CHAPTER-I

INTRODUCTION

1.1 Statement of the Problem

Transport is a service without which no country in the world can prosper in present trend of development. It is a system in which passengers and goods are carried from one place to another. It begins with the 'human porter' at the earliest stage of its development. Transport increases time and place utilities by providing a means of movement of man and materials from place of abundance to the place of deficit. Mainly for its tremendous progress in surface, air and water transport means during last few decades transport made the earth smaller and smaller.

The word 'transport' has been derived from the Latin word 'transportare'. In Latin, 'trans' means across or the other side and 'portare' means to carry. Thus transport means to carry from one place to another. It carries raw materials to the factories for processing, finished goods to market for distribution and persons from the homes to office and workplace. It thus permits the growth of industries and helps developing trade. It ensures greater social mobility and is therefore indispensable to the growth of society. It is not enough to provide a means of mobility to man and material, but it requires certain essential qualities which are (a) speed (b) safety (c) regularity (d) flexibility (e) cost effective and (f) adaptability.

Transport should be able to provide quick means of movement of various categories of passengers and goods traffic. A quick transport service leads to a quicker turnover of capital and reduces the capital charge of production. If the transport is
slow it may be necessary to establish a stock of goods in the area of demand so that they may be supplied immediately from stock. An increase in speed ensure greater economic utilization of fleet.

Safety in operation is an important aspect of the transportation system. Land routes are relatively safer than shipping and air for they have access to public in the event of an accident and other calamity. Not only safety to passengers, but also to goods and property of others should be the objective of transport system. It avoids deterioration of goods by refrigeration, heating and ventilation and also protects goods against pilferage, fire etc. Despite all modern advancement, general people always hear about the accidents in all the means leading to deaths of thousands. Such events shake our confidence in the modes of transport.

Regularity and frequency of service is an important consideration in transport policy. Transport system should provide regular and frequent services to the consumers. Land routes particularly railways are able to provide regular and assured services to the consumers.

Flexibility of service determines a passenger’s choice of a particular form of transport. Road transport is the most flexible form of transport because the goods can be carried even at the doors of the consignee. This ensure safety of consignment.

In a rational transport system cost of service is an important consideration. Cost of transport service should be reasonable enough to attract traffic. However, it should not be judged by the schedule of freight rates of the service but also the cost of travel time.

Transport service should be adaptable to the requirements of various categories of consumers. Road transport is suitable for short distance journey, while railways are most suitable for carrying heavy, bulky and low graded goods over a long distance.
Though the above elements are required for an efficient transport system, main considerations of a balance system are time and cost. The cost of travel should be minimum especially in metropolitan cities where the journey to work takes longer time affecting adversely human efficiency and productivity. As such the transport system needs to be managed such a way that it ensures greater economy, greater speed and at the same time safety and comfort.

From the advent of the human race, the means of transport has been evolving according to the conditions of development of science and technology. Earlier methods of transportation were animal drawn carts on land and sailboats on water. Some five thousand years ago, the advent of the wheel marked a development of far reaching consequence and laid the foundation for efficient ground transportation. Solid wheeled carts and chariots were the immediate outcome. The discovery and application of steam and electricity in the 19th century and the internal combustion engine in the 20th century revolutionized travel and introduced the present era of mass transport. The next spectacular break through came in late 1950, with the invention of aircraft and jet planes opening the world to the immense benefits of air travel.

The Indian transport industry dates back to ancient days wherein trade routes linked several rural and Urban centers to ports and markets in the country. Roads have been existing in India for the last 5000 years. Historians have tried to establish a link between caves, rock art and travel. Many caves were on the ancient trade routes in India. The town plans of Harappa and Mohenjodaro indicate well planned road in townships for transport purposes. In early stages of Indian history, Ashoka and Chandragupta made efforts to construct roads. But the real progress was made during the Mughal period. A number of roads were laid during the Sultanats and Mughal period. Most of the present trunk roads follow the Mughal routes. These routes were
essential for strengthening and consolidating the empire. One such road was constructed by Sher Shah Suri which connected Peshawar with Calcutta (Presently Kolkata). It was named as Grand Trunk Road and joined Amritsar with Calcutta after partition of India in 1947. Presently, it is known as ‘Sher Shah Suri Marg’.

