CHAPTER II

LITERATURE REVIEW

This chapter is going to give an interesting previous studies that are useful of the basic concepts to understand this study about the related research studies, definitions and related fields in *"The cost analysis of the disability victims by alcohol drunk driving in traffic accident : A case study in Bangkok."*

Findings of the review of similar studies in Thailand.

According to this research related to the economic loss from road accident because the disability victims by alcohol drunk driving are the sub-population in the road traffic accident population. The cost of disability victims and their relatives are quite similar to the cost of people who have road accident in Thailand. So, reviewing the literature about economic loss from road accident may necessary to this study.

There are quite a number of research projects on the analysis of economic losses from road accidents in Thailand. Virtually all of these have adopted the human capital approach in estimating the loss. Working at the national level includes Direk Patamasiriwat (1994), R.Tosutho (1997), Angsana Boontam (2001), Worawet Suwanrada (2005), Kittiporn nongnual. (2008). Prapee Komnamoon (1979), Chareonrat Promglam (1998), Rungnapa Kradang-Nga(1999), and Wanapa Sumiratana (1996). Other studies, such as Watana S. Chanchareon et. al.(1993) and Supachai Kunaratanapruek et. al. (1995), focus on medical costs of road accidents. Most research projects on road crash costs in Thailand include only lost output due to death and injury of the victims, and do not take into account lost output due to care taking of the injured. However, there are three studies 1)Direk Patamasiriwat (1994), 2)Tosutho (1997),and 3)Worawet Suwanrada (2005) which attempt to quantify the loss of income of those who carry the burden of caring for the disabled. In estimating lost output, most researchers use the same principle by examining losses in terms of time and income which should have been earned during the remaining working life of people who dead from accident. In the case of injury, income losses are estimated

during and after the hospitalization period, both for the injured and their care takers. Therefore, it is necessary to make projections of future income for those affected by accidents. The methods of income projection are elaborated clearly in Prapee Komnamoon (1979), Direk Patamasiriwat (1994),

R. Tosutho (1997), Worawet Suwanrada (2005), and Angsana Boontam (2001). The methods used differ from one another. Worawet Suwanrada (2005) calculates foregone income from the "wage function" which relates wage income to age, and is estimated based on the data from a work status survey by the National Statistical Office.Tosutho (1997) estimates average income classified by age from the "earning function", while Direk Patamasiriwat (1994) derives average income classified by age and gender from a set of survey data by the National Statistical Office. Kittiporn nongnual. (2008) used Human capital method to study economic loss from traffic accident found 9,078 disability in Thailand have the medical cost for the disability have to spend for the treatment is 12,095 baht per 1 person but this number not include the cost for the long term treatment which is 569,632 baht per 1 person ,the loss of the productivity is equal to 1,219,743 Baht per 1 person and the quality of life cost of disability due to traffic accident is 3,602,783 Baht per 1 person and total cost for disability from traffic accident only is 40,882.582 million Baht.

From the human capital method it contains useful items and necessary for this research that interested in only cost which affect to the household costs of disability victims and their relatives by alcohol drunk driving from traffic accident in Bangkok (in term of patient's and their relatives point of view).So, this might focus 1)loss of productivity due to disability or cannot come to work or leave the job or patients and their relative's income foregone due to received treatment and loss work, 2)medical care cost for treatment in inpatient and outpatient department and 3)long-term care cost for the disability whole life that cannot work anymore .these is useful method that can select the calculation method and model to support the study.

Rungnapa Kradanga (1999) Studied in term of provider (hospital)point of view and researched in Costs of motor vehicle accident patients with the Protection for Motor Vehicle Accident Victims The result of this study found that the total cost of in-patients department in the Fiscal year 1998 was 17,436,065.40 baht. Each Unit cost of in-patient service was 5,948.85 baht per patient day. Considering component parts of unit cost, routine service cost was 4,897.84 bath per patient day. Unit cost of medical care cost was 1,051.01 baht per patient day. The highest unit cost of diagnosis related group on investigation and treatment was medical back problem group (DRGs 243), the cost amounted to 297,298.95 baht per case. The lowest unit cost of diagnosis related group on investigation and treatment was Traumatic Stupor & Coma, Coma < 1 HR age 0-17 group (DRGs 30), the cost amounted to 24,978.56 bath per case.

