CHAPTER 3

RESEARCH METHODOLOGY

This chapter of research methodology comprised three parts, (i) the conceptual framework of the study; (ii) the operational definitions of certain key terms used in the thesis; and (iii) the general assumptions underlying the economic loss and road accident related factors.

3.1 Conceptual Framework of the Study

This study has to answer two secondary questions, first what is the economic loss due to road accidents and second what extent have the road accidents related factors contributed to the number of deaths from road accidents.

The conceptual framework of the study comprised of three complementarily frameworks:

(i)　the framework of the overall research which attempts to highlight the link between the two majors questions of the study;

(ii)　the framework of the second part of the study dealing with the trends of economic loss and cost indicator of road accidents.

(iii)　the framework of the analysis of the study.

3.1.1 Framework of the Overall Research

This research will, first estimate the trends of economic loss and then construct cost indicator of road accidents and finally analyze the related factors through the number of mortality of road accidents.

The numbers of deaths due to road accidents can be affected by socio - economic factors, the budgets of road transportation for road safety and traffic land transportation legislation. These factors will be grouped into two sets of factors, the quantitative factors and the qualitative ones.

The quantitative factors which have an influence on road accidents are (i) the road transportation budgets for direct, indirect and neither direct nor indirect road safety; (ii) the alcohol consumption; (iii) the economic growth of agricultural, manufacturing and services sectors in each year; and (iv) the number of car, bus, truck and motorcycle registration per year.

The qualitative factors which can have any influence of road accidents are the limits speed, the motorcycles helmet and the seat belt use. Figure 3.1 summarizes the components of the economic loss and road accident related factors for this research.

On the left side, the trends of economic loss and cost indicator of road accidents will be estimated. The different components of economic loss and estimated earning income of individual labor force, which will be used for the individual average income of the victims from road accidents, will be considered in the paragraph below. (see 3.1.2)

3.1.2 Framework of the Economic Loss

To design a model for estimating the trends of economic loss from road accidents, this study will (i) identify economic loss from road accidents;(ii) identify the direct loss of road accidents; (iii) identify the indirect loss of road accidents; (iv) estimate individual earning function from socio - economics survey in 1988 to be used for average individual income of victims; (v) value the trends of loss in monetary term in each year and lastly; (vi) construct the cost indicator of road accidents.

The indicators of the economics loss in this study are divided in two categories, first the direct loss due to treatment in the health sector and property damage, second the indirect loss due to the opportunity cost to victims due to work inability and families care, and as well as income forgone individuals decreased in road accidents.

The estimating earning function, which is used for individual average income of victims and relatives, will be determined the relationship between age, sex, years of school, individual occupation and individual income of labor force.

The value of all economics loss from road accidents in each year will be analyzed in monetary terms. The trends of loss between 1981 - 1985 will be used to construct the cost indicator of road accidents by selecting only one year for indicating the general level of economics loss from road accidents. Figure 3.2 summarizes the trends of economic loss and cost indicator of road accidents.

3.1.3 Framework for Analysis

As shown in the conceptual framework above, this research attempts to answer two questions, each with a specific analytical technique (see figure 3.3)

The first question will be answered by using multiple regression analysis to estimate the earning individual income of labor force. Regression on dummy variables technique will be used for the qualitative factors such as labor's occupation. The costs analysis technique will be used to assess the economic loss from road accidents for each year.