Road transport development is very important for the socio-economic development of any region. Development of industry, mining, forestry, agriculture, trade and tourism etc. depends to a large extent on the existence of an efficient transportation network. In India, the cities as well as the villages have been connected with the road transport. However many urban areas are connected with air transport means. Some of the coastal towns and villages as well as some areas situated near the perennial big rivers are connected with water ways. As most of the cities in India originated hundreds years ago the culture and tradition of the settlements are quite different from western settlements. This difference also well reflected in the case of transport means as well as in pattern. The roads were laid to transport man and materials by means of bullock carts. Later it has been replaced by motor vehicles in most of the urban centers. However, many settlements have still bullock cart as main means of transportation while in some it is of mixed type. With the natural growth of population as well as migration, the number of vehicles have increased in all the urban centers of the country though it is not uniform throughout. Many of the cities have now suffer from traffic congestion in recent years. In some of the cities it becomes a serious problem. City dwellers face several problems for which living in such cities become miserable. Guwahati is one of such cities which are facing serious traffic congestion problem from last few years. Here, how the problems created, what is the present pattern of road transport, how it changes in course of time, and what are the solutions in solving the road traffic related problems are the matter of discussion.
Guwahati is virtually the capital of entire North-East and one of the most fast growing cities of the country (Fig. 1.1). The locational peculiarities particularly having direct rail, road and air connections with the rest of the country enhance its importance to a great extent. National and State Highways link this city with states of Tripura, Mizoram, Meghalaya, Manipur, Nagaland and Arunachal Pradesh besides other areas of Assam. The city is also linked by daily air service with Mumbai, Kolkata and Delhi besides daily air flights to Agartala, Imphal, Silchar, Tezpur, Jorhat, Dimapur, North-Lakhimpur and Dibrugarh. Recently Guwahati airport has been given the status of international airport by Ministry of Civil Aviation, Government of India. Flight to Bangkok, Singapore originate regularly from here. The railway broad gauge line which connects it to the rest of the states of the country passes through the heart of Guwahati city. Once Guwahati was also well connected with Kolkata by regular steamer services through the river Brahmaputra. However, river route is virtually closed after the partition of the country.

Guwahati experienced initial growth after independence due to establishment of institutions of higher education like Gauhati University, Engineering College, Medical College, Veterinary College etc. There after the establishment of North East Frontier Railway Head Quarters at Maligaon, Noonmati Oil Refinery and other heavy and medium sized Petro-chemical industries as an offshoot of Refinery have given some industrial impetus to this area. The major business houses have set up their regional offices at Guwahati. Since 1971, after shifting of the capital of Assam from Shillong, Guwahati regained its political eminence, which was lost during the British days. Since 1971, Guwahati became a tea auction center, the second of its kind in India next to Kolkata. The location of this tea auction center led to the construction of a large number of godowns in and around the city in subsequent years. The only stock exchange in the North East India is located at Guwahati.
LOCATION OF GUWAHATI

Fig-1.1
At present the city of Guwahati covers an area of about 262 Sq. km under the Master Plan area out of which 215 sq km is under Municipal Corporation area. The city is divided into 60 wards (Fig. 1.2). The city spread about 10.0 km in the north-south direction and about 27 km in the east-west direction. The population of Guwahati Metropolitan Area as per census of 1971 was about 2,92,029 and rose to 8.16 lakhs as per 2001 census, indicating growth of population more than 280 percent. This rapid growth of the population and consequential growth in residential units and related infrastructure, public utilities was uncontrolled and unplanned which has resulted in many problems in the city. With the increase in population density, spurt in building construction activities, filling of the beels (wetlands) and low lying areas and encroachment along the side of the existing drainage channels reduced the hydraulic capacity of drains and has resulted in a situation where even a downpour of half an hour plunges many areas of the city into flood like situation. Clogging of drains due to heavy silt brought down from surrounding hills aggravate the seasonal hazard of water logging in the city.