Taejing Siripanich M.D.(2006)study about the disability victims from drunk driving by interview them and found that the disability have a lot of problem especially financial support.and estimated the victims of drunk driving about 100,000 or more but no one did the real survey about number of drunk driving victims.so it'll have a problem about exactly population of disability victim by alcohol drunk driving so some researcher such as Ms.Jantima Sai-ngam (2007) use the "Snow ball" technique for sampling technique because the limit of the population's difficult to find and difficult to reach the data of patient in a hospital about the hospital medical records.Ms.Jantima Sai-ngam (2007) a Researcher from social research institute, Chulalongkorn university studied about the impact of victim from drunk drive report from research during January 2006 – December 2006 the result found the cause that make them become a victims are from 3 causes, first Drunk and drive themselves 47%, second is the victims who was crashed by drunk driver 32% and there're 21% from Passenger in car with drunk driver. According to this research result found that more than 50% of the victims are the people who're not drunk and drive by themselves.The age of victims are most during 16-25 years old by 49% and other are during 26-30 year. From these data can conclude that the most of victims are risky in the young age and it can effect to the economic of the country.Amounts 40% of the victims are using the wheelchair.While 40% loss the eyes, hands, legs and have a

problem with brain disability. Just only 12% have not serious disability. In term of social problem found that 90%of the victims divorced with their wife or husband also with victims who's not married their lover will broke up after got an accident.
it means that they've to face with both physical and psychological problem in the same time.About the methodology the researcher team focuses on drunk driver, passenger in car and people who is punished by drink and drive.

Ms.Jantima Sai-ngam has given the definition of "drunk drive victims" that means "people who've got an accident from the drunker in driving that still alive and become disability more than 6 months"

Summary of Previous literatures review

Table 2.1 : Previous literatures review

The duration of study, Level of data and Type of cost/loss that the researchers are interested to study about "The economic loss due to road traffic accident"

Researcher	duration of study	Level of data	Type of cost/loss
Prapree Komnamoon(1979)	1976	Bangkok	1. Loss of income 2. Treatment cost 3. Cost of vehicle damage and property damage 4. other cost
Direk Patamasiriwat (1996)	1992	Thailand	1. life year loss of fatality 2. loss of income of disability 3. treatment cost 4. Opportunity cost of patient's relative 5. Property damage cost
Wattana S. Janjaroen et. al.(1994)	1993 - 1994	Bangkok and The Central	Treatment cost
Supachai Kunaratanapruek et. al.(1995)	1993 - 1994	Thailand	Treatment cost
Tosutho R. (1997)	1981 - 1995	Thailand	1. Treatment cost 2. Loss of income 3. Property damage cost 4. Opportunity cost of patient, patient's relative and family
Direk Patamasiriwat (1996)	1998	Thailand	Treatment cost before sending patients to the hospital.
Wannapa Sumirattana(1996)	1996	Thailand	Treatment cost
Chareonrat Promglam(1998)	1996	Bangkok and The Central	1. life year loss of income 2. Treatment cost 3. Cost of vehicle damage and property damage 4. The cost due to the delay of traffic accident that impact to other people in a traffic road.
Rungnapa Kradunga(1999).	1997-1998	Thailand	Treatment cost
Angsana Boondhama (2001)	1995-2002	Thailand	The economic loss(used Thailand's National GDP to calculate)

Table 2.2 : Previous literatures review
The duration of study, Level of data and Type of cost/loss that the researchers are interested to study about "The economic loss due to road traffic accident" (Continue)