Also, the second question will be answered in using the multiple regression technique for the variables affecting the road accidents. Regression on dummy variables technique will be used for the qualitative factors. Both of the economic analysis technique will be used to explore the relationship between the numbers of deaths from road accidents and the road transportation budgets, socio - economics factors and traffic land transportation legislation.
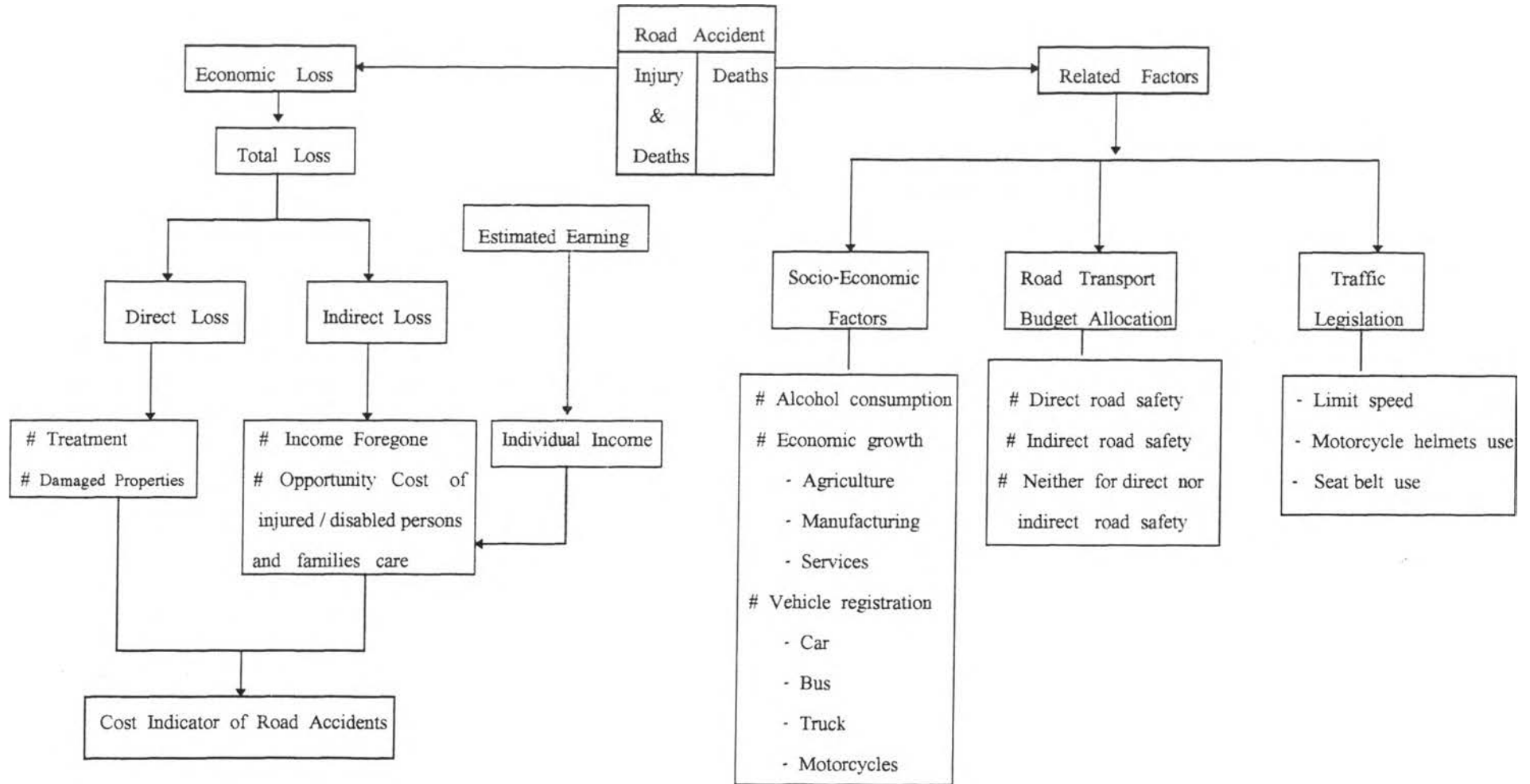
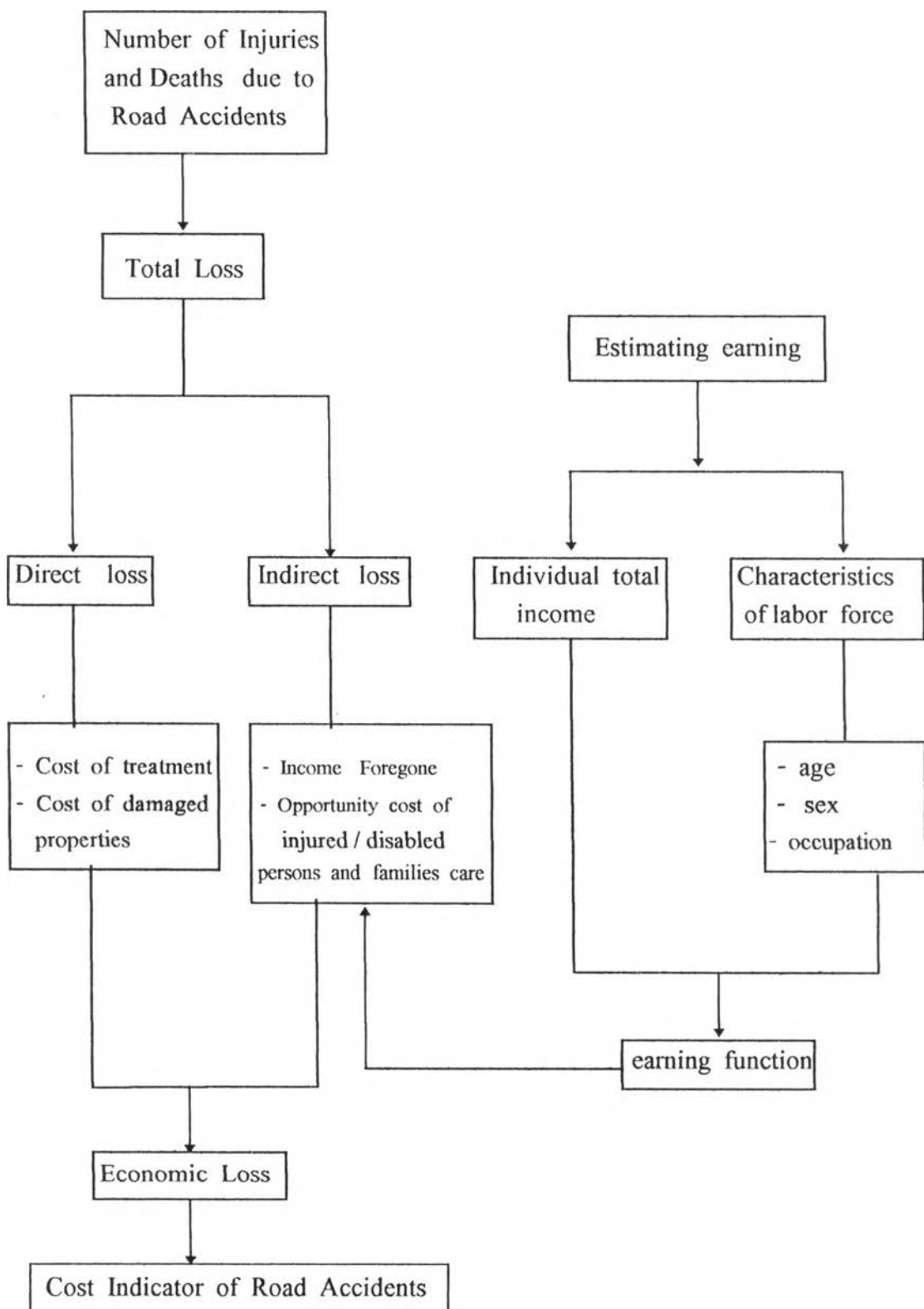Figure 3.1: Conceptual framework of economic loss and road accident related factors.