With the growth of population the number of both motorised as well as non-motorised vehicles have alarmingly increased. Upto 31st March 2002 as many as 2,79,983 motor vehicles have been registered in the city. It has been estimated that altogether 3 lakh motor vehicles plied on the roads of Guwahati. The figure includes the vehicles registered at Guwahati and the daily entrance of the vehicles from different states of North East India as well as other part of Assam. A large number of heavy vehicles and old, ill maintained private as well as government vehicles create different environmental problems in the city. More problems have arised due to narrow and unmaintained roads, improper traffic management and unaware people of the city. All these made the city life miserable. People now do not like to go out to face the problem of traffic congestion, walk on muddy roads, inhale dust and smoke and many other
hazards in the city. All look for development and like to enjoy a healthy city environment. But with a few natural causes, day to day activities create many environmental problems. So far the efforts made by the government and non-government organizations seem to be inadequate in solving many of the problems.

In this study out of many problems in Guwahati, the transport pattern and related issues have been taken up for examination and finding out solution to make the city healthy and keep livable for the future generations. The problem could be analysed from various angles. It has been tried here to deal it from geographical perspective.

1.2 Review of Relevant Literature

Transportation is one of the prime factors for all kinds of economic activities. However, the geographers gave little attention in this respect. For long, no conscious effort was made to define the nature and objective of transport geography. However, from the later part of the last century some efforts have been made to develop this branch of geography. Gradually, systematic approaches were introduced and as a result it recognised as one of the distinguished branches in geography. As a pioneer, Prof. Ullman (1954)\(^1\) marked out the nature and objective of this branch and showed its concern with economic aspects which involved study of various features of traffic volume, origin and distribution, rate structures and type of physical facilities. B. J. L. Berry (1959)\(^2\) later observed that specialised economy, circulation and traffic and transport system are mutually interdependent.

Of late, many scholars have contributed substantially to the field of transport

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geography. The works of J. O. Wheeler and F. P. Stutz (1971) on spatial dimensions of urban social travel, A. J. Scott (1971) on transportation network, S. J. Bernstein (1973) on mass transit and the urban ghetto are such literatures appeared. Before that J. Singh (1964) traced out transport studies in different countries in which four objectives found common – (i) to make the study of the transport system in a region a systematic one (ii) to develop a transport network which controls rational proportion between the growth of transportation and other aspects of regional economy, (iii) to examine the role of transportation in space economy and (iv) to use transportational expression as a tool for analysing or explaining other geographical phenomena. According to Vaislevskiy (1963) the transport geography in general falls in two divisions - (i) the geography of traffic and (ii) the geography of transport routes (transport-nets, lines, nodes).

Among the theoretical studies, the works of Kansky (1963) deserves first mention. Some of the transportational characteristics he analysed are accessibility, circuity, traffic etc. Passenger traffic has given less priority in his analytical models. In this regard a few other works can be recorded. The typical sequence of transport development in the under developed countries have been worked out by Taaffe (1963) and others. Similar approach has been made by Sven Godlund (1956). The transportation has received an apt response from urban geographers. Urban

sphere of influence, hierarchical order of an urban centre, suitability of a town as a centre for different specialised facilities are controlled mainly by the transport facilities. These aspects have been studied by Brown (1959)⁸, Mayer (1954)⁹, David (1962)¹⁰, Green (1966)¹¹ and others. Almost in same way Garrison (1959)¹², Glimore (1953)¹³ and Horwood (1959)¹⁴ also tried to show the impact of transportation upon the changing landuse pattern within and in proximity of the towns. The works of John Whitelegg (1986)¹⁵ cover the aspects like transport and landuse in urban areas, the structure of personal travel, role of cars and private vehicles in urban areas etc. The transport expert Michael Thomson (1977) in one of his books identified seven major sets of transport problems in the large cities of capitalist countries. These are traffic congestion, accidents, public transport, pedestrians behaviour, environmental impact and parking.