Researcher	duration of study	Level of data	Type of cost/loss
Paramet Luathep and Yordphol tanaboriboon (2005)	2002	Thailand	1. Treatment cost 2. Economic loss of fatality, serious injuries and slight in juries 3. Property damage cost 4. First aid treatment cost 5. Cost of insurance company to patients 6. Human cost
Worawet Suwanrada(2006)	2003	Thailand	1. Loss of outputs of fatality 2. Loss of output due of the disability and their relatives (both who're working and not working) 3. Loss of output due of the disability and their relatives during have the treatment in a hospital . 4. Treatment cost 5. Property damage cost 6. Human cost(painful and sadness)
Kittiporn Nongnual (2008)	2005-2008	Thailand	1. The expense of treating the wounded people. 2. The economical losses of handler. 3. The value of damages of vehicle which has an accident. 4. The value of damages of governmental services property. 5. The psychological losses. 6. The expenses of administration of insurance company. 7. The expenses in the proceeding of police. 8. The losses of income or product which has been lost through the working life of dead people. 9. The losses of income or product which has been lost during the period of break for being nursed of wounded people . 10. Cost-Benefit by applying the Net Present Value (NPV) of the project of protective proceeding and reducing of road traffic accident during New Year and Songkran festival in the year of 2550.

Table 2.3 : The summary of literatures about affect to the household costs of traffic accident patients

Researcher	The formula that be used	Source of its Variables
Prapree Komanamoon(1979)	**The cost of serious injury per person** = the cost of hospital per 1 patients per day X the average admit day of patient in hospital X the total number of the serious injury in Bangkok in 1976.(the cost of hospital per 1 patients per day = total cost of hospital X number of bed X 365)	Studied in 3 public hospitals Siriraj hospital, Ramadhibodi hospital, Central hospital.
	The cost of slight injury per person = the cost of hospital per 1 out-patients per day X the total number of the slight injury in Bangkok in 1976.(the cost per 1 out patients per day = total cost of medical services and drug per 1 patient /all of out patients)	
Wattana S. Janjaroen et. al.(1994)	**Analysis of the factors affecting to the cost of treatment;** EXP = 13.932 – 11.09HOS + 21.OPN ,where EXP = the cost of treatment HOS = type of hospital (Public or private hospital) OPN= the medical doctor's opinion to the patient's injuries	Collected the data from 2 public hospitals and 4 private hospitals in Bangkok,Samutprakan, Samutsakorn and Kanjanaburi province
Direk Patamasiriwat (1996)	**Cost of the hospital to provide medical service to the injuries from road traffic accident (launching the program)**= medical equipment cost + telecommunication device cost + radio centre cost + the training cost to the medical officers and employees. **Cost of the hospital to provide medical service to the injuries from road traffic accident (Operational)** = the benefit of the employee and officers + fuel cost + maintenance ambulance car cost + medical equipment and drug cost + treatment cost+ the depreciation value of ambulance car and equipments.	Rachaviti hospital,Vachira hospital and Bangkok Hospital.
Tosutho R. (1997)	**Treatment cost of road traffic accident injuries** = N1 X 4,542 X CPI where, N1 = number of injuries each year 4,542 = treatment cost of road traffic accident patient's in public hospital CPI = Consumer price index	The number of injuries and CPI collected from National Statistic Office and the treatment cost of road traffic accident patient's in public hospital are from the research result of Wattana S.(1996)

Table 2.4 : The summary of literatures about affect to the household costs of traffic accident patients (Continue)

Researcher	The formula that be used	Source of its Variables
Paramet Luathep and Yordphol tanaboriboon (2005)	**Total treatment cost of traffic accident patient** = the cost of treatment per 1 patient X the number of all patient	The Khon Kaen central hospital
Worawet Suwanrada(2006)	**Treatment cost** = the number of injuries each type X the average of treatment cost	The number of traffic accident injuries collect from MOH and the treatment cost from Wattana S.(1994) and Supachai Kunaratanapruek(1995)

Table 2.5 : The summary of literatures related to the loss of income of the disability ,the injuries and the patient's relative from road traffic accident patients.