Figure 3.2 :Conceptual framework of the trends of economic loss and cost indicator of road accidents
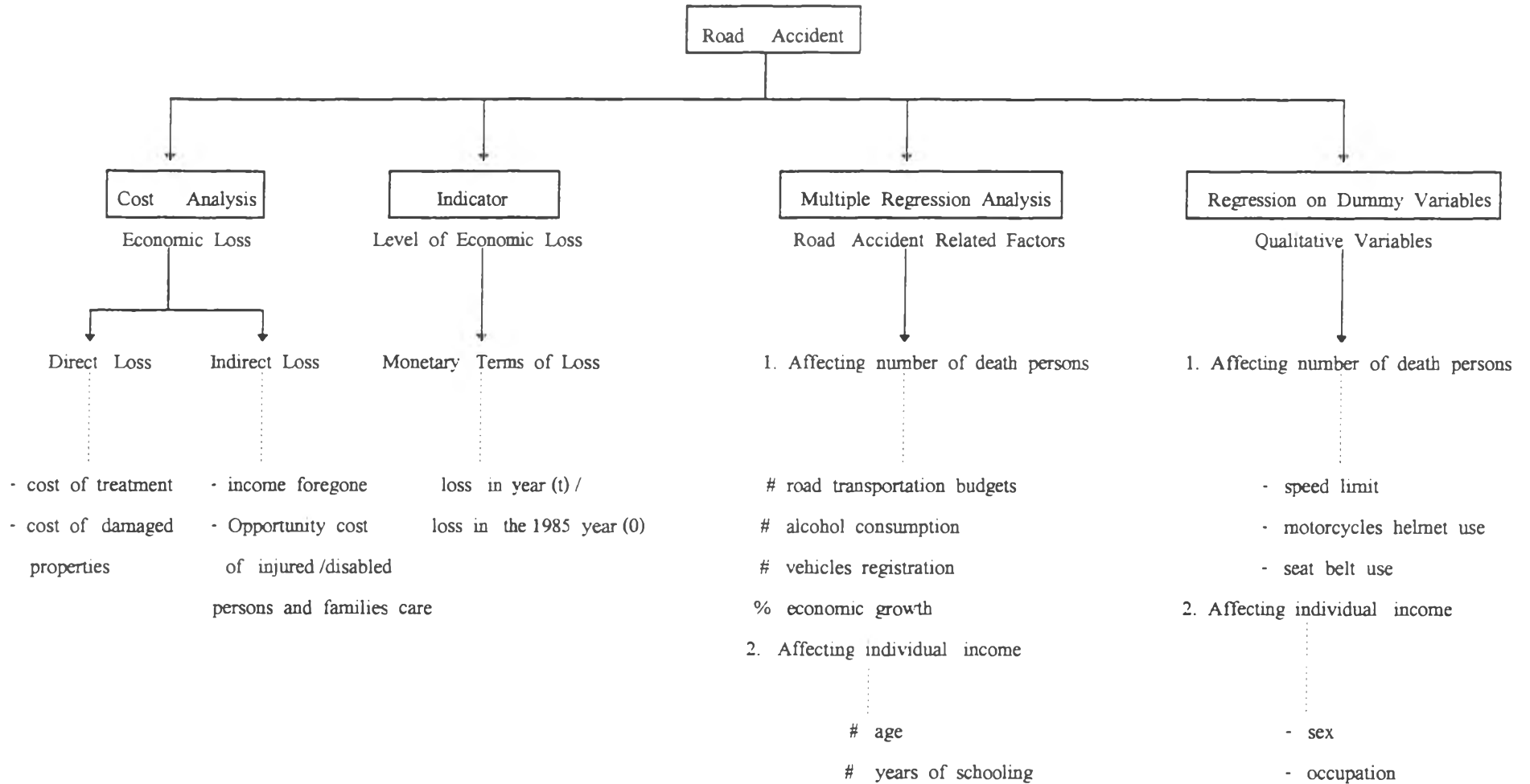
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                                    ┌─────────────────┐
                                    │  Road   Accident │
                                    └─────────────────┘
        ┌──────────────────┬──────────────────────────┬──────────────────────────┐
┌─────────────────┐  ┌─────────────┐   ┌───────────────────────────┐   ┌──────────────────────────────┐
│ Cost   Analysis │  │  Indicator  │   │ Multiple Regression Analysis │   │ Regression on Dummy Variables │
└─────────────────┘  └─────────────┘   └───────────────────────────┘   └──────────────────────────────┘
   Economic Loss     Level of Economic Loss   Road  Accident Related Factors      Qualitative Variables
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Direct Loss   Indirect Loss   Monetary Terms of Loss   1. Affecting number of death persons   1. Affecting number of death persons

