28	28
			DRR	120	12	12	12	12	12	12	12	12	12	12
Total Budget				47,717.50	5,108.00	4,860.25	4,756.50	4,721.25	4,715.25	4,715.25	4,710.25	4,710.25	4,710.25	4,710.25

6. Action Plan for Road Accident Reduction under the Ministry of Transport , 2018-2020

6.1 Guidelines for Development of Action Plan for Road Accident Reduction under the Ministry of Transport, 2018-2020

The development of action plan to serve master plan and the decade of action for road safety comprises vision, mission, strategy, strategic issues, strategic goals, strategic means to reduce loss according to road safety action plan. It is aimed to achieve sustainable road accident reduction.

As a result of previous study review and previous projects study, data collection, public hearings, focus group meetings, and interview with agencies involved with road accident reduction, the proposal of strategy, tactics, and project plans was made. This will be incorporated in the development of action plan for road accident reduction under the Ministry of Transport was made.

Action plan for road accident reduction under the Ministry of Transport for 3 years (2018-2020) shall be developed based on strategic framework of master plan for road accident reduction of the Ministry of Transport for 10 years. The plan consists of 5 major strategies; pillar 1 – Road Safety Management, pillar 2-Safer Roads and Mobility, pillar 3-Safer Vehicles, pillar 4-Safer Road Users, and pillar 5-Post-crash Response. The strategic issues shall be under the decade of road safety framework.

6.2 Details of Action Plan for Road Accident Reduction under the Ministry of Transport, 2018-2020

Detailed descriptions of all projects are summarized and budget to use and project duration under the action plan is presented in Table 6.2-1

Table 6.2-1 Summary of Action Plan for Road Accident Reduction under the Ministry of Transport 2018-2020 (3 years)

Strategies	Plans	Projects	Agencies	Budget (million Baht)	Years (A.D.)		
					2018	2019	2020
Strategy 1 Road Safety Management	1.1 Establish central organization specifically overseeing national road safety.	1.1.1 Road Safety Organization Establishment Project	MOT	35	15	15	5
	1.2 Improve road accident database system to meet international standards.	1.2.1 Road Accident Database System Development Project	MOT	115	55	55	5
	1.3 Promote in-depth accident investigation.	1.3.1 In-depth Accident Investigation Project	DOH	60	20	20	20
			DRR	60	20	20	20
			EXAT	30	10	10	10
			SRT	30	10	10	10
			DLT	30	10	10	10
Strategy 2 Safer Roads and Mobility	2.1 Clearly classify hierarchy of roads network.	2.1.1 Study Project for Speed Limit Determination and Road Network Hierarchy Classification	DOH	21	21		
			DRR	9	9		
	2.2 Manage proper and safe speed limits of road network	2.2.1 Traffic Management in Community Areas Project	DOH	162	54	54	54
			DRR	69	23	23	23
		2.2.2 Promotion of Technologies for Traffic Management Project	DOH	645	215	215	215
			DRR	279	93	93	93
	2.3 Upgrade safety standards for road design and construction to meet international standards.	2.3.1 Study Project for Elevation of Road Safety Design to Meet Global Design Standards	DOH	21	21		
			DRR	9	9		
		2.3.2 Study Project for Design of Infrastructures and Facilities for Motorcycles	DOH	1,680	560	560	560
			DRR	720	240	240	240
		2.3.3 Pedestrian Safety Design and Management Project	DOH	486	162	162	162
			DRR	207	69	69	69
		2.3.4 Safety Devices Standards Elevation and Improvement Project	DOH	70	70		
			DRR	30	30		
		2.3.5 Road Safety Quality Assessment at Global Standards Project	DOH	162	54	54	54
			DRR	69	23	23	23
	2.4 Improve risky and black spots systematically.	2.4.1 Road Safety Audit Project	DOH	2,661	887	887	887
			DRR	1,821	607	607	607
			EXAT	18	6	6	6
		2.4.2 Black Spots Analysis and Correction Project	DOH	1,875	625	625	625
			DRR	225	75	75	75
		2.4.3 Cross Roads Improvement and Railroad Crossing Correction Project	SRT	120	40	40	40
	2.5 Management roadside accidents systematically.	2.5.1 Study Project for Roadside Hazard Management	DOH	138	46	46	46
			DRR	102	34	34	34
		2.5.2 Development of Truck and Heavy Vehicle Rest Areas on Main Road Project	DOH	2,118	706	706	706

Table 6.2-1 Summary of Action Plan for Road Accident Reduction under the Ministry of Transport 2018-2020 (3 years) (Cont.)

