Chapter VI

SUMMARY AND CONCLUSION

The whole Brahmaputra valley of North-East India is recognised as a functional region as it functions in a variety of ways for the services of entire North-East India. Being a land-locked valley, the entire flow of men and materials to and from the neighbouring regions is maintained through the valley region. Consequently the region has to shoulder a great responsibility for the activities and usual growth process of the neighbouring States. Owing to unavoidable physical and economic difficulties for the growth of railways and airways, the road transport becomes the only vital means of inter and intraregional mobility.

The region has a strong geographical personality. This personality has provided the motive force for the growth of road transport in the region. On the otherhand the road transport itself propelled the wheel of economic growth of the region. The long history of the region has the imprints of the origin of the present road system. The ancient trails serving as avenues of trade intercourses were improved, extended and abandoned according to the needs of the growing settlements and circumstances. A beautiful road-net existed not only within the valley region but had a number of trade
routes communicating China, Tibet and Burma across the Eastern Himalayas. As the region was inhabited and ruled by a number of Adibasis namely the Koches, the Kacharies, the Chutias and lately by the invading tribe the Ahoms from North Burma and followed by the British colonizers, the socio-economic status of the region was shaped in variable ways. It is an admitted fact that its present socio-economic structure was laid down during the Ahom period. This economic set up was gradually renovated with modern tinges by the Britishers. The advent of British rule brought the improvement of the old roads in the region in accordance with their requirement of establishing a strong administrative machinery. Further improvement of transport lines was stimulated by the industrial potentialities of the region namely tea, coal, and petroleum. The introduction of railways was also done by the Britishers originally for facilitating the development of above noted industries. A number of feeder railway lines and feeder roads were also constructed for easy access to the great Brahmaputra river, mainly in tea and oil districts of upper Assam. With the expansion of railway from the beginning of the 20th Century, the feeder roads to the railways had to be constructed which increased the road length in the region. The outbreak of the second world war
necessitated construction of a new network of roads to meet the emergency. Because the existing road-net and communication lines miserably failed to meet the emergency, primarily due to the fact that these were developed with selfish designs of the exploiters for harnessing the resources and not for the welfare of the region.

After Independence, the Government of India adopted the principles of socialistic developments and framed the Five Year Plans to achieve a radical socio-economic transformation of the country. In the first three successive Five Year Plans, besides development of other sectors, comprehensive schemes were taken up, by which the roads, bridges and culverts were improved, expanded and a large number of through roads were constructed. The Chinese aggression in 1962 was, in reality a blessing in disguise so far the development of roads in the border areas were concerned. Because the war exigency demanded speedy movement of supplies to the strategic points for which the only alternative was roadway. The planning regime shows a satisfactory road development in Assam, which approaches almost the national average, but in comparison to other States, such as Bihar, Uttar Pradesh, West-Bengal, Madhya Pradesh, Tamil Nadu, the growth is too
meagre considering its strategic importance and resource potentialities. The poor condition of the rural roads is reflected by the meagre percentage of villages connected with all weather roads. The miserable conditions of the village roads greatly inhibit effective marketing of agricultural products as well as supplies of essential goods for rural communities. This is also one of the contributory factors for slow urbanization in the Brahmaputra valley.

Prior to the second world war the rural road development was under Local Boards, an organization of the local self-Government. The tumultuous conditions of second world war made the Local Boards almost defunct. After Independence, this institution of local self-Government was replaced by Panchayats both at village and subdivisional levels, having advisory authority for improvement and development of roads. But the execution of such development schemes actually rested upon the reorganised Public Works Department of the State Government. Apparently under the new administrative set up, road length was increased and fresh interior areas were opened up, but the existing road communications and the available service facilities were inadequate to bear the burden of traffic load of the region.
The gradual nationalization of road transport eliminates the uneconomic competition of private transport organizations and promoted adequate and efficient services to the common people. The significant growth of private transport both for passengers and goods indicates the soaring demand for road transport. The Government also could not cope with the ever increasing mobility of the people and goods primarily because of ever increasing wholesale business in the valley region. Limited railway connections, difficulty of transhipment between marketing centres and rail-heads, the introduction of insurance in road traffic, all probably play vital role in the growth of private road transport. The Central Road Transport Corporation helped much in the inter-state mobility of goods during the period of crisis like Chinese and Pakistani aggression. This came forward for prompt supply of essential commodities and provided security to the supply lines. Perhaps the growth of private transport carriers and return of normalcy in the country reduced the importance of this organization of Central Government.