Researcher	The formula that be used	Source of its Variables
Tosutho R. (1997)	**Total opportunity loss of injuries** (TL3) = N1 X(23/365) X AI ,where N1 = total number of the injuries all year 23 = average treatment day of injuries AI = average income per patient per year = 26,520 Baht **Total opportunity loss of disabilities** (TL4) = N2 X(6,000/365) X AI ,where N2 = total number of the disability all year 6,000= number of work day loss AI = average income per patient per year = 26,520 Baht	The number of injuries and disability from road traffic accident collected from National Statistic Office,the average treatment day of injuries average income per patient per year from Wattana S.(1994) , the number of work day lost from National council.
Prapree Komnamoon (1979)	**Loss due to absent work of injury (L)** = (Yd – Cd) X I X (d1 + d2)/365 : using Loss of Net output method where, Yd =Income per person per year (year that have injure) Cd = Consumption per person per year (year that have injure) D1 =the lost workday due to serious injuries D2 = the loss workday in the future I = the total number of road traffic accident injuries	Income per person per year collected from NESDB, the number of workday loss due to serious injuries and the loss workday in the future from department of labour,Ministry of Interior in 1972 and number of injuries from traffic accident from traffic polic department in 1976
Paramet Luathep and Yordphol tanaboriboon (2005)	**The economic loss of serious injury patient from road traffic accident** = the average work day loss(30 days) X average basic salary rate (326 Baht) **The economic loss of slight injury patient from road traffic accident** = the average work day loss(2 days) X average basic salary rate (326 Baht)	Data from MOH,The Khon Kaen central hospital and National Statistic Office.
Worawet Suwanrada (2006)	**The economic loss due to loss workday of patient and patient;s relatives from road traffic accident** = the number of injuries each type X the number of treatment day X the average income per day	The number of traffic accident injuries collect from MOH and the treatment cost from Wattana S.(1994) , Supachai K.(1995) and the Report of health survey(2004)

Definition of alcohol and disability

Alcohol

Definition of Alcohol

The American Heritage (2005) give the definition of Alcohol (Ethanol) is liquor obtained from the fermentation of sugars and starches or by chemical synthesis. It is the intoxicating ingredient of alcoholic beverages, and is also used as a solvent, in explosives, and as an additive to or replacement for petroleum-based fuels. Also called ethyl alcohol, grain alcohol. Chemical formula: C_2H_6O.

.

Effect of alcohol to drinker

Alcohol, specifically ethanol, is a potent central nervous system depressant, with a range of side effects. The amount and circumstances of consumption play a large part in determining the extent of intoxication; for example, consuming alcohol after a heavy meal causes alcohol to absorb more slowly. The concentration of alcohol in blood is usually measured in terms of the blood alcohol content.

Initially, alcohol generally produces feelings of relaxation and cheerfulness, but further consumption can lead to blurred vision and coordination problems that create the highly risk to have accident easily if they drunk and drive.

Blood Alcohol Concentration Limits Worldwide

The mission of the International Centre for Alcohol Policies (ICAP) define the meaning of Blood alcohol concentration (BAC) that it represents the amount of ethanol in a given amount of blood, and is noted as "weight by volume." The table below lists the legislated maximum levels for a number of countries given in milligrams of ethanol per millilitre of blood (mg/ml).

Table 2.6 : Standard BAC limit (Last updated February 2007)

STANDARD BAC LIMITS			
Country	**Standard BAC (in mg/ml)**	**Country**	**Standard BAC (in mg/ml)**
Albania	0.1	Kyrgyzstan	0.5
Algeria	0.1	Latvia	0.49
Argentina	0.5	Lithuania	0.4
Armenia	0	Luxembourg	0.8
Australia	0.5	Macedonia	0.5
Austria	0.5	Malaysia	0.8
Azerbaijan	0	Malta	0.8
Belarus	0.5	Mauritius	0.5
Belgium	0.5	Mexico	0.8
Bolivia	0.7	Moldova	0.3
Bosnia and Herzegovina	0.5	Mongolia	0.2
Botswana	0.8	Nepal	0
Brazil	0.0	The Netherlands	0.5
Bulgaria	0.5	New Zealand	0.8
Cambodia	0.5	Nicaragua	0.8
Canada	0.8	Norway	0.2
Colombia	0	Panama	0
Costa Rica	0.49	Paraguay	0.8
China	0.5	Peru	0.5
Croatia (Republic of)	0.5*	Philippines	0.5
Czech Republic	0	Poland	0.2
Denmark	0.5	Portugal	0.5
Ecuador	0.7	Romania	0
El Salvador	0.5	Russia	0.3
Estonia	0.2	Singapore	0.8
Ethiopia	0	Slovak Republic	0.2