There are very few works on the aspects of city bus service for urban transport system. In India the works of Kayastha and Singh 91972)¹⁶, Bharadvaj (1955-56)¹⁷,

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Mukherjee (1974)\textsuperscript{18} and Sen (1971)\textsuperscript{19} are worth mentioning. Traffic flow in Varanasi (1963)\textsuperscript{20}, Commuters flow of Calcutta (1963)\textsuperscript{21}, accessibility in North Bihar (1967)\textsuperscript{22}, traffic pattern at Sirsi (1968)\textsuperscript{23} and road transport in Brahmaputra Valley (1979)\textsuperscript{24} are the significant works to be mentioned.

In regard to the role of transport in human interaction and economic interdependence, the contributions of a few researchers are worth mentioning. Analysis of economic interdependence of Meerat City with surrounding rural places and urban centres done by Naresh Kumar (1985)\textsuperscript{25} and application of factor analysis in the study of functional regions within a city by Goddard (1970)\textsuperscript{26} are some of such examples.

Rural-urban relationship study forms an important basis of geographic research in India and abroad. In this regard the contributions of Morril (1965)\textsuperscript{27} and Clark

\begin{thebibliography}{99}
\item A. B. Mukherjee, Road Transportation Network Structure and Levels of Urbansisation in Rajasthan, \textit{The National Geographical Journal of India, Vol. XX}, part 1, 1974
\item D. N. Singh, Accessibility in North Bihar \textit{National Geographical Journal of India, Vol. 13}, 1967
\item B. N. Sinha & L. T. Sharma, \textit{Traffic Pattern at Sirsi}, Dharwar, 1968
\item D. Deka, Regional Analysis of Road Transport in the Brahmaputra Valley-A study in its Development and Potentials, \textit{Ph D Thesis} Unpub, G.U. 1979
\item N. Kumar Economic Interdependence and Human Interaction in Meerat City \textit{Proceedings of the Sixth NAGI seminar IIT Kharagpur}, 9-11 May, 1985, pp. 137-138
\item R. L. Morril, Migration and Growth of Urban Settlements \textit{Lund Studies in Geography Series B, Human Geography (26)} 1965, pp. 130-170
\end{thebibliography}
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(1967 & 1968)\(^2\) are important. In the study of Morril emphasis was given on the
analysis of migration and consequent growth of urban areas. On the other hand Clark
worked on consumer travel pattern. In India, the assessment on rural urban relationship
done in the study of Hyderabad Metropolis by Alam and Khan (1972)\(^2\), the study on
Bangalore city by Prakash Rao and Tewaris (1980)\(^3\) and on rural urban migration to
Delhi metropolis by Banerjee (1987)\(^4\) are worth mentioning.

Traffic frequency become essential, particularly for developing countries, when
the capital available is scarce and has competing demands; the investment in a transport
project have to be planned carefully. This underlines the need of traffic forecasting.
But the long range transport plans are not very useful because the plans do not exist in
other sectors.\(^5\) In general, transport plans are done for a period of about ten years -
five years in detail and an additional five years in less detail. Goldberger’s (1964)\(^6\)
theory in this regard found to be most relevant.

The trip generation is a general term used in transport planning to cover the field of
calculating the number of trips end in given areas. It is used to understand the reasons
behind the trip making behaviour. In this regard the contributions of Fratar (1954)\(^7\),

