

## EFFECTIVENESS OF SPEED ENFORCEMENT IN THAILAND: CURRENT ISSUES, NEED FOR CHANGES AND NEW APPROACHES

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### ABSTRACT

*Thailand has experienced a rapid growth in motorization. Consequently, speeding that prevails on highways and on roads in built-up areas has been found to be a key contributory factor to road traffic crashes. Although speed enforcement has been included as an integral part of the speed management policy, its effectiveness has been limited for a number of reasons. This paper identifies some gaps in knowledge concerning the speeding problem and the current practice of enforcement. Issues that need to be addressed for more effective speed enforcement as well as the potential alternative speed management strategies are discussed.*

**Keywords:** speed enforcement, road accidents in Thailand

### INTRODUCTION

One of the great benefits of modern road transport is the reduction of journey times by motorized vehicles. However, the level of speed that make possible these improvement in journey times have adverse effects in terms of energy consumption, environmental costs, and the occurrence of road crashes and consequent deaths and injuries (Allsop, 1998). The road crashes due to speeding imply the need to control vehicle speeds for improving road safety, despite encountering an enhanced capability of modern cars to go faster and an increasing demand to build roads with a higher standard of speed. As such, it is the management of speed that has become one of the challenges for policymakers and road safety professionals around the world.

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Thailand has experienced rapid growth in motorization with the development of modern road infrastructure over the past decades. Consequently, speeding that prevails on rural highways and on roads in built-up areas has become a key contributory factor to road traffic crashes. Traffic law enforcement has been included as an integral part of the country's speed management policy. Since the Land Transport and Highways Acts were enacted, and the speed limit regulation was introduced in 1979, the Highway Police Department has the responsibility to enforce speed limits on national highways located outside cities. Physical policing has been the most common method used for speed enforcement on highways, though it is not undertaken on a regular basis. Speed offenders on the highways are detected by means of radar guns and they are immediately stopped by the highway police. For streets and highways in cities and metropolitan areas where regular police officers have been given the authority, it is sadly true that enforcement of speed limits has not been in practice, due partly to lack of speed enforcement equipment and training.

Apart from enforcement, speed management initiative also involves public education campaign which has been undertaken by various stakeholders. Information on the danger of speeding has been communicated to the public through media releases, featured articles, on-street boards and posters, government publications and websites. Yet, such publicity measures are neither carried out in a regular and coherent manner nor expressly designed from a perspective of supporting speed enforcement activities. The engineering approach taken as part of speed management measures on streets and highways mainly involves installing rumble strips to alert drivers that they are about to enter potentially high crash-risk areas. As the design and installation of such strips are not standardized, the question whether these strips contributed to any appreciable reduction in vehicle speeds still remains to be unanswered.

It seems that to some extent Thailand's speed management policy has to rely heavily on speed limit enforcement. Enforcing the speed limit influences speeding behaviour through its deterrent effects on the public at large and on the speed violators who actually get apprehended. While the effectiveness of speed enforcement in Thailand has rarely been examined, it is bound to be controversial for a number of reasons, including the existence of a large number of speeding-related accidents, the high prevalence of speeding behaviour, limited understanding of speed regulations and the negative public attitude towards the existing speed enforcement programme. Drawing upon evidence from relevant data and findings revealed by previous research, this paper attempts to identify some gaps between existing speeding problems and the current practice of speed enforcement in Thailand, which in turn offers important lessons that could be relevant for other developing countries with similar problems and institutional arrangements.

In the next section, the extent and nature of the problem of speeding in road traffic crashes are discussed. This is followed by a review of survey evidence on the frequency of speed limit violations, which could serve as an indication of the need for more effective speed enforcement. In section III, some obstacles to the effectiveness of the current practice of speed enforcement have been identified that needs to be taken into account for better speed compliance. Finally, the potential of alternative speed management strategies for Thailand is briefly discussed.