Physiography of the region is a determining factor for road development. The major trunk roads are designed according to the linear configuration of the landscape. The great east-west flowing river Brahmaputra in the middle and the
hills in the north and south are responsible for the growth of two sets of road-net with rectangular pattern. The Brahmaputra river with its large number of tributaries necessitate the construction of a large number of bridges, and culverts for through communication lines. Frequent change of courses of the rivers also is the greatest impediment for roadway construction and maintenance.

Climate also plays no less important role in construction, maintenance and development of roads in the region. Heavy rains and frequent floods are chronic obstacles to road construction and maintenance. Unlike southern and northwestern States of India road maintenance involves huge recurring expenditure every year in this region. On the other hand the flood damaged roads adversely affect the economic functions of the entire region.

It is important to note that the various resources of the region have great impact on the development of the road transport. The contribution of tea, coal and petroleum industries towards the road communication development at the initial stage had to be augmented with the growth and expansion of these industries in time and spatial dimension. Again owing to the growth of roads some other medium and small scale industries have come up in the region along with a
number of agglomerated growth poles. Owing to the advantage of easy access, the industrial enterprisers mainly prefer the road transport.

In the Five Year Plans greater emphasis was laid on agro-based industries of which jute-mill was noteworthy. The decision for setting up of the jute-mills in the Brahmaputra valley was taken not only for availability of raw materials and a potential market for the finished product, but for minimization of transit cost between Hooghly valley jute-mill belt and the Brahmaputra valley market. The sites so selected for location of the jute-mills will demand extension of road transport communication in the respected regions as well as enhancement of road capacity of the existing one. The forest-based industries too need the road transport facilities for collection of logs and distribution of timber to far-flung urban markets. As the road transport acts as a catalyst to bring about agricultural development of the region, it is necessary to provide proper communication system for the rural population in general and to the farmers in particular. The railway accessibility is so limited that the agricultural regions of the valley have to depend usually upon the roadways for all types of short and long distance haulages. So to provide an effective motivation for agrono-
mical innovation in rural sectors, good roads are a must and therefore these are among the best investments a nation can make. The latest policy of the Government for rural upliftment is primarily based upon improvement of rural accessibility. Naturally success of agricultural development aimed at rural transformation will need radical road communication development.