\(^{28}\) W A V Clark, Consumer Travel Pattern and the concept of Range Annals, Association of
American Geographers 58, 1969, pp 386-396
\(^{29}\) S. Manzoor Alam and W. Khan, Metropolitan Hyderabad and Its Region. A strategy for
development, Asia Pub. House, Bombay 1972
\(^{30}\) V. L. S. Prakash Rao and V. K. Tewari, The structure of an Indian Metropolis - Bangalore
\(^{31}\) B. Banerjee, Rural to Urban Migration and the Urban Labour Market - A case study of
Delhi, Himalayan Pub. House, Delhi 1987 pp 1-279
\(^{32}\) H. A. Adler, Sector and Project planning in Transportation, World Bank Staff Occasional
Papers No. 4, John Hopkins Press 1967
\(^{33}\) A. S. Goldberger, Economic Theory, Wiley, 1964
\(^{34}\) T. J. Fratar, Vehicular Trip Distributions by Successive Approximations, Traffic Quarterly
Vol. VIII No. 1 Sangatuck 1954, pp. 9-14
Voorhees (1955)\textsuperscript{35}, Tanner (1961)\textsuperscript{36}, Hanseh (1962)\textsuperscript{37}, Blunden (1971)\textsuperscript{38} are important.

Traffic assignment is another important aspect which is equally important in transport planning process wherein the trip interchanges are allocated to different parts of the networks forming transportation system. The main applications of traffic assignment are to determine the deficiencies in the existing transport system, to develop construction priorities and to test alternative transportation system proposals by systematic procedures. A number of methods have been tried in this regard. Significant contributions in this respect made by Zakaria (1968)\textsuperscript{39}, Burrell (1968)\textsuperscript{40}, Smock (1962)\textsuperscript{41} and Schneider (1963)\textsuperscript{42}.

Model split is a process of separating person trips by the mode of travel. In general, model split refers to the trip made by private car as opposed to public transport. Along with this the trip characteristics i.e. trip purpose and trip length aspects have

\begin{itemize}
  \item \textsuperscript{35} A. M. Voorhees, A general Theory of Traffic Movement, \textit{Proceedings of the Institute of Traffic Engineers}, 1955
  \item \textsuperscript{36} J. C. Tanner, Factor Affecting the Amount of Travel, \textit{Road Research Technical Paper No. 51 HMSO}, London 1961
  \item \textsuperscript{38} W. R. Bluden, The Land use, \textit{Transport System}, Pergamon Press 1971
  \item \textsuperscript{40} J. Burrell, Multiple Route Assignment with Application to Capacity Restraint, \textit{4th International Symposium on the Theory of Traffic Flow}, Karlsruhe, 1968
  \item \textsuperscript{41} R. Smock, An Intermative Assignment Approach to capacity Resistant on Arterial Networks, \textit{H R B. Bulletin 347}, H. R. B. Washington 1962
  \item \textsuperscript{42} M. Schneider, A Direct Approach to Traffic Assignment, \textit{Highway Research Record No. 6}. H. R. B. Washington, 1963
\end{itemize}
been analysed. These have been done by Keefer (1962), Wilson (1967), Bruton (1970), Warner (1982) and Raghavachari (1982).

The aspects mentioned above are discussed by the researchers not only in other countries of the world but also studied in India. However, most of the studies in India are piecemeal in nature. In case of Assam, such studies are very few. However, following studies in this state, particularly in Guwahati are noteworthy. The development of roadways in Assam by Goswami (2003), a macro study for safety on roads in Greater Guwahati during 1974-81 by Das (2003), road accident and safety studies and some problems in Guwahati roads by Barua (2003) are some of the important contributions in recent years. The papers published in the book- Guwahati : the Gateway to the East, edited by K. Alam et. al (2000) highlighted various issues which directly related to transport and associated problems in Guwahati city. The important