## **I. SPEEDING INVOLVEMENT IN ROAD TRAFFIC CRASHES**

Data from the accident databases maintained by the Royal Thai Police and the Department of Highways (DOH) are primary sources of information that have been used to understand both the extent and nature of the speeding-related accidents in Thailand. The police data generally provide a summary of the number of vehicles involved, the number and gender of victims, estimated costs of property damages and probable causes of traffic accidents on all types of roads for the whole country by province. The data are gathered from police stations throughout the country and are available only in aggregate form. The highway accident database, despite being limited to reporting statistics for traffic accidents on highways under the responsibility of the DOH, is a partially computerized system and provides richer information. The data maintained by DOH are collected for each accident case, containing information on traffic crash events such as the location and probable cause of accident, type of accident, type and severity of injuries, date and time of occurrence, the number of vehicles involved, weather condition, etc. Nevertheless, it is important to note that the information on the cause of accidents in the DOH database does rely heavily on the police accident reports, where the identification of probable cause of crash events by police officers is questionable due to lack of training and standardized practice (Suriyawongpaisal and Kanchanasut, 2003), and considers mostly human factors (Tanaboriboon, 2004).

According to the police data for the period 2001-2007, speeding contributed to 15-23 per cent of all police-reported accidents on all types of roads (see table 1). When examining data for traffic accidents on national highways, which constitute about one fourth of the total road network, a different picture emerges. For the years 2001-2007, speeding involvement has been reported to be as high as nearly 80 per cent of all traffic crashes on national highways. This comes as no surprise as driving at high speed is more common on highways, compared to local roads and urban streets. In addition, the proportion of highway accidents due to speeding has risen in the recent years.

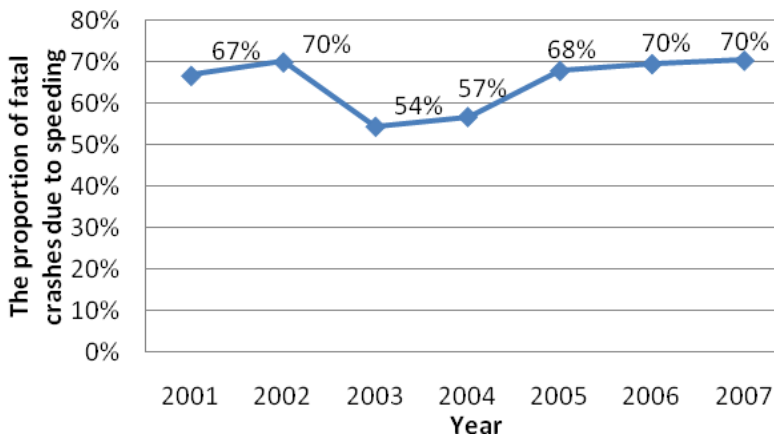
**Table 1. Speeding-related crashes in Thailand, 2001-2007**

Year	All types of roads		National highways	
	Total accidents	Speeding-related accidents (percentage)	Total accidents	Speeding-related accidents (percentage)
2001	77 616	17 156 (22)	15 341	12 060 (79)
2002	91 623	20 896 (23)	15 066	11 832 (79)
2003	107 565	21 259 (20)	15 171	11 683 (77)
2004	124 530	21 332 (17)	18 547	13 035 (70)
2005	122 040	18 349 (15)	16 287	11 910 (73)
2006	110 686	19 036 (17)	12 918	9 754 (76)
2007	101 752	17 278 (17)	13 655	10 581 (77)
2001-2007	735 812	135 306 (18)	106 985	80 855 (76)