Strategies	Plans	Projects	Agencies	Budget (million Baht)	Years (A.D.)		
					2018	2019	2020
Strategy 3 Safer Vehicles	3.1 Develop safety standards for new vehicles before entering road system.	3.1.1 Development of Safety Standards for New Vehicle Project	DLT	40	20	10	10
	3.2 Audit and screen existing vehicles in the system to ensure ability to function in compliance with safety standards.	3.2.1 Existing Vehicle Audit and Screening Project	DLT	40	20	10	10
	3.3 Enhance proper use of vehicles and safety devices.	3.3.1 Strong Law Enforcement on using incorrect truck type Project	DLT	15	5	5	5
		3.3.2 Development of Laws and Rules about Excessive Passenger Transport Project	DLT	25	10	10	5
		3.3.3 Development of Laws and Rules about Overload Transport Project	DLT	40	20	10	10
		3.3.4 Promotion of Suitable Usage of Vehicles and Safety Devices Project	DLT	12	4	4	4
		3.3.5 GPS Installation on Public Transport Vehicles Project	DLT	29	15	7	7
	3.4 Develop quality and safety license granting system for passenger and goods transport operators.	3.4.1 Development of License Granting System for Passenger and Goods Transport Operation Project	DLT	40	20	10	10
3.5 Encourage all vehicles to be under supervisory system.	3.5.1 Promotion of Supervision for All Vehicles Project	DLT	11	5	3	3	
Strategy 4 Safer Road Users	4.1 Develop driving license testing standards.	4.1.1 Driving License Test Development Project	DLT	37	20	15	2
		4.1.2 Granting Driving Licenses for VRUs Project	DLT	27	15	10	2
		4.1.3 Supervision of Lifetime Driving License Holders Project	DLT	10.5	10	0.25	0.25
		4.1.4 Project for Development of Law Offenses Database in collaboration with the National Police Bureau	DLT	22	10	10	2
	4.2 Enhance providing education to drivers, riders, passengers, and other road users.	4.2.1 Driving Lessons Formulation and Learning through Social Media Project	DLT	20.25	10	10	0.25
		4.2.2 Promotion of Rest Aras with Safety Standards Project	DLT	14	10	2	2
		4.2.3 Driving School Standard Audit Project	DLT	30	10	10	10
	4.3 Enforce laws to control risk behaviors systematically.	4.3.1 Enhancement of Serious Law Enforcement Project	DLT.	30	10	10	10
		4.3.2 Promotion and Integration of Systematic Checkpoints Installation in Collaboration with the Police and Communities Project	DLT	30	10	10	10
		4.3.3 Truck Drivers’ Roles and Behaviors Monitoring Project	DLT	40	20	10	10
	4.4 Promote safer drivers of public passenger and goods transport.	4.4.1 Safety Promotion for Drivers of Public Passengers and Goods Transport Project	DLT	15	5	5	5
	Strategy 5 Post-crash Response	5.1 Develop access to accident scenes for Emergency Medical System.	5.1.1 Traffic Incident Management Project	DOH	84	28	28
DRR				36	12	12	12
Total Budget				14,724.75	5,108.00	4,860.25	4,756.50

7 Accident Data and In-depth Accident Data Management

7.1 Definitions about road accidents.

Road accident

Road Safety Directorate has given the definition of "Road accident" as a road accident that occurs between 00.01 - 24.00 each day only in the case of death and/or with any injured people who have been admitted to hospital and it is the accident caused by the use of the following vehicles for traffic or transportation: private cars, taxis, motorcycles, motorized tricycles, pickup trucks, vans, regular and non-regular route buses, all types of trucks, two-wheeled bicycles, Agricultural machinery, any machinery disguised from agricultural engines, Skylab cars. "Road accident" also refers to the accident caused by the train colliding with private cars as well as other types of cars.