The road transport has a great impact on the exchanges of trade and culture between the valley and its neighbouring hill States, as there are no alternative modes of transport. It is the road transport which helps much in the growth of urban centres because the road transport focal centres naturally become the growth-poles for providing accessibility and mobility of men and materials to a commanding area. The flexibility of operations of motor vehicles has made road transport an important element in the transformation of the social order. Conversely, easy means of transportation may encourage rural exodus to the urban areas temporarily and it stimulates greater mobility of men and ideas for rapid psychological as well as social changes in the rural areas. Through this process regional imbalances may be radically removed.
The impact of population growth in the extension and improvement of the roads and in turn their efficacy in the context of population growth is best understood. The use of the technique of simulation model has made it possible to examine the conditions underlying the growth and location of transportation network. The treatment is made only with the nationalised route. Ordered comparison between the real and simulated road-net tends insight into the general transportation problem of accessibility. It also helps in identifying the areas having pressing need and to be avoided for transport development. The trans-Brahmaputra routes, viz. Dhubri - Mankachar, Nowgong - Tezpur, Goalpara - Bongaigaon, and the North Lakhimpur - Jorhat are theoretically identified. Except the Saralghat bridge over the Brahmaputra river there is no through road connection between the two sets of northern and southern road network. As such the transhipment problem arises in the places located far away from the bridge line. Consequently a great detour avoiding transhipment becomes necessary to cover a short distance. The Mankachar - Dhubri including Goalpara - Bongaigaon route is potentially a viable lines as it communicates the border towns and considerable settlements in the extreme west of the valley, including the promising industrial centre at Bongaigaon. Naturally there is an impo-
rative call for construction of a bridge over the Brahmaputra. Similarly the Nowgong - Tezpur route being centrally located, is a vital link in maintaining the trade relations between north and south valley. It is also strategically significant. These are the reasons that call for immediate construction of a second bridge over the Brahmaputra between Nowgong and Tezpur and in view of its urgent need, the construction work of the said bridge is being started. The other trans-Brahmaputra routes have also equal pull for intercommunication between north and south bank through bridges. There are several routes in each of the districts having pressing demand for nationalization on the ground of economy and demography. In western and middle Assam districts the identified routes connect the places of agricultural importance whereas the routes in upper Assam districts connect the tea gardens. From the study, it is inferred that the population is the main factor which draws the attention of all the infrastructures among which road transport is significant for radical socio-economic changes and development of the region.

The trunk roads in the region touch urban centres numbering fifty one out of sixty two (including the satellite towns). The balance of eleven centres of the region are linked
by the other district roads. The graphical representation of the road network has made it possible to measure relative locations of the urban centres on the road network. The measurement of the centrality or the remoteness of the centres in the region is marked by the associated number. Higher the associated number the greater is the remoteness and lower the associated number greater is the centrality. The centrality or the remoteness of a place shows its locational advantages and disadvantages more particularly the ease with which one can get easy access to the places. The measurement also provides an instrument to measure the effectiveness of a transportation cover. Guwahati is found most centrally located. Dhubri and Margherita are the farthest growth points on the west and east of Guwahati respectively. In reality Guwahati has got requisite infrastructure favourable for wholesale market, administration and education.

The flow of traffic volume has shown an accurate picture of the pattern of movement of men and materials. It also helps to assess the traffic frequency at a particular node. Among the nine important market centres Guwahati is found to be the biggest and busiest. As a regional node and for its advantageous location in the road network, it
functions as the main collection and distribution centre for the whole valley region. In the extreme north-east of the valley, the position of Tinsukia is significant. As these two centres have monopoly agency houses of retailers, most of the goods are directly distributed either through roadways or railways or through combination of both to the different consumer centres. Owing to the dominance of these two centres, the service jurisdictions of the centres like Dibrugarh, Jorhat, Nowgong, North Lakhimpur, Tezpur, Dhubri, Gauripur have become smaller. The traffic density is heavy on the National Highways as the major focal centres are linked by them. The Hill States are not connected with any other modes of transport and hence the mobility of all types of traffic depends upon roadways.