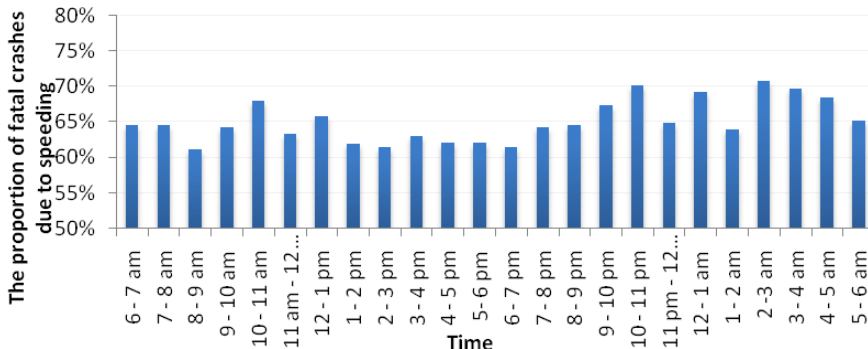
*Source:* For all types of roads, Royal Thai Police; for national highways, Department of Highways.

Speeding is also the leading cause of fatal crashes on highways. The data from the highway accident database indicate that speeding has predominantly contributed to road traffic deaths. As can be seen in figure 1, about two thirds of fatal crashes on national highways between 2001 and 2007 were related to speeding. In fact, Thailand had experienced an increase in the proportion of speeding-related crashes on highways since 2003. Moreover, it was found that speeding as a factor in highway fatalities was more pronounced for late-night crashes than day-time crashes (see figure 2).

**Figure 1. Speeding as a factor in fatal accidents on national highways, 2001-2007**



**Figure 2. Speeding as a factor in fatal accidents on national highways by time of day, 2001-2007**



**II. SPEED LIMIT VIOLATIONS**

The accident statistics discussed above highlight the seriousness of the speeding problem, which is the principal contributing factor to road traffic crashes and fatalities in Thailand. Despite the potential limitations in identifying the probable causes of accidents by police officers, the magnitude of crash and fatality risks associated with speeding could also be practically reflected by the simple fact that speed limits are violated very often in Thailand.

According to the Land Transport and Highways Acts of 1979, the speed limit for small and medium-sized vehicles (such as car, van, pickup and motorcycle) was set at 80 kph in cities or towns, and 90 kph on highways

outside of the cities or towns. For heavy vehicles such as large trucks and buses, the speed limit was set at 60 kph in cities or towns and 80 kph on highways in non-built up or rural areas. On motorways and expressways with full access control, the speed limit was set at 120 kph for passenger cars and pickup trucks, 100 kph for buses and ordinary trucks, and 80 kph for trailers. The maximum fine for speeding offences is currently set at 1,000 baht (approximately \$30). The actual fines imposed range from 200 to 500 baht (\$6 to \$15), depending on the level by which the speed limit is exceeded and, perhaps, the discretion of police officers.

Although previous studies have shown some deterrent effects of speed enforcement at particular locations with the presence of police (Kulleab et al., 2006; Ponboon et al., 2009), the general deterrence of speeding on the public appears to have been minimal. Speeding has remained very common. Information on the speed limit violations have been obtained from on-site observations of vehicle speeds and automatic traffic counters. In 1995, a collaborative research team involving five universities in Thailand carried out traffic speed surveys in Bangkok and seven other major provinces in the country. It was found that the proportion of vehicles exceeding the speed limit ranged from 37 per cent to 54 per cent (Chongsuvivatwong et al., 1999). However, the results from some recent surveys, though not possibly comparable to the 1995 survey, reveal no significant improvement in the speed limit compliance rate. Table 2 presents a summary of observed speed limit violations on major arterial highways outside of cities, which are gathered from several survey studies. Typically, 40 per cent to 70 per cent of the car drivers exceeded the speed limit of 90 kph, while similar results were found for truck and bus drivers who were not allowed to exceed 80 kph. The speed limit violations among motorcycles were generally much lower. But it can be seen that the percentage of motorcycle riders not complying with the speed limit of 90 kph could be as high as 20 per cent and over in some locations.