Accident information

Accident information is used to report facts about accidents. How accurate the facts are depends on the reporters or the data recorders. Accident information is a valuable asset for the entire system of road safety procedures. In order for the accident reporters or recorders to record accident data correctly, the recorders need to understand the meaning of each part of information, the purpose of collection, and the benefit to the public. (Road Safety Directorate)

Death

The Ministry of Public Health defines "Death" as the death from a road accident from the time of accident to 30 days after the accident. It also refers to the death at the scene, during hospital delivery, at the emergency room, admitted cases that die within 24 hours at the patient's building and die in the patient's building after 24 hours up to 30 days after the accident, and the case of requesting to go back and die at home. All age groups are counted.

The Department of Disaster Prevention and Mitigation has defined "Death" as the death from a road accident at the scene of the accident and death in the hospital from 00.01-24.00 every day.

Injury

According to Road Safety Directorate, "injury" is defined as a person injured from a road accident and a person injured and admitted in a hospital

In-depth Crash Investigation

Cautiously checking and paying attention to every detail of all contributing factors that will reinforce the accident will provide a good description of the sequence of events that are based on good basis and true facts. (River, 1995)

Road Safety Audit

This official road safety audit by a qualified independent auditor reviews the project or the existing road, the project under construction, or even those in the process of design. The investigators will report the potential for accidents and the safety in the use of the project and the road. (Pichai Thaniananont, Peerapan Tanaboom and Lamduan Srikodda, 2005).

7.2 Information related to road accidents

Basic information about road accidents can be divided into 4 main groups

1) General accident information

General accident information focuses on providing users with insight into the place and time of the accident, the cause and reason of the accident, and the process of accident. This group of data is considered as the main data in accident records.

2) Accident information about roads and surroundings

Accident information about roads and surroundings is important for identifying the factors that contribute to the accident and the severity of the accident. Sometimes, despite a degree of expertise of the driver and a car which is in good condition, driving through dangerous roads or risk areas and surrounding can lead to accidents and losses. Therefore, gathering accident information about roads and surroundings is vital in order that the root causes of the problem are addressed with appropriate solutions.

3) Accident information about the victim

Accident information about the victim, especially the severity or danger of accidents, is needed for setting the criteria of sequencing the importance of each accident. In addition, the risky behavior of the victims directly affecting the accident or the severity of the accident needs to be understood as this will lead to the prevention and correction of such risk behaviors.

4) Accident information about the vehicles

Accident information about the vehicles is used to segment vehicles at risk for each type of accidents. It is imperative that measures to prevent accidents and violence be taken to suit different types of car users who are at risk for different accidents.

7.3 Accident & In-depth Crash Database

The database above should be integrated in order to achieve data integration. However, there are still many obstacles in data integration between agencies. This study, therefore, presents the concept of integrating road accident data in Thailand as shown in Figure 3-1; the host unit should possess a computer system that can link the accident database with both the basic accident information (from existing agencies) and in-depth crash information from the accident investigation unit (this can either be a brand new agency or the existing agency). The information can be sent via the website or smartphone.

To achieve the above framework, this study presents the prototype of road accident database management, as shown in Figure 7.3-2, consisting of two main parts: importing and reporting data. The data is divided into 3 parts:

- 1) National road safety data;
- 2) Provincial road safety data and
- 3) Accident data. (Basic information and In-depth information)

