CHAPTER-VIII

SUMMARY OF THE STUDY AND CONCLUSION
8.0.0 Development of the Research

Research on transport modelling, planning and development being conducted to-date in developing economies had its origin in the studies already undertaken in developed western countries with the main objective being to alleviate problems associated with urban population growth, rapid increase in motor vehicle ownership and usage and at the same time, utilizing the full range of transport modes available for urban movement.

Thereof, it was observed and established that land-use development patterns in a given region is a function of traffic generation or attraction. The reciprocal proposition that transportation is a function of economic development is also true. This inter-dependence has been considered a key-note for modern transport planning. The process for conducting these studies was developed and is still evolving to provide systematic methods for solving regional transportation problems of developing countries. The fundamental premise which underlies these studies and the present research is that some future planning-year equilibrium condition of regional economy is a meaningful state to attempt to predict and evaluate.

In the case of developing economies, it is observed that there was an enormous growth of traffic in regional areas more especially in urban centres of Indian economy. However, the concerned authorities have no doubt been taking continuous steps to tackle the challenging traffic and transportation problem but unfortunately the facilities for traffic being created have always been witnessed as an unending process and has naturally led to deterioration of traffic and economic development conditions in most Indian regional economies.

Therefore, the critical problem in most Indian regional economies is inadequacy of transport infrastructure which is further aggravated by increasing demands of inter and intra-regional traffic due to rapid growth in agricultural sector, industrial sector, population and employment. Realising this need, the Indian government decided to step up the investment schemes and programmes for development of regional road transport facilities.
Despite these efforts, the solutions to the problem of regional traffic growth and transport facilities development are not yet been fully utilized. In other words, it is observed that regional transport investment required is very large and the resources available are too scarce compared to what is required to be invested. Hence, there is need to ensure that every investment is well planned for regional transportation and development. In this context, the policy makers and planners in charge of implementation must have the necessary concepts and models related to regional transport planning and development to ensure that every investment is put to the best use.

For this purpose Bharuch region was selected as case study because of its proximity for data collection, analysis and survey involved in this research. This case also represents a typical industrialising regions in developing economies. Its recent dynamic activity patterns over space and well documented literatures related to this study are the principal motivations for the adoption of this region for the study.

8.1.0 Development of Hypotheses

Based on the earlier theories in chapter I section 1.1.0 and chapter II section 2.3.0 of this study. The following hypothesis were developed and tested.

(i) Whether there is any relationship between regional transport generator or attraction and various kinds of activity development pattern over space.

(ii) What are the magnitudes of regional traffic volumes? Where do they originate from and their major final destinations? Are they likely to change? How? Are the regional traffic homogeneous?

(iii) What are possible alternative transport plan suggested? What will be it’s future conditions and impact?

(iv) How should the governments and non-government organisations efficiently allocate their resources in regional transportation investment and development.
8.2.0 Methodological Aspects

In this study we have delineated Bharuch region into eleven internal and six external zones for the purpose of easy data collection, analysis modelling, and policy planning. As discussed in the methodology resolutions in chapter, this zonalization has been carried out on the basis of homogeneous geographical locations in terms of land-use development patterns, population, employment, service activities and urban centres that could attract and generate traffic zone-wise. Hence, regression model was used in the above data to test the earlier mentioned hypothesis in this study.

The contribution of this regression model is to establish a cross-sectional relationship between zonal number of traffic generation and various activity development for the period taken into consideration.

One of the chief assets of the regional transport planning model is its ability to test the significance of contribution of a number of variables, thought to affect transport generation behaviour, and to select those which are more important for policy issues.

Based on the ratio $R^2$ in the regression model which assumes a magnitude between 0 and 1. In this case, planner or policy-maker will select alternative policies for regional transport planning. The good fit of $R^2$ in the model depict excellent regional transport policy planning.

Land-use transport model, discussed in chapter III is very important in determination of regional land-use activity allocation and transport demand simultaneously in the study region. At the regional level minimum mean deviation residuals of alpha magnitude depict best solution for alternative regional transport policy planning.

8.3.0 Type and Source of Data

This analysis is carried out with the help of zone-wise secondary data collected from different census 1991 handbook, Bharuch District, Gujarat State, India and various reports of road transport statistics and economic reviews published by the institutions of the concerned
region as well as government organisations such as Gujarat State Road Transport Corporation (GSRTC) Bharuch Division and Non-governmental Organisation (NGO).

8.4.0 Major Findings and Conclusions of the Study

As discussed in the methodology of research of the present study, the study has proceeded through two methods of analysis - descriptive and quantitative. We first attempted to examine zonalisation of existing and future required land-use patterns and activity categories in terms of freight and passenger traffic expected in regional transport development of the case study.

