

CHAPTER 2

REVIEW OF LITERATURE

The literature on the causes or factors and prevention measures of road accidents is fairly extensive. Less is developed the literature on the economic analysis of road accidents. The following literature review will include done four sections with respect to:

- (i) the economic loss of road accidents;
- (ii) the economic evaluation techniques for loss;
- (iii) the related factors of road accidents; and
- (iv) the legislative / enforcement interventions to reduce road accidents.

2.1 Economics Loss from Road accidents

Japan International Cooperation Agency (1985) studied the traffic safety plan of Thailand roads. The report mentioned that the monetary values of the person saved from fatality and prevented from injury and saving from prevention of property damage can be considered benefits implementation of the traffic safety improvement plan. As for the economic value of accident reduction, it can be estimated on the basis of such elements as wage lost, medical expense, home and family care, and physical and mental pain.

The components of economics loss from road accidents have been described by Bunyahotara (1989). They can be divided in two categories : first the direct loss of treating victims and properties damage, second the indirect loss due to opportunity cost of morbidity, mortality and disability of the victims. The indirect loss included also the intangible loss, i.e, pain, suffering of injured persons and loss the lovers of relatives or friends. The value of direct loss from road accidents was less than indirect loss.

In a study of the expenditure and characteristics of injured persons from road accidents, Janjarocan and others (1994), the direct loss was estimated through the expenditure by the health sector to treat injured persons. The indirect loss was characterized for road accidents victims admitted in patients department about twenty days. The injured persons were unable to work in the period of treatment in the hospitals. Therefore, earning income would be decreased not only for them but also for their households.

As every year there is a great number of injured persons because road accidents in Thailand, this also could lead to decrease the national productivity.

Pattamasiriwat (1993) studied the economic loss of road accidents. He focussed the economic analysis on society's loss that could be divided into six categories :

- (i) income foregone because of mortality;
- (ii) the decreased of earning income from disability;
- (iii) opportunity cost to victims because of days of work lost;
- (iv) opportunity cost to relatives who attended the injured persons;
- (v) loss of damaged properties; and
- (vi) loss of direct expenditure on treatment.

Pattamasiriwat and others (1996) studied the pre - hospital service program for road accidents victims. Based on cost benefit analysis technique, their study calculated the financial benefit of the program for surviving road accidents victims who could earn income in the subsequent working years. The result of the study indicated that the program could save human resources, hereby increased the national productivity.

2.2 The Economics Evaluation Techniques for Loss

The literature involved the economic technique of economic loss from road accidents as :

2.2.1 Concept of Earning Function.

Becker (1966) studied the investment in human capital in relation to earnings, costs, and rates of return. The most important determinants of earnings was age and education. The average income at each age was strongly related to the education level. Earnings tend to be relatively low at the beginning participation in the labor force (14-21 age class) rise throughout later ages until a peak in the 45 - 54 age class, and decline in the 55 - 64 age class.

Kaewsonthi and Kamolrattakul (1991) stated that the average number of working years is 15 to 60 years, with average earnings years for 45 years.

Chiswick (1976) estimated the earning functions for less developed countries. His paper showed that the development and deployment of human resources was a key aspect of economic growth. He studied the relationship between annual income, age, schooling years and sex. His estimation was based on a pooled sample of people with only wage and salary income and people with only self-employment income. The result showed that the explanatory power of the equation (R^2) increased with education level and was somewhat better for men than for women. Estimating the earnings function was most useful for studying an important part of the labor force that considered least amenable to empirical analysis.

2.2.2 Concept the Methodology of Economic Loss

National Safety Council (1987) defined the methodology of economics loss from road accidents as followings:

- Direct loss is based on direct expenditure to treat injured persons and damaged properties. For treating injured persons, they used average admitted days times with cost of treatment in each injured persons.

- Indirect loss is based on years work of loss due to morbidity, mortality and disability of victims from road accidents. The estimation of indirect loss was calculated by, first the number of work days lost from both morbidity and mortality, second the combined work day loss converted to costs in using the average earning multiplied by percent employment or by per capita gross national product and adjusted by discounting concept.

2.2.3 Concept of Index Number

Mendenhall (1996) said that when an index number was reported at regular intervals of time, it was a time series variable. Index numbers used to measure the changes in some business or economic phenomena range. For example, the Consumer Price Index aims at measuring the general level of consumer prices in comparison to the value of the price in a based year.

2.3 Road Accidents Related factors

This review of the related factors leading to road accidents considers first the behavior of road users, then the increased in numbers of vehicles registration and economic growth. Lastly the budgets are allocated for road transportation in object to reduce road accidents.

