Chapter-1

INTRODUCTION

The problems of risk occurrence, generation and distribution is closely researched in urban areas and a proper transport planning is suggested which is the principal issue in our day to day life. Risk occurrence is intuitive reaction by the road user to what he perceives to be unanticipated situations or dangers such as stress, emotional outburst, influence of liquor, sudden disturbance on the road etc., when travelling. Risk occurrence is an impact of the influence injected by road user through his reactions. This sudden injection of individual reaction characteristics leads to risk occurrence.

Risk is expression of the road user and it is an impact of influence generated by speed, headway and delay as major criteria along with other contributors, which leads to congestion and accident occurrence. The user behavior on a road invites risk due to multiple factors of influence which leads to risk formation in spatial way.

Urban Transport Planning is an element of comprehensive urban planning, intended to reach certain goals related to the development of urban complex. Assessment of risk generation in traffic mobility is an important task in integrated planning. When risk assumes a spatial form, it is required to find contributors and their dependency level which are responsible for risk. Risk analysis with reference to congestion has been carried out to identify the factors contributing to the risk and suggest a priority based planning of an area.
1.1 Aims of the research

The imperative for research is facilitated from road network of the study area using Geographic information system. It facilitates to obtain the characteristics of the road network with satellite data as input.

The basic aim is to analyze the characteristics which are responsible to the risk, dependency of risk contributors, risk generated links and suggest a priority based planning of the study area by dividing them based on the dependency of the risk.

1.2 Objectives of the study

The rapid growth and development give rise to enduring, sensitive and at times controversial land use issues which leads to traffic problems. Urbanization in the fringe area brings up a number of transportation problems of safety, congestion, accidents, parking, management and enforcement.

The main objectives of the present study are

• To analyze all the characteristics of the road network which contribute to the functionality of road network.

• To analyze the risk contributing criterions (Geometric characteristics, Traffic characteristics, Land use or Road side characteristics and Utility characteristics) and the generation of risk in the study area.

• To divide the study area based on the dependency of the risk contributing criterions.
To promote an effective priority based transportation planning and suggestive traffic management plans for improvement of road system and traffic in the study area.

1.3 Assumptions

- It is not possible to collect full data of input attributes on real time and one normally takes recourse to sampling.
- All the independent variables are independent of each other.
- Risk contributors are considered to obtain maximum risk i.e. objective function method is adopted.
- Practically roads are unspecified to represent traffic demand network.
- The various transportation arteries are represented as links of a network and their intersection as nodes on it.
- Travel between (Origin Destination) OD pairs is restricted to take place solely along the user preferred paths.
- Traffic analysis zones are assumed to be delineated by ward boundaries.
- Each trip made in the study area is equally important.
- All the major corridors of the municipality playing a role in traffic mobility in the process of interaction.

1.4 Lead to the study

Urban congestion and risk on travel are the two major issues which are influencing road user. This influence is effecting on economic travel, leads to pollution of environment, causing
psychological strain and a travel imbalance on traffic mobility. There is a need to identify the risk cause for the phenomenal influence rendered in traffic and to find risk criterions and their influence on traffic.

The user behavior on a road invites risk due to multiple factors which may successively lead to risk formation in a spatial way and it leads to risk generation, distribution and occurrence. This proposal leads for risk modeling right from generation, formation and occurrence of a risk to travel and to find major risk contributors and their dependency on traffic mobility.

1.5 Outline of the thesis

This study is framed on risk analysis using multilevel influencing factors. The input data is collected using output data generated by GPS technology, GIS based supportive approach data and field surveys. Speed, headway and delay are considered as major criterions and other factors are independent variables. Mathematical models have been developed to find risk dependency. Principal component analysis and causal techniques have been used in the analysis. The results obtained from models are compared with original values to find risk generation nodes and establish how they are distributed to other nodes.

The framework for risk analysis for urban areas is designed using an optional utilization of the existing infrastructure. The thesis focuses on the enhancement of operational performance of the system concerned in terms of risk occurrence and distribution with respect to
congestion and also improvement in the operational performance to prioritize the existing functional roads.

1.6 Organization of thesis

Chapter 1: Introduction this chapter deals with the concept of risk, aim of the research, objectives, and lead to study and outline of the thesis.

Chapter 2: Literature review deals with the literature survey of risk, congestion and its models. It deals with study of geographic information and risk factors. It deals risk criterions i.e., Geometric characteristics, Traffic characteristics, Land use or Road side characteristics and Utility characteristics.

Chapter 3: Theoretical analysis deals with the study of the Principal Component Analysis (PCA) and causal techniques which are used to find characteristics which are responsible for risk generation and to study risk dependency of criterions. Principal Component Analysis is a well-established method for dimensionality reduction and multivariate analysis. It also deals with evaluation of parameters.

Chapter 4: Study areas: This chapter deals with explanation of study areas, Gaddiannaram, Rajendranagar and Qutubullapur municipalities. This chapter is facilitated with road network of the study area obtained from using geographic information system. It also facilitates to obtain characteristics of the road network from satellite data and from field survey as input.
Chapter 5: Application of Principal Component Analysis: It deals research design and algorithms for risk analysis using PCA. Objective function is considered to obtain maximum risk. PCA is implemented for Gaddiannarm, Rajendranagar, Qutubullapur municipality areas data and new derived data sets (experimental values) are found out.

Chapter 6: Risk analysis and evaluation of risk criterions is done by using casual techniques. It deals with the finding of risk contributors, regression coefficients, percentage of dependency of the contributors, Causal model equations, Evaluation of risk contributors, finding of the risk generation links and distribution of the links of Gaddiannarm, Rajendranagar, Qutubullapur municipalities areas.

Chapter 7: Results and findings: Results from the present research work and findings give us the risk priority nodes, Risk casual equations, percentage of risk contributors and risk generation links and distribution of links. It deals with findings from the outcome of the research.

Chapter 8: Summary and scope for further research concludes the thesis.

References.