Table 2.7 : Standard BAC limit (continue)

Country	Standard BAC (in mg/ml)	Country	Standard BAC (in mg/ml)
Finland	0.5	Slovenia	0.5
France	0.5	South Africa	0.5
Georgia	0.3	South Korea, Rep of	0.52
Germany	0.5	Spain	0.5
Greece	0.5	Sweden	0.2
Guatemala	0.8	Switzerland	0.5
Honduras	0.7	**Thailand**	**0.5**
Hungary	0	Turkey	0.5
Iceland	0.5	Turkmenistan	0.3
India	0.3	Uganda	0.5
Ireland	0.8	United Kingdom	0.8
Israel	0.5	United States	0.8
Italy	0.5	Uruguay	0.8
Japan	0.3	Venezuela	0.5
Kenya	0.8	Zimbabwe	0.8

*BAC level for professional drivers and drivers under 24 years of age is 0.0 mg/ml.

Source: Virginia Tech and Federal Aviation Regulation

Table 2.8 : Progressive effects of Alcohol

Blood Alcohol Concentration (mg/100ml)	**Changes in Feelings and Personality**	**Physical and Mental Impairments**
<30 mg%	Relaxation Sense of Well-being Loss of Inhibition Lowered Alertness Joyous	Thought Judgment Coordination Concentration
30-50 mg%	Blunted Feelings Disinhibition Extroversion Impaired Sexual Pleasure	Reflexes Impaired Reasoning Depth Perception Distance Acuity Peripheral Vision Glare Recovery
51-100 mg%	Over-Expression Emotional Swings Angry or Sad Boisterous	Reaction Time Gross Motor Control Staggering Slurred Speech
100-150 mg%	Stupor Lose Understanding Impaired Sensations	Severe Motor Impairment Loss of Consciousness Memory Blackout
150-200 mg%	Severe Depression Unconsciousness Death Possible	Bladder Function Breathing Heart Rate
=> 400	Unconsciousness Death	Breathing Heart Rate

Source: Virginia Tech and Federal Aviation Regulation

Table 2.9 :Unit of Blood Alcohol Concentration (BAC)

BAC units	**Abbreviation**	**Used in (Example)**
milligrams per hundred millilitres	mg/100ml, mg/%, mg%, mg/dl	UK, Africa(parts),Middle East, Malaysia, Canada, Thailand

Source: Virginia Tech and Federal Aviation Regulation

Drinking and driving

Alcohol affects the central nervous system, impacting various behavioral and cognitive capabilities

"Drivers who have been drinking are more likely than sober drivers to be involved in crashes. Reaction times of an inebriated driver may be reduced by up to 10%–30%, vision may become blurred, and the judgment of distance, speed, and hazards is likely to be diminished" (Davis, Quimby, Odero, Gururaj, & Hijar, 2003).

Drunk driving is the act of operating and/or driving a motor vehicle while under the influence of alcohol and/or drugs to the degree that mental and motor skills are impaired.

Table 2.10 :The punishment for drunk driver in sample countries

Country	**BAC limit (mg%)**	**Punishment**		
		Year of Driving license is suspended	**Criminal charge (in Thai Baths)**	**Time in jail**
Thailand (Normal)	50	6 months or lifetime suspended	5,000-20,000	Not over 3 months (1)
Thailand (Harmful injured)	50	More than 2 years or lifetime suspended	40,000-120,000	2 – 6 years
Thailand (Victims died)	50	Lifetime suspended	60,000 – 200,000	3 – 10 years
UK	80	1 years	Not over 350,000	Not over 3 months
Japan	30	3 years	Not over 135,000	Not over 3 years (2)
France	80	3 years	Not over 315,000	Not over 2 years
Vietnam	50	N/A	80,000	1
Italy	50	0	72,240	6
Iran	0	N/A	0 but have to receive 40 hits	Not over 3 months
Korea	50	N/A	170,000	Not over 3 months (3)

Note:

1.In Thailand if there's first time for drunk driver, the court will extend for 1-2 year for punishment but driver must do for public charity for 24-72 hrs.