44 F. R. Wilson, The Journey to Work-Model Split, Macclaren, 1967
47 S. Raghavachari, Modal Split Models for Work Trip Travel, Indian Highways, New Delhi, 1982
48 B. M. Goswami Development of Roadways in Assam : Souvenir, Indian Road Congress Orgs. by PWD Govt. of Assam 2003, pp. 25-27
49 N. N. Barua, Need for Mechanisation and Compaction Control in Flexible Pavement Construction and Compliance in 4-Laning of Guwahati by pass from Km 156 to 163.895 of NH 37 under East West corridor, Souvenir, Indian Road Congress, Org. by PWD Govt. of Assam, 2003, pp. 35-67
50 M. U. Ahmed, Road Accident and Safety Studies and Some Problems in Guwahati Roads. Souvenir, Indian Road Congress, Org. by PWD Govt. of Assam, 2003 pp. 44-52
contribution in this book in regard to transport in Guwahati and associated issues are reflected in the works of Bhattacharyya (2000), Hazarika (2000), Bez (2000) and Sharma & Bhattacharyya (2000). Bhattacharyya’s work is on growth and changing face of Guwahati, Hazarika’s works on development problems of Guwahati, Bez’s works on transport problem and Sharma and Bhattacharyya’s work confined on road transport in Guwahati city since 1972. The environmental problems of Guwahati and their relation with transportation are reflected in the works of Hazarika and Sharma, and Sharma and Rahman.

The white paper on pollution in Guwahati with Action Points (1999) deals with various environmental issues of Guwahati. Many of the issues are related to the road transport in Guwahati. Remote sensing application in wetland mapping by C. R. Deka and P. Barua (1993), urban water supply study by Barua are noteworthy contributions. Guwahati Path Finder published in 2000 by SRDC in which detail road network and distribution of basic infrastructures like banks, schools, colleges, post

54 K. Bez ‘Empirical Evidence of Transport Problems in Guwahati city; Guwahati: The gateway to the East, ed. K. Alam et. al. concept Pub-2000 pp 136-144
offices, police stations, temples, churches, mosques, rivers, telephone exchanges, hotels, hospitals, warehouses etc. have been plotted after extensive survey. It is an important document consulted in this research. Moreover, water logging problems of Guwahati by P. C. Bora and R. Saikia (1998)\textsuperscript{59}, environmental management through land use planning by R. Sahoo and J. Bora (1998)\textsuperscript{60} and landslide hazard zonation of Guwahati city by B. Das Saikia and R. Saikia (1998)\textsuperscript{61} are some of the worth mentioning contributions.

1.3 Objective of the Study

The basic objective of the study is to examine the issues related to road transport pattern and its problems in the city of Guwahati. The issues being addressed in this respect are -

(i) To study the present pattern of road transport within the city of Guwahati and its growth during the last few decades particularly after shifting of the capital from Shillong to Dispur.

(ii) To find out the causes of traffic congestion and to highlight the trend of traffic related problems and its consequences,

(iii) To study the environmental problems arisen due to traffic volume, traffic congestion and management policy,


(iv) To highlight the impact of population growth, management problems and other related aspects which are directly or indirectly responsible for transport problems in the city,

(v) To generate a database for proper transport planning in and around the city and

(vi) To suggest some of the solutions to minimize the transport problems in North Eastern States in general and Guwahati in particular.

1.4 Hypotheses

Road transport is the main means of transport not only in Guwahati but almost in all cities in the country. Proper planning of road transport with long term perspective is lacking in most cases. As a consequence with the progress of time the cities are facing many problems. In certain cases city life become miserable. Guwahati is approaching in this direction. Traffic related problems are increasing day by day. Many environmental problems have arised due to increasing number of vehicles and unmanaged situation. Unfortunately, adequate study in this regard has not been done. Therefore, an attempt has been made in this study to examine the following hypotheses. The conclusions drawn from these enquiries will help to develop a proper understanding of the problem and better perception on management of the city environment. The main hypotheses being tested in this study are the following:

(i) Road transport development in Guwahati is related mainly to its locational advantage rather than other advantages.