**Table 2. Violation of speed limits on major arterial highways outside the cities**

Authors	Province	Route/site characteristics	Time of day	Exceeding the speed limit (percentage)		
				Car	Truck /bus	Motor-cycle
Siwarochana et al. (2004) <sup>a</sup>	Songkla	n/a	7 am - 9 am	56	-	20
	Phuket	n/a	1 pm - 3 pm	51	-	8
	Phetchaboon	n/a	5 pm - 7pm	31	-	3
	Pichit	n/a		69	-	20
	Nakhon Sawan	n/a		24	-	1
	Lampang	n/a		50	-	2
	Chiang Mai	n/a		49	-	10
	Khon Kaen	n/a		43	-	9
	Nakhonratchasima	n/a		28	-	13
	Chachoengsao	n/a		13	-	3
	Chonburi	n/a		15	-	2
	Pathumthani	n/a		41	-	8
Kullueb et al. (2006) <sup>b</sup>	Khon Kaen	Highway No. 2/ 4-6 lane divided	6 am - 5 pm	71	55	35
Thailand Accident Research Center (2008a) <sup>a</sup>	Ayutthaya	Highway No. 1/ 6 lane divided with frontage roads	9 am - 2 pm	65	48	-
			8 pm - 11pm	61	63	-
Department of Highways (2009) <sup>c</sup>	Prachuap Khiri Khan	Highway No. 4/ 6 lane divided	7 am - 9 am	47	27	4
			9 am - 4 pm	54	39	5
			4 pm - 7 pm	48	31	4
			7 pm - 7 am	49	44	6

Notes: The superscripts denote the data collection method used for spot speed surveys: <sup>a</sup> stopwatch; <sup>b</sup> hand-held radar gun; <sup>c</sup> pneumatic road tube.

The high prevalence of speed limit offences has also been observed in urban areas. Table 3 presents the results from roadside observation of vehicle speeds in Bangkok and 16 other urban cities throughout the country. This observational survey was carried out by Thailand Accident Research Center (2008b) in collaboration with other five universities. Speeds of vehicles were sampled during off-peak periods at 120 monitoring stations on a variety of road types and roadway characteristics, excluding motorways and expressways. It was found that, depending on the road environment, 6-37 per cent of cars and other small/medium-sized vehicles exceeded the urban speed limit of 80 kph. The percentage exceeding the limit tends to increase with the number of traffic lanes and the presence of a road median.

On several divided highways with six or more traffic lanes, more than 60 per cent of the drivers were travelling faster than the speed limit. The results for heavy vehicles and motorcycles exhibited similar trends.

**Table 3. Distribution of vehicles exceeding the speed limit in urban areas (percentage)**

Type of vehicles	Percentage exceeding the limit	2-lane roads (17 stations)	4-lane undivided roads (27 stations)	4-lane divided roads (18 stations)	6-lane divided roads (40 stations)	8-lane divided roads (18 stations)
Car/van/pickup (80 kph limit)	None	5	7	2	2	0
	under 20 per cent	9	17	10	21	9
	20 per cent - 39 per cent	2	2	4	8	2
	40 per cent - 59 per cent	1	0	1	2	2
	60 per cent - 79 per cent	0	1	1	3	3
	80 per cent or over	0	0	0	4	2
Bus/Truck (60 kph limit)	None	5	12	3	1	0
	under 20 per cent	5	7	5	14	5
	20 per cent - 39 per cent	2	4	6	11	4
	40 per cent - 59 per cent	3	2	1	7	1
	60 per cent - 79 per cent	2	0	1	6	4
	80 per cent or over	0	0	2	1	3
Motorcycle (80 kph limit)	None	5	8	5	4	0
	under 20 per cent	12	18	11	30	13
	20 per cent - 39 per cent	0	1	2	4	1
	40 per cent - 59 per cent	0	0	0	2	4
	60 per cent - 79 per cent	0	0	0	0	0
	80 per cent or over	0	0	0	0	0



Type of vehicles	2-lane roads (17 stations)	4-lane undivided roads (27 stations)	4-lane divided roads (18 stations)	6-lane divided roads (40 stations)	8-lane divided roads (18 stations)
<i>Average percentage of vehicles exceeding the speed limit</i>					
Car/van/pickup	11	6	16	27	37
Bus/truck	22	12	30	33	44
Motorcycle	2	3	6	10	17

Source: Thailand Accident Research Center (2008b).