In chapter V we zoned Bharuch region and examined the future growth rate of various disaggregated activities in terms of zonal number of population, employment, household, trade and commerce, other services, freight and passenger traffic zonewise. The zonal activity projections expected in 2041 are worked out with the help of alternative forecasting methods such as arithmetic increase method, geometric increase method, and incremental increase method, calculated for regional transport planning and development in these activities. The results of this analysis showed that the expected percentage increase in zonal number of population, household, employment, trade and commerce and other services are very high at the end of year 2041. This may be due to the fact that in the next five decades Bharuch region is expected to experience economic reforms and transformation in government policies, agricultural sector, industrial sector and other service sectors which will be attracting outside world for investment in the same. The future changes in regional economic development will be expected also to have a bearing in traffic growth zonewise at the end of year 2041 while transport facilities remains constant.

In chapter VI of this study we have modelled and examined a cross-sectional relationship between zonal number of traffic generation and various activity development over space zonewise.

Here, an attempt is made to examine Mitchell and Rapkin's hypothesis that various kinds of traffic generation is a function of various kinds of activity development pattern over
space in the study regional area, using the logarithmic regression analysis. The results indicates that zonal number of population, trade and commerce, service manufacturing industries, other services, employment, household and mode of transport frequency are highly significant and have positive relationship on the determination of traffic generation and attraction zonewise in Bharuch region. While the other variables namely zonal number of marketable surplus, production input and area under agriculture are insignificant and positively influenced the determination of traffic generation rates zonewise.

Thus, we have adopted a step-wise regression model, where each zonal independent variables is introduced subsequently i.e., one independent variable at a time against the dependent variable of zonal number of traffic generation. Therefore, on the basis of the step-wise regression it is found that when more zonal independent variables are included together in the regression analysis they have a meaningful influence in determining the zonal rate of transport generation. This result supports the earlier hypothesis by Mitchell and Rapkin. It is also true that the rate of zonal transport generation in Bharuch is a function of regional economic development. The insignificant of some independent variables in Bharuch region indicates the presence of multicollinearity.

In chapter VII of this study, we have calibrated 1991 zone-wise land-use variables in terms of employment and population, with the help of Lowry-Garin model and the magnitude of alpha value was found at 1.3. Hence, with alpha value at 1.3, the zone-wise total population and employment converged with existing population and employment within the acceptable tolerance of 1 percent. Therefore, at 1.3 magnitude of alpha value, the model was taken to be calibrated. Hence, with the help of this model we obtained future traffic solution matrix 17 x 17 in the planning year 2041. In 2041, we observed that there is high growth rates of passenger traffic generation zone-wise as compared to the study year 1991.

In this case, therefore, we suggested expected alternative policy package that new linkages and bus mode of transport could be provided to capture the expected traffic growth in 2041. This could reflect a wide range of efficiency and development in Bharuch region at the
end of planning year.

The result of transport demand in 2041, indicates that as the expected level of economic development rapidly increases over space has a bearing on zonal traffic growth in Bharuch region.

Thus, the empirical analysis undertaken in this study shows different experiences in the regional transportation and development, further the analysis leads to the conclusion that the rate of transport generation is not determined by activity development categories alone, but there are a number of technological and socio-political factors, which shape the nature and pattern of regional transportation development.

8.5.0 Limitation of the study

As stated earlier, this study has been carried out with the view of the following limitations.

i) The study is limited to regional road transport modelling, planning and policy analysis with respect to integrated activity development patterns that could influence existing and future transport generation or attraction in the study region for future alternative plans and development.

ii) The models adopted in this study are exclusively derived from the principles of urban transport planning analysis devised for developed countries with due modifications. Otherwise there was no alternative in existence for developing economies.

iii) Due to financial and time constraint the present study could not be undertaken for Kenya regions where the author belongs. Therefore, the study was carried out abroad. However, the procedures and principles of this study are capable of generalization to other regions in developing economies for future research.

iv) The projections attempted in this study for various transportation variables and similarly various independent variables relating to activity patterns in the region should not be taken as form prediction/forecast, they aim at exploring the future scenarios on the
basis of past observed behaviour and time trends. The uncertainty of future and unknown
developments in transportation technologies provide an important limitation of such
planning study to which the study is no exception.

8.6.0 Scope for Future Research

Due to time and financial constraint this study could not undertaken all the tasks fully.
Therefore, the scope for future research in this study can be understood from the following
perspective.

(i) In chapter VII of this study, we obtained the expected solution traffic distribution at
the end of 2041. In the context of future research therefore, assignment model could
be developed and adopted to utilize traffic volumes on existing road network zone-
wise, so that to determine the transportation deficiencies in Bharuch region and formulate
alternative regional transport plan to eliminate the deficiencies observed in the planning
2041. Such plans which may emerge from this model could reflect a wide range of
regional efficiency in transportation and development.

(ii) Development of linear programming model could also be developed and used to obtain
optimum expected alternative regional transport solutions in the planning year 2041,
for regional efficiency and development.