2. Partner who's in the car with the drunk driver has to be punished also.

3.In Korea if victims died from drunk driving, the punishment to the driver will be changed to lifetime in jail.

Source: Don't Drive Drunk foundation (2008)

Disability

Disability is a lack of ability relative to a personal or group standard or norm. In reality there is often simply a spectrum of ability. Disability may involve physical impairment, sensory impairment, cognitive or intellectual impairment, mental disorder (also known as psychiatric or psychosocial disability), or various types of chronic disease. A disability may occur during a person's lifetime or may be present from birth.

Definition of Disability in Thailand

According to the Rehabilitation of Disabled Persons Act 1991 which reported in "Country Profile on Disability Kingdom of Thailand " from Japan International Cooperation Agency Planning and Evaluation Department (2002),give a definition of disability is "a disabled person" means "a person with physical, intellectual or mental abnormality or impairment, of which the type and criteria are designated in the ministerial regulation".

In the description of Ministerial Regulation in 1994 No.2 pursuant to the Rehabilitation of Disabled Persons Act 1991 defined types of disability are classified as follows:

Types of disability are classified as follows

1. Impairment of vision
2. Impairment of hearing or communication
3. Impairment of physical ability or locomotion
4. Impairment of mental ability or behavior
5. Impairment of intellect or learning ability

Each type of disability is defined more definition as follows:

Impairment of vision means:

The better eye, after using regular eyeglasses, is able to see less than 6/18 or 20/70 downward until unable to see any light, or a visual field of less than 30°

Impairment of hearing or communication means:

A hearing frequency of 500, 1000, or 2000 Hertz in the better ear under the average audibility as follows:

1. over 40 decibels up to the point of not hearing at all for a child not older than 7 years of age
2. over 55 decibels up to the point of not hearing at all for a general person, or abnormality or malfunctioning of the hearing system restricting comprehension or use of verbal language to communicate with others.

Impairment of physical or locomotion means:

Obvious abnormality or malfunctioning of the physical condition which makes her/him unable to perform routine daily activities, or
loss of ability to move hands, arms, legs, or body as a result of amputation, paralysis or 6 Country Profile on Thailand weakness, rheumatic disease, arthritis or chronic pain including other chronic illness caused by body system dysfunction inhibiting her/him to perform routine daily activities or earn a living like an ordinary person.

Impairment of mental ability or behavior means:

Psychological abnormality or malfunctioning of a certain part of the brain associated with perception, emotion and thought which causes inability to control behavior necessary for self-care or living with others.

Impairment of intellectual or learning ability means:

Abnormality or malfunctioning of the brain or intelligence, which causes inability of a person to learn through a regular educational system.

Note: severity of each type of disability can defined by medical doctor to a various kinds of type, in this thesis will use a severity level from the Disability book which issued by National Office for empowerment of persons with Disability(NEP.) as the references to severity level.

Various types of disability

Sukajan Pongprapai M.D.Thai Rehabilitation Medicine Association (2002) defined various types of disability in the "Country Profile on Disability Kingdom of Thailand " from Japan International Cooperation Agency Planning and Evaluation Department (2002), the survey ranked the following starting with the most common types in Thailand

1. Mobility impairment at 19.6 per cent
2. Hearing impairment at 13.2 per cent
3. Intellectual impairment at 10 per cent
4. Speech impairment at 5.4 per cent
5. Visual impairment at 1.9 per cent.

According to the percentage above, Mobility impairments are the most common type for disability and contain some of victims by alcohol drunk driving from traffic accident.