### III. OBSTACLES TO THE EFFECTIVENESS OF CURRENT SPEED ENFORCEMENT

#### Limited understanding of speed regulation

The Thailand Accident Research Center conducted a focused group survey in 2008 on 407 people in Bangkok, Chiang Mai and Phuket. Seventy-eight per cent of the survey participants considered speeding as a risky and undesirable behaviour. In order to prevent road accidents, an overwhelming majority of them (93 per cent) agreed the need of speed enforcement as a legal measure. However, it is also essential for motorists to correctly understand the speed limits required by law and how the speed limit is enforced. The survey also revealed an important fact that many people did not know the speed limit. From the survey it was found that only 32 per cent of participants correctly stated the speed limit enforced, whereas the others either did not know or incorrectly perceived the speed limit. About 57 per cent of them were, however, aware of the legal punishment for exceeding the limit.

Insufficient communication about the speed limit to motorists could be an important source of such confusion. In many countries, speed limit signs are provided along the roads to inform drivers of how fast they are allowed to travel on that particular road section. The police normally set the enforced speed limit for a road section in accordance with the posted speed limit. In Thailand, the issues of inadequate speed limit signs and inconsistency in their installation have been discussed for many years. The recent survey of speed offenders' awareness of speed law regulation was initially undertaken in 2008 by TARC (2008a); it has been followed by another study by Sontikul (2009), with a greater sample size. In the survey by Sontikul, 607 drivers of passenger cars, vans, and pickup trucks, who were stopped and penalized by the police for exceeding the speed limit on national

highways, were questioned about their perception and attitude towards the current practices of enforcing speed limits. The results show that 77 per cent of speed offenders paid little attention to or did not observe the posted speed limit signs along the highways. Of particular importance was that many of them were also unaware of the legal speed limit. Only 11 per cent were aware that the speed limit was 90 kph, whereas 53 per cent did not know and the rest believed that it was higher or lower. These findings must be interpreted cautiously, however, as some of those surveyed may have been accused of speeding and therefore may have a biased opinion. This study also interviewed 617 general drivers at a superstore and gas stations located in the same study area and found that the percentage of those who knew the speed limit correctly was just 18 per cent.

## **B. Public attitude towards the current speed limit**

Successful speed enforcement requires wide support from the public. An issue that often evokes considerable debate in Thailand is the acceptability of the current speed limits: whether or not they are credible and logical in view of the improved road and the road environment.

According to survey results of speed violators by Sontikul (2009), 85 per cent were against the speed limit of 90 kph on rural highways. Among those opposed to the current speed limit, 52 per cent thought that the current speed limit was too low with no particular reason given, whereas another 17 per cent were of the opinion that they should have been allowed to travel at higher speeds on multilane arterial highways. Some others stated that the current speed limit could lead to sleepiness or congestion, and that it was not suitable for modern vehicles. Another attitude survey targeting general drivers by Yaktawong and Kanitpong (2009) also sheds some light on this issue. A total of 1,364 drivers in Bangkok and other six provinces in central and north-eastern regions were asked about their motivations for speeding on highways. While it was not surprising that 64 per cent tended to do so when in a hurry, almost half of the drivers interviewed (45 per cent) considered the current speed limit was set too low. The results of these surveys clearly demonstrate that there is a clear misconception in public mind concerning the necessity of speed limit and other levels.

## **C. Public attitude towards the current methods of speed enforcement**

The survey by Yaktawong and Kanitpong (2009) also considered drivers' acceptability of the current and potential future methods for controlling and enforcing speeds. For highways outside cities, twelve different speed management strategies were considered covering four categories. The first category was speed information campaign related to installation of

speed warning and speed limit signs. The second category included engineering measures that consisted of roundabout and rumble strips. Smart vehicle design was the next category with three levels of intelligent speed adaptation (ISA) installed in vehicles. The last category was speed enforcement campaign in five strategies: automatic speed camera enforcement, speed detection by radar gun, stationary police vehicle, police checkpoint to slow down traffic, and increased punishment. It may be noted that only the use of radar gun for speed detection and police checkpoint are currently practiced. Findings from this opinion survey are presented in table 4.