(ii) The evolutionary process is controlled by the geo-economic environment of the city as well as surrounding areas.
(iii) High rate of population growth particularly after shifting of capital from Shillong and concentration of economic activities in the recent years are responsible for the increase of road traffic,

(iv) Natural geo-physical environment is responsible for causing certain traffic related problems in Guwahati,

(v) Government policy and mismanagement at many levels are responsible for creating traffic related problems in the city, and

(vi) Lack of public awareness and reluctant attitude in involving the developmental activities of the city keep many of the problems remain unsolved,

1.5 Methodology

Information required for the study are collected from various sources. Both primary and secondary data have been used to draw inferences relevant to the study. Relevant data generated by the government agencies, findings of published and unpublished research works, reports of various organizations have been taken as secondary data sources. Base map for the study was prepared superimposing maps published by Survey of India, Assam Remote Sensing Application Centre (ARSAC), Guwahati Municipal Corporation, Public Works Department etc. Moreover, qualitative information required to know the past and present transport scenario in Guwahati have been collected from various government and semi-government offices.

The above secondary information have been supplemented by primary data. The primary data have been collected partly using questionnaires specially designed for the purpose and partly by counting category-wise vehicles on roads at various time interval. Moreover, a few experienced persons have been interviewed to know about the changing scenario of the city.
As it is not possible to put all the data collected in the thesis, the data had been summarised and tabulated. In summarizing the data sets, both conventional techniques as well as computer software were used. To make the things easily understandable, summarized data have been presented using maps and figures. Some of the figures drawn using conventional cartographic methods and the others with the help of computer application. Analysis of the figures, maps and other information helped in establishing findings based on which some suggestive measures have been put forwarded.

1.6 Significance

The transport geography is itself a recent subject which has developed in last few decades. The development in the country like India is still new compared to many other countries of the world. The study of this kind is very limited in Assam and no such serious efforts made so far in the case of Guwahati which have laid emphasis on proper transport planning. The study has been taken up basically from geographical perspective and therefore the geographical aspects related to the transportation have been considered here.

Looking into the present transport problems in Guwahati which have caused due to high rate of population growth as well as increase of transport vehicles of all kinds, poor road condition, failure of management system, this study has been undertaken.

Paucity of relevant data required for transport planning is one of the major problems. Therefore, the data which have been generated in course of the study definitely help in identifying the problems and its causes and also in finding out the solution for making the city a healthy one.

The findings of the study and the measures suggested here definitely help in
developing suitable implementation models for transport promotion and to minimize the problems created due to haphazard growth of transportation in and around the city. As there are many cities like Guwahati in India the suggested solutions of the thesis may also be utilized in other similar cities for implementation. As such, the study has both academic significance and also practical utilities.

1.7 Organisation

The work comprising eight chapters in which the issues under study have been analysed to draw some inferences as well as to suggest some measures to improve the situation.

The introduction chapter, covers the statement of the problem, objectives, methodology, hypotheses for testing, significance and organization of the study. The chapter II has been devoted to the historical background of the study area i.e. about Guwahati. The chapter III contains the geographical setting of the study area. In the first part of this chapter, the physiography, climate, drainage, geology, soil, flora-fauna etc. have been discussed while in the second part i.e. in the cultural setting part brief description of population and settlement, land-use, transport and communication, industry, trade and commerce and about various institution in the city have been incorporated.

The chapter IV has been devoted to the evaluation of transport from ancient to modern age and to find out the various historical and economic forces which have mould the existing pattern of transportation in Assam as a whole and in Guwahati in particular.

The chapter V depicting the growth and development of transportation in the city. The present scenario of transport pattern in the city has also been discussed. The
next chapter i.e. the chapter VI covers the analytical part of the study. The generated primary and secondary data have been analysed here to find out degree of accessibility, effectiveness of the existing transport arteries. It aims at identifying the cause and effect relationship of various parameters of transportation in the city.

The Chapter VII covers the transport problems in intra-city, inter-city, urban rural and sector level. The environmental problems related to transport and associated activities also discussed in this chapter. The aspects related to its planning and future prospects have also been discussed in brief.

The Chapter VIII has been devoted to give suggestive measures for improving the existing transportation system. Some specific suggestions have also been made in regard to new linkages, road improvement and to dilute the transport related and environmental problems in and around the city of Guwahati.