All the headquarters assumed the status of major transport focal centres in the valley. Depending upon the intensity of specialised activities, the district headquarters have higher frequency of daily contacts with surrounding region. All the district headquarters have their respective set of destinations towards which the passenger buses ply daily in response to social, economic and civic needs. In case of passenger traffic, Guwahati shows its
supremacy for its ever increasing administrative and commercial activities. Each of the district headquarters have made their own hinterland and the size of the hinterland varies according to the dominant activities. The destinations of each centre are distributed throughout the valley region. But most of the destinations of each centre are confined within its district jurisdiction. The distributional pattern of each focal centre and its bus traffic destinations are examined by the technique of Nearest-Neighbour Analysis. A maximum and minimum limit to recognise randomness or otherwise of the points have been taken (see chapter V). The patterns are examined in two dimensions, one limiting within the district and the other within the entire valley. In the first dimension, it is observed that the Rn values for the areas of Dhubri, Guwahati, Jorhat, Dibrugarh, and North Lakhimpur lie within the limit of the Scale for random pattern (0.35-0.69). Under this inference, the above district headquarters with their respective set of destinations are found to be distributed in a random pattern. The nature of variation of Rn values within the range of random pattern is possibly indicative of the control of physiography, the economic disparity and the unplanned road network on the irregular spacing of settlements. In Nowgong and Tezpur area, the Rn values lie within the limit
of uniform pattern (.70 - 1). The pronounced uniformity (.84) of the Nowgong area may be attributed to its wider plain topographical configuration and linear settlements along the road lines of radial pattern. Moreover the absence of other prominent nodal centres near Nowgong has stimulated the uniformness of the pattern. In Tezpur area, the Rn value (.70) is just touching the lower limit of the uniform pattern. A general east-west linearity in the arrangement of the majority of the destinations and the rectangular pattern of roads favour an even spacing of destinations in Tezpur area. The second dimension of study reveals that the Rn values for the five sets of destinations of the district headquarters such as Gauhati (.516), Dibrugarh (.425), Nowgong (.399), Jorhat (.346), and Tezpur (.347) in the entire valley region lie within the limit of the scale for random pattern. The variation of the Rn values lying within the limit of the random pattern is according to the degree of functionality of each district headquarters in the entire valley region. The pronounced tendency towards random pattern for Gauhati and its destinations (.516) reflects the strong dominance of Gauhati on its surrounding region. Gauhati as a capital city, a big commercial centre, the largest entrepot and an important focal centre has to keep
contact a large number of centres spread over the entire valley region. In case of Dhubri and North Lakhimpur, the Rn values lie within the limit of aggregated pattern (0 -.34). These two centres being located in two extremities of the valley have limited functional intercourses. Greater the tendency of deviations from the aggregated to the Random pattern, higher is the potency for traffic hinterland development.

The relative accessibility of the urban centres is found out in terms of passenger movement by private and corporation buses. The private buses serve the intra-district mobility of the common people whereas the corporation buses serve both the inter and intra-district mobility. The former one always carry the passengers beyond capacity and the later one carry limited passengers. On the basis of these conditions, the passenger movement is measured in terms of weightage value (see chapter V) for each terminating and intermediate stations in a route.

The hierarchy of the relative accessibility of the urban centres is found out from the direct and indirect bus services to and from each of the urban centres. Gauhati is found to be the most accessible in the region which is
followed by Nalbari, Barpeta, Hajo, Jorhat and others. The dominant association of each urban centre with other centres is also determined (see chapter V).

With the increase of population and growth of private and public transportation, a set of service centres in hierarchic form have come up in the region. These service centres have partially decentralised the functions not only of the district headquarters but also of other major centres. This has set the inertia of development into motion and has made the requirements of the people easily available within the means of their reach.

Through a very simple diagrametic form it is tried to find out the field of influence of each major service centre (District headquarter). Gauhati along with other six district headquarters are located in a linear pattern in the elongated valley region. The influence field of Gauhati is the largest, followed by Jorhat, Nowgong, Tezpur, and North Lakhimpur. Dhubri and Dibrugarh being two peripheral centres, the fields extend upto western and eastern border respectively. Within the broad hinterland of each district headquarter, a number of smaller hinterlands with subsidiary flows to and from a group of service centres are nested. All
the hinterlands are categorised in orders according to the frequency of the buses to and from each centre. Altogether twenty five centres with variable sizes of hinterlands are found. The city amenities available at Guwahati are slowly disseminated in variable degrees into the rest of the twenty four centres of the valley.