The overall results suggest that the speed enforcement strategies were not strongly supported by drivers as one would have expected. The percentages of drivers who were against the speed enforcement campaign were higher, compared to information and engineering measures which were not associated with legal punishment. Focusing on the current practice of speed enforcement, it was found that speed detection by radar gun did not receive much support from those who drive with average maximum speed higher than 90 kph (33 per cent disagreement). The opinion was more unfavourable in case of police checkpoints. Motorists who often drive over the limit tended to be more strongly against the idea of blocking roadways to slow down the traffic. This also raises another concern about speed and safety. To some extent, it could increase the prevalence of speeding after passing the checkpoint as some drivers may want to compensate their lost time.

**Table 4. Public attitude to methods for managing speeds on highways outside of cities**

No.	Speed management strategies	Percentage of disagreement		
		Drivers with average maximum speed > 90 kph (696 samples)	Drivers with average maximum speed ≤ 90 kph (668 samples)	Total (1,364 samples)
	<u>Information</u>			
1	Speed warning signs	6.9	4.2	5.5
2	Speed limit signs	22.2	15.5	18.8
	<u>Engineering</u>			
3	Roundabout	28.6	23.4	26.0
4	Rumble strips	2.5	2.3	2.4
	<u>Smart vehicle design</u>			
5	ISA: Advisory level	19.2	15.9	17.5
6	ISA: Mandatory level	42.1	42.1	42.1
7	ISA: Voluntary level	36.8	35.8	36.3
	<u>Enforcement</u>			
8	Automatic speed camera	30.2	17.0	23.5
9	Radar gun	32.8	21.0	26.8
10	Stationary police vehicle	45.2	30.6	37.8
11	Police checkpoint	43.3	24.4	33.7
12	Increase punishment	45.1	27.7	36.2

*Abbreviation:* ISA = intelligent speed adaptation.

#### IV. ALTERNATIVE APPROACHES FOR SPEED MANAGEMENT

The previous sections gave an account of the current situation concerning speed management in Thailand, which is characterized by insufficient and sporadic implementation of selected proven interventions. Consequently, speed management did not contribute much to curbing speed-related injuries or changing speeding behaviours and unfavourable attitudes towards speed enforcement. The current situation has prevailed due to a highly centralized bureaucratic system of management, policy manipulation by vested interest groups and limited country-wide participation by the population. Given this background, it is very difficult to translate widely

available knowledge and to use technologies for speed management through sensible policy formulation and actions.

In this section, the discussion will focus on ways forward in bridging the gap between knowledge and actions. Three major approaches will be explored: from the supply side, the demand side, and top-down vs. bottom-up.

## **A. Supply-side approach**

A supply-side approach means dealing with a handful of players, such as road authorities, the vehicle industry and regulatory bodies. As a result, it usually requires less cost to get things done as compared to a demand-side approach, which means dealing with millions of drivers and the public.

Existing knowledge from road engineering perspectives provides a number of options for self-enforcing measures to control vehicle speeds in urban areas which include vertical speed control and horizontal speed control measures. Examples of vertical measures include speed humps, speed tables and raised crosswalks. Horizontal measures may include roundabouts, neighbourhood traffic circles, chicanes and other similar engineering interventions. Some of these physical speeding reduction measures are low cost interventions. Among them, evidence from a cost effectiveness analysis indicated that speed humps could cost \$2-5 per disability-adjusted life year (DALY) averted, which compares favourably to the costs per DALY averted in other situations, for example, costs of vitamin A and zinc supplementation, with or without measles vaccination, which are \$25 and \$19, respectively (Debas et al., 2006). In developed countries, the implementation of road engineering measures and speed management excluding speed enforcement has been estimated to save lives in terms of percentage of fatality reduction by 16 per cent to 28 per cent (Koornstra et al., 2002).