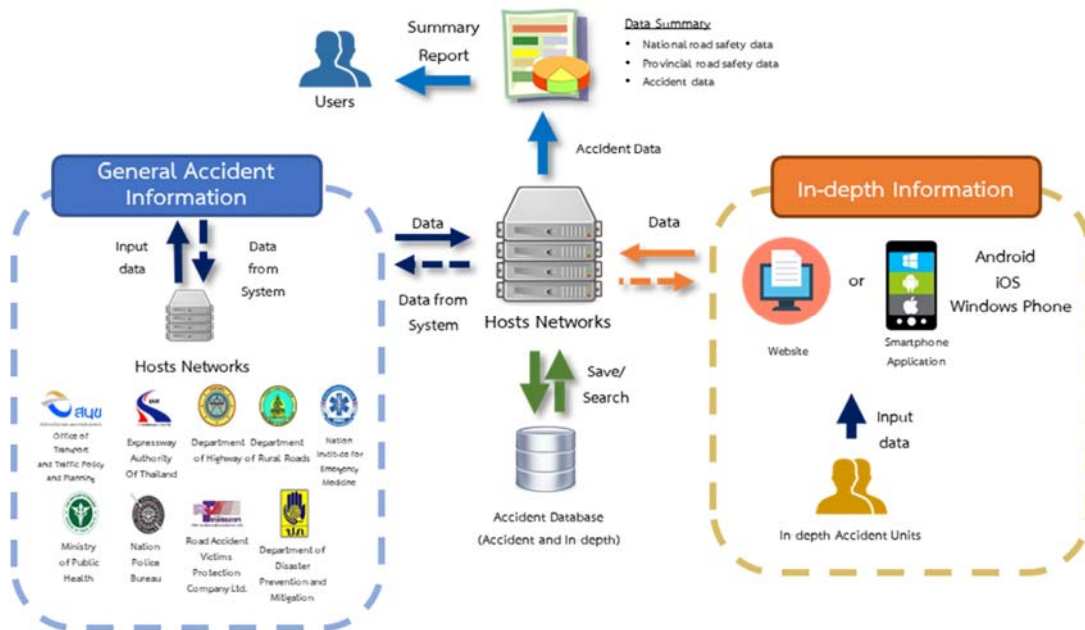


Figure 7.3-1 Conceptual framework for integrating road accident data in Thailand

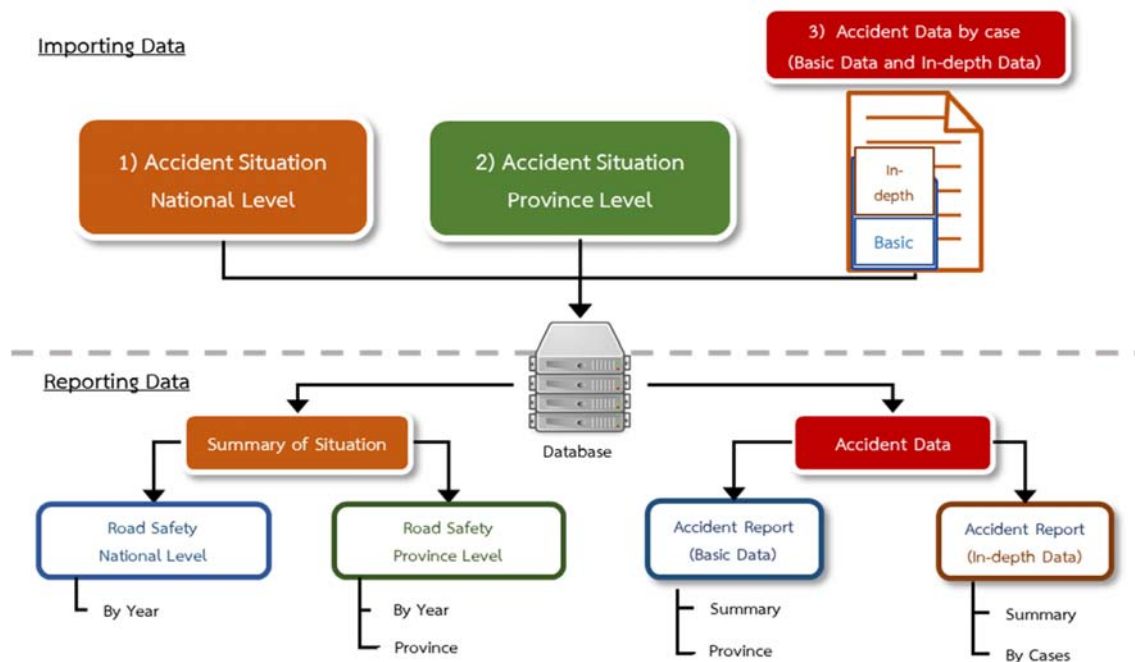


Figure 7.3-2 Framework of road accident database management

7.4 Use of Road Accident Database in Thailand

The Thai Road Accident Database has been developed based on the concepts presented in the previous section. This database can be used through the website <https://www.safetyotp.com>

