

Road Accident Analysis And Engineering Measurement

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ABSTRACT

In academia the study of road accidents and road safety is undertaken in many different ways in many different faculties and disciplines across the engineering and physical sciences and the economic and social sciences, from transport and geography to psychology, media, health and education. Each discipline focuses differently and on distinct aspects of transport safety problems, yet, simultaneously each discipline may derive research that is generally interesting and useful across the board. Road traffic accidents are more common in urban than rural areas. About 30% of all accidents occur in the metropolitan cities of Bangalore, Kolkata, Mumbai, Delhi and Chennai. Road accidents cause 1 death every 9 minutes that is 160 per day. The accidents in general and the road accidents in particular have increased phenomenally in the past few decades. Proper study is regarding the road accident may reduce the accidents in future.

INTRODUCTION

The problem of accident is a very acute in highway transportation due to complex flow pattern of vehicular traffic, presence of mixed traffic along with pedestrians. Traffic accident leads to loss of life and property. Thus the traffic engineers have to undertake a big responsibility of providing safe traffic movements to the road users and ensure their safety. Road accidents cannot be totally prevented but by suitable traffic engineering and management the accident rate can be reduced to a certain extent. For this reason systematic study of traffic accidents are required to be carried out. Proper investigation of the cause of accident will help to propose preventive measures in terms of design and control.

Objectives of accident studies

Some objectives of accident studies are listed below:

1. To study the causes of accidents and suggest corrective measures at potential location
2. To evaluate existing design
3. To compute the financial losses incurred
4. To support the proposed design and provide economic justification to the improvement suggested by the traffic engineer
5. To carry out before and after studies and to demonstrate the improvement in the problem.

Causes of road accidents

The various causes of road accidents are:

1. **Road Users** - Excessive speed and rash driving, violation of traffic rules, failure to perceive traffic situation or sign or signal in adequate time, carelessness, fatigue, alcohol, sleep etc.

2. **Vehicle** - Defects such as failure of brakes, steering system, tyre burst, lighting system.
3. **Road Condition** - Skidding road surface, pot holes, ruts.
4. **Road design** - Defective geometric design like inadequate sight distance, inadequate width of shoulders, improper curve design, improper traffic control devices and improper lighting,.
5. **Environmental factors** - unfavorable weather conditions like mist, snow, smoke and heavy rainfall which restrict normal visibility and makes driving unsafe.
6. **Other causes** - improper location of advertisement boards, gate of level crossing not closed when required etc..

ACCIDENT ANALYSIS

Accident data collection

The accident data collection is the first step in the accident study. The data collection of the accidents is primarily done by the police. Motorist accident reports are secondary data which are filed by motorists themselves. The data to be collected should comprise all of these parameters:

1. **General** - Date, time, person involved in accident, classification of accident like fatal, serious, minor
2. **Location** - Description and detail of location of accident
3. **Details of vehicle involved** - Registration number, description of vehicle, loading detail, vehicular defects

4. **Nature of accident** - Details of collision, damages, injury and casualty
5. **Road and traffic condition** - Details of road geometry, surface characteristics, type of traffic, traffic density etc..
6. **Primary causes of accident** - Details of various possible cases (already mentioned) which are the main causes of accident.
7. **Accident cost** - Financial losses incurred due to property damage, personal injury and casualty

These data collected need proper storing and retrieving for the following purpose. The purposes are as follows:

1. Identification of location of points at which unusually high number of accident occur.
2. Detailed functional evaluation of critical accident location to identify the causes of accidents.
3. Development of procedure that allows identification of hazards before large number of accidents occurs.
4. Development of different statistical measures of various accident related factors to give insight into general trends, common casual factors, driver profiles, etc.

ACCIDENT INVESTIGATION

The accident data collection involves extensive investigation which involves the following procedure:

1. **Reporting:** It involves basic data collection in form of two methods:

2. **Motorist accident report** - It is filed by the involved motorist involved in all accidents fatal or injurious.
3. **Police accident report** - It is filed by the attendant police officer for all accidents at which an officer is present. This generally includes fatal accidents or mostly accidents involving serious injury required emergency or hospital treatment or which have incurred heavy property damage.
4. **At Scene-Investigation:** It involves obtaining information at scene such as measurement of skid marks, examination of damage of vehicles, photograph of final position of vehicles, examination of condition and functioning of traffic control devices and other road equipments.
5. **Technical Preparation:** This data collection step is needed for organization and interpretation of the study made. In this step measurement of grades, sight distance, preparing drawing of after accident situation, determination of critical and design speed for curves is done.
6. **Professional Reconstruction:** In this step effort is made to determine from whatever data is available how the accident occurs from the available data. This involves accident reconstruction which has been discussed under Section No.7 in details. It is professionally referred as determining “behavioral” or “mediate” causes of accident.

7. **Cause Analysis:** It is the effort made to determine why the accident occurred from the data available and the analysis of accident reconstruction studies..

SAFETY MEASURES RELATED TO ENFORCEMENT

The various measures of enforcement that may be useful to prevent accidents at spots prone to accidents are enumerated below. These rules are revised from time to time to make them more comprehensive.

Speed control

Checks on spot speed of all vehicles should be done at different locations and timings and legal actions on those who violate the speed limit should be taken

Training and supervision

The transport authorities should be strict while issuing licence to drivers of public service vehicles and taxis. Driving licence of the driver may be renewed after specified period, only after conducting some tests to check whether the driver is fit

Medical check

The drivers should be tested for vision and reaction time at prescribed intervals of time

Safety measures related to education

The various measures of education that may be useful to prevent accidents are enumerated below.

Education of road users

The passengers and pedestrians should be taught the rules of the road, correct manner of crossing etc. by introducing necessary instruction in the schools for the children and by the help of posters exhibiting the serious results due to carelessness of road users.

Safety drive

Imposing traffic safety week when the road users are properly directed by the help of traffic police as a means of training the public. Training courses and workshops should be organized for drivers in different parts of the country.

Safety audit

It is the procedure of assessment of the safety measures employed for the road. It has the advantages like proper planning and decision from beforehand ensures minimization of future accidents, the long term cost associated with planning is also reduced and enables all kinds of users to perceive clearly how to use it safely.

CONCLUSION

This thesis provides an important subject of highway safety and accident studies. Everything a traffic engineer does, from field studies, planning and design; to control operation is related to the provision of the safety system for vehicular travel. This chapter gives an insight of how the analysis of traffic accident can be done from the viewpoint to reduce it by designing proper safety measure. Rapid and continuous advances in communications and computer technology are spurring a host of new concepts in road traffic control. Automobiles equipped with on-board computers, driver displays, and communications devices will receive instructions about the optimal path to a destination from a traffic control centre. The vehicle also will periodically report its travel time and speed to be used as part of the information for the computer to give advice. In more advanced systems, the timing of traffic signals at intersections and ramps will be coordinated with the routing

advice. Rather than simply accommodating vehicles that travel through the network, the system will cause patterns of travel to be altered. Computers and sensors within the vehicle will monitor the operation of critical safety systems (e.g., brakes, steering), warning the driver when conditions exceed nominal values.

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