The road linkage development of each of the hinterlands are examined by three indices - Beta, Gamma and Alpha. The Beta index shows the ratio between edges and vertices, Gamma index shows the ratio between the numbers of edges and the maximum possible number in that network, whereas the Alpha index stands for the ratio between the number of circuits and the maximum possible number of circuits in the region. The extent of development and structural complexity of the road linkages in the region have been clearly indicated from the above indices, tabulated on the basis of all types of roads. It is also indicative of mutual road accessibility between two independent points. Among the hinterlands the variation of Beta index is from 1.00 to 1.65 and the connectivity and circuity vary from 40 percent to 61 percent and 6 percent to 40 percent respectively. Higher values of the three indices indicate the better development
and more structural complexity of road linkages in Rangiya, Tihu, Nalbari, Bongaigaon, Nowgong, Golaghat, Jorhat etc. The least connectivity is found in Digboi hinterland. There is a direct correlation of economic development with that of road linkages of the above mentioned regions. There is also an inter-district variation of transport indices depending on the degree of economic viability. Transport linkages are better developed in Nowgong, Kamrup, Sibsagar and Dibrugarh districts where agrarian and industrial facilities encourage the growth of settlements. The spatial configuration of the land also helps to develop the internodal linkages. But the low percentage of connectivity in Lakhimpur and Darrang districts is probably due to the economic backwardness and the narrow elongated nature of the land. From the study, it is revealed that the road linkage development in the valley region is very poor in comparison to other developed countries. This is probably due to the physical limitations, presence of innumerable rivers, and the unsystematic growth of settlements.

It is a matter of great concern that though roads play an important role on the movement of men and materials in this part of North-East India, still the level of development of road linkages is very low as depicted by the transport indices.
From the study, it may conclusively be inferred that Gauhati has become a regional centre for the entire north-east region. This is primarily due to its advantageous location and thereby it is aptly recognised as the gateway of this region. It seems that the bulk of the traffic intercourses takes place through this gateway. The Brahmaputra bridge is the single most important factor to raise its status to such a height and this linkage facility has promoted greater accessibility to its near and far neighbourhood.

This has been clearly described that the Brahmaputra valley has limited scope of further development of railways in near future, on the contrary, it has got vast scope of intra and inter regional road and water transport. Therefore, a well-knit coordination through organised integration would perhaps be a strong motive force in the economic transformation of the entire north-east region of India.

Being a riverine region with heavy monsoon rains, road development is always constrained due to heavy maintenance cost. This is further aggravated by erratic nature of the rivers and rivulets. Naturally for establishment of a stable road network river training may be taken as
complementary development programme for the valley.

For the betterment of the road transport in the region the following steps may be suggested.

a) It is crystal clear from the study that the inter-modal connectivity in the Brahmaputra valley region is poor. This observation needs attention of the social scientists, planners and administrators as transport development is an essential element of an expanding economy.

b) The seasonal roads may be made all-weather whereby greater accessibility to the productive villages can be provided.

c) Rate of route nationalization may be accelerated with efficiency. It is clearly exhibited in the study that there is pressing demand of population for the linkage development with efficiency. The limitation of the jurisdiction of the organizations has some adverse effect in maintenance of efficiency and co-ordination which needs expansion and further decentralisation in order to cover the micro-region and to bring them into the hierarchic orders in a well-knit arrangement.

d) Immediate actions are needed for introduction of nationalised goods transport system over the entire valley
instead of confining it to one route only namely Gauhati - Shillong in order to keep conformity with the adopted national policy of expansion of job opportunities and better social service facilities. This will have an additional providence to the State Exchequer.

e) The construction and improvement of the hill routes will help to explore and exploit the resources of the hill regions surrounding the Brahmaputra valley.

In order to raise the status of each and every district headquarter, subdivisional headquarter and other important focal centres to a higher level, the increase of road accessibility is indispensable. With the raising of the status of the above centres, there may be scope for functional decentralisation of the Gauhati city which in turn may gear-up the regional development. The additional linkage development will increase the mutual accessibility of each and every settlement of the region. This will also increase the potency for traffic hinterland development in the regions like Tezpur, North Lakhimpur, Dhubri etc.

Development of road linkage in the Brahmaputra plain is a precondition for the development of the neighbouring states like Meghalaya, Tripura, Manipur, Mizoram, Nagaland and
Arunachal etc. as the physical constraints of these States demand only road transport. Therefore in the entire north-eastern region of India road transport development is not only indispensable for a balanced growth but also the only means of socio-economic integration with the main stream of the nation.