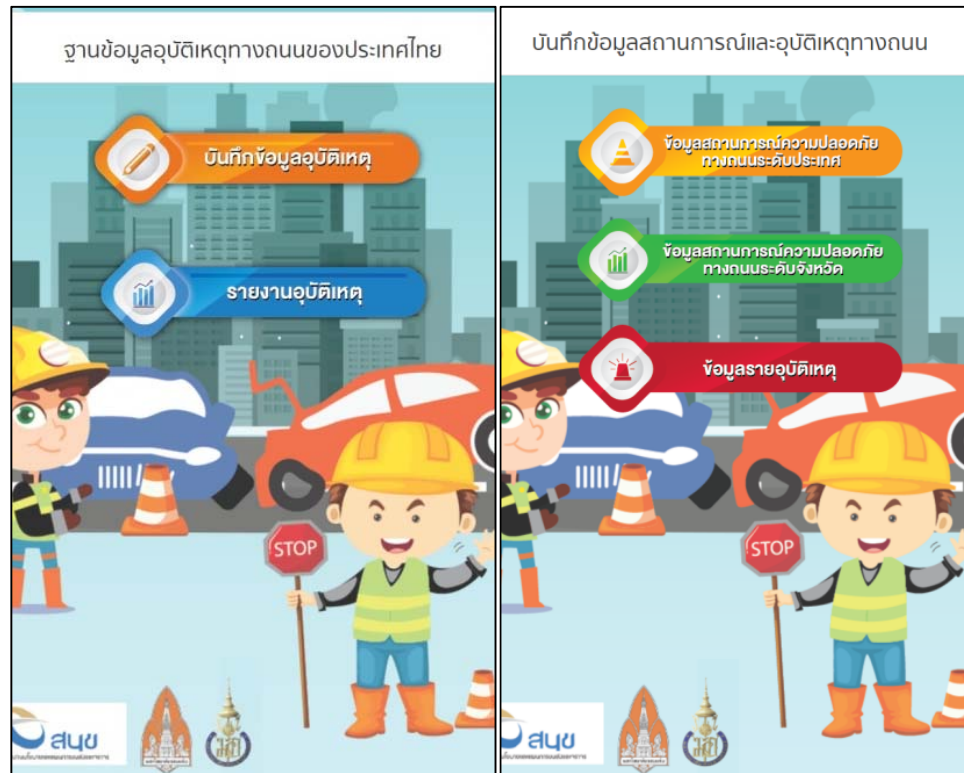
The main screen is shown in Figure 7.4-1A. which consists of 2 parts:

- 1) Accident record
- 2) Accident report

When entering the accident record screen (Figure 7.4-1B), you will find three subsections for the record:

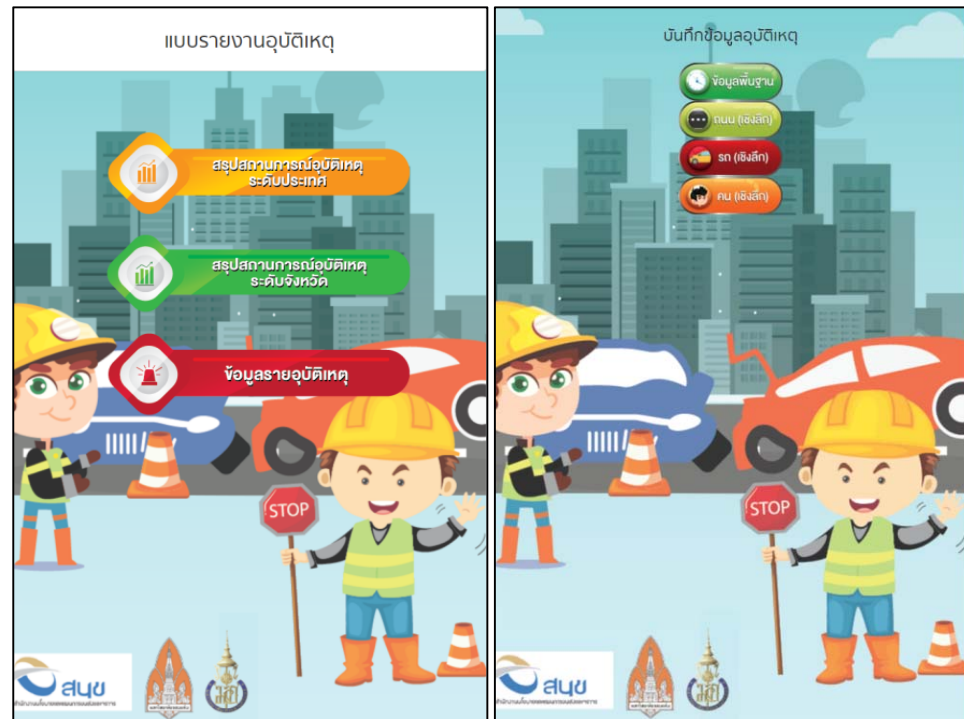
- 1) National road safety information
- 2) Road safety situation
- 3) Accident information

When entering the Accident report, you will find general accident record include road data, vehicles data, and victims data (Figure 7.4-1 D), Manuals of Road Accident Database in Thailand include in the Manuals of Accident Data and In-depth Accident Data Management.



A) The main screen

B) The recording screen



C) The viewing screen D) The recording accident

Figure 7.4-1 The screen of Road Traffic Accident Database of Thailand

8 The Manual for Monitoring and Evaluation of Performance according to the Master Plan and the Action Plan for Road Accident Reduction under the Ministry of Transport

The monitoring and evaluation of performance according to the master plan and the action plan for road accident reduction are a complex process when put in practice. This is mainly because it concerns multiple parties, and the process itself is imperative for assessing the effectiveness of efficiency of transport safety work as a whole. The aim of this manual is to provide a tool for relevant organizations to work on following up and evaluating their projects related to road accident reduction, both within and outside of the Ministry of Transport.

8.1 Definitions and information concerning monitoring and evaluation as referred to in the Master Plan and the Action Plan on Road Accident Reduction under the Ministry of Transport

Monitoring

Monitoring refers to a process in which an assessment of progress in performance is conducted under the Ministry of Transport according to the master plan and the action plan on road accident reduction. This process covers the periods of time before, during and after project operation. The aims of the process are to assess whether the project is operating as planned, as well as to report any problems that may occur during the project.

Evaluation

Evaluation means a process in which value, cost-effectiveness, practicality and success of the master and action plans on road accident reduction under the Ministry of Transport are assessed. The assessment consists of the following questions. Is the actual practice in accordance with the plans? Does the actual practice follow the goals, objectives or indicators stated in the plans?

Monitoring and Evaluation

Monitoring and evaluation means the process of measuring and following up with the performance of the projects from the master and action plans on road accident reduction under the Ministry of Transport. This process covers the periods of time before, during and after the project operation, and is conducted with the aim of assessing whether the projects are conducted in accordance with the goals, objectives and indicators stated in the plans.

The Transport Safety Board (TSB)

The Transport Safety Board is a central organization in the Ministry of Transport that oversees transport safety. Its primary roles are 1) proposing policies and strategic plans, 2) establishing safety standards, 3) collecting data, in-depth analyses of accidents, and research and development, 4) improving high-risk areas. The board has the authority to manage and control internal organizations within the Ministry of Transport, and co-ordinate with and provide supervision to external organizations, both domestic and international.