2.3.1 Behavior of Road Users

The Ministry of Public Health presented the situation road accidents in Thailand in 1995. The causes of road accidents are divided into three major types (i) vehicles; (ii) environment condition (roads condition, climate weather); and (iii) road users. The road users, who drove vehicles, were the main responsible for road accidents, especially, because of the behavior of drivers exceeding speed limits, drinking alcohol and neglecting to respect the traffic rules.

An analysis of the road accidents at Wichienburee Hospital, Wasunsirisakul (1996), show an increase in the number of injured patients from 1993 to 1995. The causes of accident and injury were alcohol drinking, careless driving, lack of helmet use and limited law enforcement. All of them stated the causes to be mainly linked to the human behavior .

Suriyawongpibal and others (1995) studied the evaluation of the government interventions on road accidents. This study used a methodology based on observation and interview of road users. The human behavior was the main cause of road accidents, namely, drinking alcohol and neglecting of traffic law enforcement.

2.3.2 Vehicles Registration

Traffic Accident Statistics of Traffic Engineer Division (1995), the report analyzed the growth of vehicle registration and economics had led to the increase in numbers of road accidents.

Suntikarn and Dumnakaew (1994) reports the situation of road accidents in Thailand between 1988 - 1993. Their study evaluated vehicles registration on the roads has been related the increase in numbers of road accidents.

2.3.3 Economic Growth

According to Japan International Cooperation Agency (1985) reports that the economic growth has been primarily directed to the development of the road transportation system. The road transportation is the most important means in domestic transport. The road networks have been expanded and traffic volume has increased sharply throughout the nation, road traffic accidents on the roads belong to the Department of Highway as well as other roads have also rapidly increased

2.3.4 Road Transportation Budgets

Suriyawongpaisal (1996) reviewed the measures leading to decrease accidents on the roads. His paper mentioned many interventions to reduce them. Most of the interventions required use of the budgets for road safety, for example traffic law enforcement, traffic symbols, alcohol drinking examination and radar systems to check speed limit. etc. But the budgets allocated for road safety by government are limited resources. The budgets for the construction and maintenance of roads did not include direct road safety measures.

Annual Report of the Department of Highways (1995) analyzed the budgets of the government in each National Plan. Most of the budgets were used for the construction and maintenance of roads which could only provide for indirect road safety measures.

According to the Five Years Master Plan of The Office Control Management Land Traffic (1996), reports the effectiveness of traffic engineer measures leading to decrease the number of deaths and injury from road accidents as shown in table 2.1

Table 2.1 The Effectiveness of Traffic Engineer Measures

Order	Correction Hazard Point on Roads	Injury to Die	Injury Not Die	Injury Both Die and Not Die	Benefit - Cost Ratio
1	Street lighting	47	22	22	9.5
2	Installation the medians	66	6	9	4.8
3	Adjustment the handrail of bridges	75	32	36	4.1
4	Adjustment the edge of roads	40	8	10	4.1
5	Traffic symbols	28	8	8	3.6
6	Destroy the obstruction on roads	50	23	24	3.6
7	Adjustment the traffic symbols	52	20	21	3.5
8	Adjustment the medians	45	27	27	3.3
9	Installation the roadside obstructions	33	35	35	2.7
10	Adjustment the small parts on roads	35	20	21	2.5

Source : The Office Control Management Land Traffic, 1996

The result of the table shows the effectiveness from the traffic engineer measures. These measures required the road safety budgets from the government.

Japan International Cooperation Agency (1985) suggested the approaches to safety improvement on the roads as motor vehicles inspection, driving license and road safety education from several agencies such as the department of Highway, Department of land Transport, Ministry of Public Health and Ministry of Education etc. These approaches will require to plan for the budgets.

2.4 Traffic Land Transportation Legislation / Enforcement

Much of the literature tends to show that legislation mandating the use of three most effective road accidents interventions - safety belts, motorcycle helmets and speed limits- have to be enacted. In addition the organizations in charge of road accident prevention should monitor strictly the action of drivers.

According to the United States National Committee for Injury Control (1991), the enactment and enforcement of safety belts, motorcycle helmets and speed limits have been proven effective in reducing motor vehicle injury and deaths.

Considering the “ Act of Traffic Road Transportation ” (1994), Thailand has been implementing the legislative traffic land transportation to reduce accidents on roads as follows :

- (i) the speed limit interventions has been legislated in 1979;
- (ii) the motorcycles helmets interventions has been legislated in 1992 and enacted in 1993; and
- (iii) the safety belts interventions has been legislated year 1995 and enacted in 1996.

Bunyarattapan (1996) and others studied the rate of seat belt use before and after enactment of seat belt. The result of the study indicated that the rate of regular seat belt use, it was only 58.1 % after enactment of six months. Another report was surveying the rate of motorcycles helmets use by Suriyawongpaisal et al. (1995). The motorcycles drivers did not wear helmet amounted to 75 % in urban area and 66 % on highway roads. In both studies, the helmet / seat belt use was not still strictly enforced.