Even though these road engineering measures seem to be attractive in terms of cost and effectiveness, their implementation in developing country settings might not be straightforward. The appropriate design and installation of engineering measures require capacity-building for road authorities and awareness among policymakers. Capacity-building should include knowledge transfer and awareness-raising when relevant actions are expected. In this regard, evaluation research could play a key role in providing feedback in making policy decisions; planning, design and installation; and providing the necessary funding support.

For roads and highways in rural areas (major arterials, urban ring roads and motorways) or where high speeds are desired, it is essential to ensure that the road quality is of an appropriate standard and that protection

from roadside hazards is adequately provided. As surveys indicated that the majority of drivers did not know the speed limit, attention needs to be given to installing a sufficient number of speed limit signs as a supplementary measure to encourage motorists to voluntarily comply with speed limits.

Finally, a supply-side approach could involve the industry providing safer vehicles. Given the fact that the engine size and speeding capacity of motor vehicles are closely related, evidence has shown an association between engine size and injury severity (Yannis et al., 2005). Previous experience in Thailand suggested that it was possible to induce the voluntary contribution of the industry, for example, the provision of new models of motorcycles with headlights automatically on. This success story was based on an evidence-based participatory approach to involve the industry in the policy decision forum. In many cases, however, regulatory measures are also necessary to control the action of the private sector, such as banning alcohol advertisements (Suriyawongpaisal et al., 2007).

## **B. Demand-side approach**

As in many other countries, the demand-side approach in Thailand has been more popular than the supply-side approach in road safety promotion. Publicity campaigns and law enforcement are considered to be the essence of the demand-side approach. Both need to be implemented in a concerted way if maximum effect is to be achieved, as evidenced from reports in developed countries (Koornstra et al., 2002). However, this has not been the case in Thailand. A major obstacle is the competing priorities to mobilize the police force. As has been shown by the problem of drivers' speeding behaviour, the effectiveness of speed enforcement is subject to an active police presence.

So far, the top priority of the police department has been to deal with criminal cases. Even in their road traffic control function, the police have been engaged mainly in facilitating the flow of traffic. The application of labour-intensive technologies such as speed radar guns or mobile speed cameras would hardly fit the priority concerns of the police department. A trial of speed camera enforcement along several major arterial highways by the highway police in 2006 was unfortunately discontinued, due partly to the controversy regarding the allegation of speeding based on photographic evidence from speed cameras sent by post. This issue seems to have been resolved in the case of automatic red-light cameras that have been introduced recently in Bangkok by the police department. Although this is in keeping with the argument in support of automatic law enforcement technology, a long-term follow-up of the use of automatic red-light cameras is needed to shed light on the cost-effectiveness and sustainability of the technology. Besides, given the high upfront cost of this automatic technology, it raises a concern about return on investment. In the United States of

America, only two out of five local jurisdictions reported that revenues collected from photo enforcement programme (red-light camera and speed enforcement camera) exceeded the programme cost, according to a report by the Government Accountability Office (2003).

In parallel with making use of speed enforcement technology, police deployment at randomized locations is another way to enhance the effectiveness of speed enforcement with limited resources. The current practice of speed detection with police presence could have been applied at random times and randomly chosen locations, keeping motorists uncertain of speed enforcement zones. This could lead to increases in drivers' perceived risk of being caught as a result of speeding, which in turn improves voluntary compliance with speed limit. Evidence from Australia shows that implementations of the randomized scheduled enforcement resulted in an average 32 per cent reduction in fatal and injury crashes (Leggett, 1997).