8.2 The Monitoring and Evaluation Process

The monitoring and evaluating process can be divided into two important parts as follows: the monitoring of policy enforcement and the evaluation of enforcement outcomes. As regards the outcomes, the evaluation was conducted at the level of the intermediary outcomes (the implemented measures) and the level of the final outcomes (the goal of the project). The framework for monitoring and evaluation can be divided into three significant areas, including 1) goal setting for transport safety at a policy level, 2) evaluation of the project results, 3) follow-up and control. The framework is illustrated in Figure 8.2-1 (Thailand Development Research Institute, 2015).

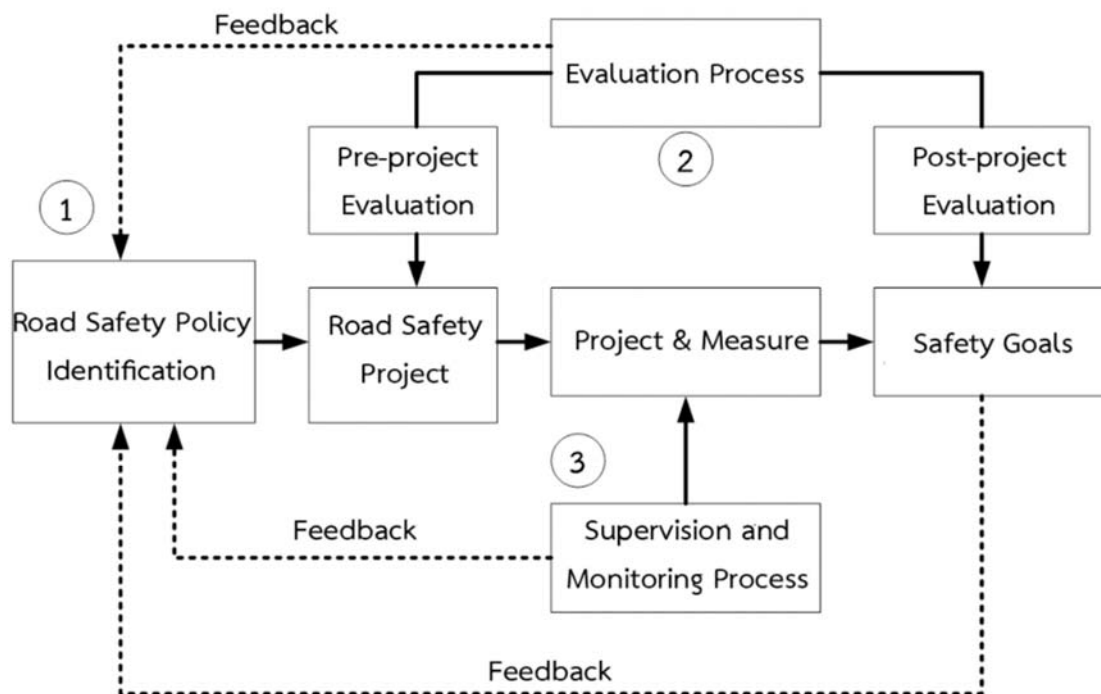


Figure 8.2-1 The framework for monitoring and evaluation of projects and measures concerning transport safety.

Source: Thailand Development Research Institute, 2015

The evaluation of the projects and safety measures is a process to gauge the value, cost-effectiveness, practicality and success of the master and action plans on road accident reduction under the Ministry of Transport. The aim is to assess whether the plans have been put into practice, and whether the practice is following the set goals, objectives or indicators. The work mechanism operates at two levels: firstly, a follow up every three months to assess the performance of each related organization and secondly, an assessment of the project outcomes at the end of the project. TSB will employ a questionnaire to evaluate the performance of operational and administrative staff for each project. Then the data will be collected and analyzed in accordance to its goal and measures.

8.3 The steps in monitoring and evaluating performance

The monitoring and evaluation of performance according to the master plan and the action plan on road accident reduction are a complex process when put in practice. This is mainly because it concerns multiple parties. Therefore, it is important that a system that aids decision making should be created. The details are shown in Figure 8.3-1.