- cost of treatment   - income foregone   loss in year (t) /   # road transportation budgets   - speed limit

- cost of damaged   - Opportunity cost   loss in the 1985 year (0)   # alcohol consumption   - motorcycles helmet use

  properties   of injured /disabled   # vehicles registration   - seat belt use

                        persons and families care   % economic growth   2. Affecting individual income

                                                                                   2. Affecting individual income

                                                                                   # age   - sex

                                                                                   # years of schooling   - occupation

Figure 3.3   Framework of the analysis of the study

3.2 Operational Definitions

3.2.1 Road accident

An accident occurs on a road by vehicles (at least one unit) and it results in injury, death or property damage.

3.2.2 Road

A way between places with a hard surface on which vehicles can drive along. It has been classified into 6 categories as follow:

1. Special Highways or Motorways are roads with specially high standards of design, particularly in respect to access to the carriage way and control of roadside activity and development.

2. National Highways are primary roads linking among the regions, provinces, districts and important places.

3. Rural Roads are roads outside the municipality and sanitary areas.

4. Municipal Roads are roads in the municipality.

5. Sanitary Roads are roads in the sanitary areas.

6. Concession Highways are highways which the government gives the concession on contract according to the concession Highway Laws and registered to be concession Highways.

3.2.3 Vehicle

Equipment have wheels which transport people or things from place to place, especially on land but it does not include vehicles which move on track.

3.2.4 Injured Person

Persons who had been injured by road accidents.

3.2.5 Death Person

Persons who had been killed by road accidents.

3.2.6 Disabled Person

Persons who had been disabled by road accidents.

3.2.7 Alcohol Consumption

The use up of alcohol beverages for each year.

3.2.8 Road Transportation Budget Allocation

The budgets of road transportation are divided in three categories in accordance with road safety as:

1. The budgets allocated for direct road safety are for ;(i) monitoring of mobile vehicles and road users on the roads. (police traffic); (ii) land transportation schools; (iii) land transportation examination (alcohol test); (iv) automobiles condition checking; (v) vehicles registration and driver ' license holder; (vi) the construction roadway countermeasure (lighting, roadway barriers); (vii) the correction of hazardous roads section; (vii) road safety education programs; and lastly (viii) audit of roads safety.

2. The budgets allocated for indirect road safety are for; (i) the construction of roads and bridges; (ii) the maintenance of roads and bridges; and lastly (iii) the adjustment of roads and bridges.

3. The budgets allocated to neither direct nor indirect road safety are; (i) land transportation administration; (ii) land transportation acquisition; (iii) the construction of building; and lastly (v) the payment the loan money borrowed from the abroad.

3.2.9 Costs of Road Accidents

The economics loss from road accidents are divided in two categories, first the direct loss is the cost of healthcare and properties damage. Second, the indirect loss is the cost due to opportunity cost from

morbidity, disability and families care, including income foregone because of premature mortality.

3.2.10 Cost Indicator of Road Accidents

The cost indicator of road accidents is a number that indicates the level of economic loss due to road accidents in comparison to the base year 1985.

3.2.11 Economics Growth

This is the growth rate of real Gross Domestic Product originating from agriculture, manufacturing and services in year t; which is equal to $(y_t - y_{t-1}) * 100 / y_{t-1}$. Details are as follows:

(i) Economic growth of manufacturing sector which in this study will include food, beverages, tobacco, textiles, leather, wood, furniture, paper, printing, chemical products, petroleum, rubber and plastic, non - metallic, machinery, electrical and transport equipment.

(ii) Economic growth of services sector which in this study will include education, medical and health, recreation and entertainment, hotels, restaurants, personal services, domestics, business services, non-profit, and repairs.

3.3 General Assumptions

3.3.1 Economic Loss from Road Accident

1. Total costs in this study means the economic loss from road accidents

2. This assumed that any injured persons will be treated in hospitals for 20 days by the study of Janjarocan and others (1994).

3. The families care will be calculated on the basis of 1 to 1 ratio. (one patient : one relative)

4. The disabled persons from road accidents will be taken into account only in case of paralysis type of disability.

5. The economics loss from road accidents in this research will include only 6 losses as; (i) cost of treatment for inpatients department government hospital; (ii) cost on damaged properties; (iii) opportunity cost of injured persons; (iv) opportunity cost of disabled persons; (v) opportunity cost of families care; and lastly (vi) income foregone from decreased individuals.

3.3.2   Related Factors of Road Accident

1. This research is a study at Macro level. There are still many other related factors to induce cost of road accidents,i.e., climate weather.

2. For the analysis of road accident related factors, only the number of deaths will be used.

3. Land Transportation Law Enforcement as a proxy for only speed limits, motorcycles helmet and seat belt use will be studied.

4. The relationship between land transportation law enforcement and the number of deaths from road accidents is assumed on the basis of full enforcement level.