Publicity campaigns need to be continued with greater concerted efforts, though these tasks have proved to be fairly difficult in making substantial impacts on behaviour. Communication strategies should be carefully developed for better public understanding about the necessity of speed limits. In order to change drivers' attitude and speeding behaviour, the design and contents of campaigns should not solely rely on mere imagination and inspiration. Limited researches have been conducted to gain insights of the speeding behaviour of Thai drivers. It is important to identify cognitive determinants of speeding behaviour in a more systematic and rigorous manner. The application of psychological theories, such as the theory of planned behaviour (TPB), has been successful in explaining drivers' speeding behaviour (e.g. Parker et al., 1992; Elliott et al., 2005; Warner and Åberg, 2006; Paris et al., 2007). An understanding of the mechanisms influencing drivers' decisions to speed could serve well as a knowledge base for the development of more effective interventions and campaigns to encourage speed limit compliance and the use of a speed that is appropriate under prevailing conditions.

Another interesting approach that has emerged is people's empowerment to voice their safety concern and take relevant actions. In Kenya, a simple evocative message posted inside a minibus could lead to passengers taking actions to counteract the risky driving behaviours of the drivers as confirmed by a randomized control trial (Habyarimana and Jack, 2009). This potential measure to empower the people has a comparative advantage over weak third party enforcement of the law. How the people's empowerment approach could be translated into speed management requires innovative practical interventions in conjunction with their careful evaluation in practice.

### **C. Top-down versus bottom-up approach in road safety planning and implementation**

The planning and implementation of both supply- and demand-side approaches require public support in order to secure resources and overcome resistance from vested interest groups. Experiences suggest that a programme implementation without adequate public support could end up in failure or not be able to sustain (Howat et al., 2001).

To the contrary, when the people are well informed and alert, implementation of road safety measures could be initiated and sustained. It is reported that there are very few villages left in India without a road hump when the road goes through a village (Traffic Safety Center, 2009). Similarly, the authors encountered a village in the north-east of Thailand where speed humps are all over the road passing through it. Interestingly, the reason for putting the humps was not for road safety improvement but to calm the traffic disturbing them during sleep hours. This anecdotal record highlights the need to understand people first through their lens before introducing any interventions that outsiders think suitable.

These stories imply the importance of combining the top-down and bottom up approaches in the planning and implementation of road safety programmes. There is nothing new about this, yet the practice based on this principle is regrettably rare. In order to promote the practice, some countries have put in place systematic mechanisms to encourage the involvement of the community and local authorities in promoting their voices and giving choices. For example, the Local Government Road Safety Program (LGRSP) in the state of New South Wales, Australia, was established in 1993 with the goal of increasing the involvement of local governments and local communities in road safety planning and activities to reduce the incidence and severity of road trauma (Orange City Council, 2009). To achieve the goal, relevant local government staff and community representatives were sitting on the Steering Committee to oversee the development of action plans.

If participatory processes or mechanisms are to be successful, barriers to participation should be identified and dealt with systematically. The barriers could be classified into two groups: personnel and planning issues as documented by Howat et al. (2001). The former includes reasons why people are often reluctant to become involved in projects in their communities, lack of leadership, and lack of skills in designing and organizing a participatory process. The latter includes inappropriate programme focus, absence of programme evaluation, lack of resources, and concern about sustainability. There are, however, established methodologies to overcome these barriers that need to be tested for the planning and implementation of safety improvement programmes.



## CONCLUSION

Despite the fact that the contribution of speeding to road traffic injuries is significant, public concern and actions pertinent to speed control have been unfavourable in Thailand. Perhaps the current top-down approach in planning and implementation of road safety programme by a highly centralized bureaucratic system and vested interest groups' manipulation in policy decisions have precluded mobilization of the knowledge and resources to get the things done. A combination of top-down and bottom-up approaches in making policy decisions and programme planning and implementation supported by a systematic monitoring and evaluation is suggested. It is worthwhile to put more emphasis on supply-side measures, since they require fewer resources than demand-side measures. The available evidence indicates that drivers are more receptive to engineering measures, which constitute a major part of supply-side measures.

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