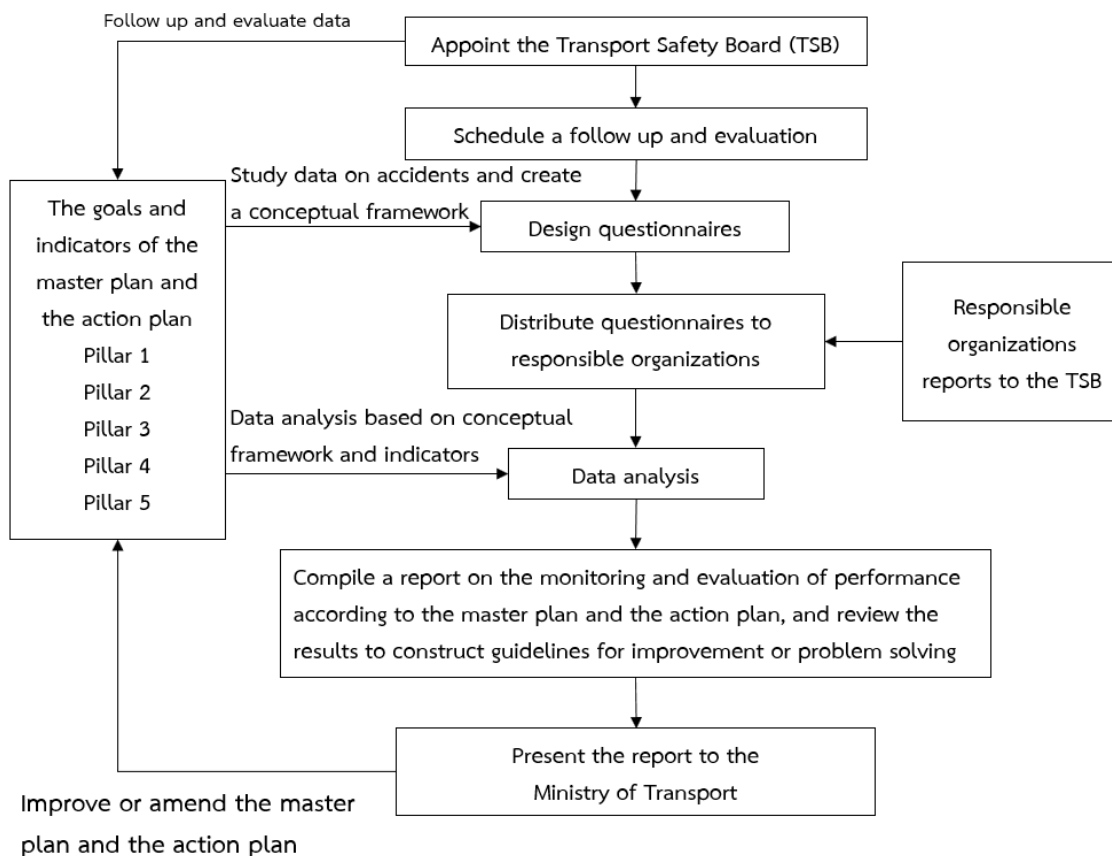


Figure 8.3-1 Monitoring and evaluation of performance

Source: Advisor (2017)

8.4 Guidelines for monitoring and evaluation

The guidelines should contain important information, including the goals for transport safety to be used as indicators for project assessment and a procedure to follow up and assess transport safety. The goals for transport safety are crucial for indicating the effectiveness of the measures and the project. They can also be used as guidelines for regulating the monitoring and evaluating processes. Therefore, the goals for transport safety can be divided into two parts: the project's final goal and the goal for each measure. These goals can also be categorized based on the five pillars of the strategic plan, each of which requires a different monitoring and assessment process depending on the work of each organization in each project. These different types of work and projects are 1) a study project which will be conducted when that kind of project does not have a precedent, 2) a regular project, for which a preliminary study and plan have been put in place, and 3) the monitoring and evaluation of the project, which will be done when the project has passed preliminarily studies and been put into practice, but not yet properly or regularly assessed.