CHAPTER II

Review of Literature

Review of literature is an indispensable part of any research work that provides an important and useful track to frame it out. There is a stream of literature dealing with various aspects of infrastructure in general. Apart from the above generalized theoretical exposition, theoretical as well as empirical studies at the national, international and the regional levels have highlighted the importance of socio-economic infrastructure in economic development of an economy. Determination of the cross-state infrastructure scenario in India has been an extensively researched area mainly to locate the regions with fewer infrastructures and with ill managed infrastructure resulting in backwardness. Various empirical studies have been conducted in this direction by the researchers at time to time both at national as well as international level, some of which are reviewed below.

The present chapter deals first with general studies on infrastructure both at national and international level. Secondly, few studies on inter-state and intra-state regional disparities on socio-economic front have been reviewed. After that a brief survey was made on the studies related to infrastructure based on Nagaland’s economy, the literature thus collected is reviewed.

2.1 Review of works based on General Studies on Infrastructure

In the following section an attempt has been made to review some of available literature on the extent and nature of development of infrastructure in India and abroad.
Shah, N (1970) studied the pattern and level of infrastructure facilities in India at the time of independence, and the trends during the first fifteen years of planning. He also attempted to relate the level of per capita income of Indian states with their level of infrastructural development. The study revealed that there was a strong high degree of positive correlation exists between per capita income and level of infrastructural development them.

Alagh, Y.K. (1971) et al studied various dimensions of infrastructure planning in India using empirical analysis of different models and projects. They concluded that infrastructure planning in India must stress on not only greater availability of infrastructural facilities but also on improvements in their efficiency. They advocated the need for decentralization and alterative kinds of public and private initiatives to arrive at an optimum planning and implementation method.

Gulati, S.C (1977) used 32 variables to construct composite indices of development for 336 districts of India. He identified a principal component that emerged as factors responsible for inter-district variations in development. Among them were ‘Social Development’ factor, which had high positive loading on surfaced road length and establishments run on electricity and ‘Irrigation Intensity’ factor.

Shri Prakash (1977) attempted to analyse the regional inequalities in terms of infrastructure facilities in India during 1951-71 with the objective to determine the extent of existing inequalities and identify the lagging regions. The author selected the important indicators like population size, density, literacy rate, urbanization, power, irrigation, banking, communication and transport, industrial and agricultural implements in his study.
Biehl, Dieter (1980) tried to determine the factors responsible for regional disparities within different European Countries. Comprehensive tests regarding the role of Public Infrastructure in explaining regional disparity were conducted for Germany with 1970 data. It was observed that when infrastructure inputs were used as explanatory variable in explaining variations in regional per capita income, then the adjusted Coefficient of Determination varied in between 0.4 to 0.5 and was significant at five percent level. This indicated that regional disparities in development level measured by per capita income could be explained by variation in levels of public infrastructure.

Looney, R and P. Frederickson (1981) tried to examine whether infrastructure has important effect on GDP and whether different regions (advanced or backward) show different responsiveness towards economic infrastructure and social infrastructure. They divided Mexico into Intermediate Regions and Lagging Regions and used data for 1970. It was found that for the intermediate region, economic overhead capital like Public Telephone, Electric Generating Capacity, and Surface Road Length had significantly positive parameters when GDP was expressed as dependent variable on those variables along with population, capital invested in agriculture and number of large firms in area. For the Lagging regions the Social overhead capital (SOC), like Doctor’s offices, Medical emergency facilities, Hospitals, Primary Schools & Kindergartens’ had significantly positive parameters. This supported the general view that infrastructure does help in economic development. It also supports the Hansen thesis that different economic regions respond differently to the two types of overhead capitals- economic and social.

Tewari, R.T. (1984) looked at inter-regional disparities in levels of development in Indian context and commented that there existed a perpetual gap between the
‘developed’ group of states and the developing states. According to him, inadequacy of existing infrastructure facilities seems to be the major obstacle in the path of progress of the developing states. In his publication of 1983, he examined the interrelationship between economic infrastructure and development and tried to identify the role of the former on the latter through analysis of state level data at two points of time, 1970-71 and 1980-81. The results suggested that in 1970-71, six states had both higher level of infrastructure and higher level of development. Two states viz. Maharastra and West Bengal had low infrastructure but high development level while two other states Andhra Pradesh and Himachal Pradesh had relatively lower levels of economic infrastructure but high level of development. He obtained a significantly positive direct relationship between infrastructure and development.

Joshi, B.M. (1987) made an attempt to examine the relationship between economic development and the level of infrastructure at the district level in Uttar Pradesh with the help of regression analysis for the period 1980-81. Ten core infrastructural indicators pertaining to agriculture, industry and overall development were taken as independent variables for the analysis along with three dependent variables – Net Domestic Output per capita, Gross Value of Output per Hectare of Net Sown Area and Value Added per Industrial Worker. The study revealed positive correlation between the development indicators (dependent variables) and infrastructural indicators (independent variables). However, in many cases, the associations proved non-significant as the value of regression coefficients were statistically non-significant in most of the cases, though the sign of the coefficients were generally in the expected micro-regions in Tamil Nadu were very slight. Moreover, the values of the discriminant functions proved non-significant on the basis of F-test. The small value of Mahalanobis distance function confirmed the same. However, during 1961-
81, the difference was slightly wider although neither Mahalanobis nor discriminant functions proved significant statistically. They concluded that there had been no significant change in regional development pattern in Tamil Nadu during 1961-81 for the period of 20 years.

Amin, P (1990) reviewed the role of infrastructure in determining the regional distribution of SSI in Gujarat. She divided the state into three regions – backward, developing and developed on the basis of their infrastructural development level and found that the industrial development also followed similar patterns.

Rao (1991) examined the stages of power sector development in Karnataka. He showed how the variations in investment in this sector have led to inter-district disparities in Karnataka.

Dadibhavi, R.V (1991) surveyed the level of social infrastructure in the state of India over the period 1970-71 to 1984-85 using education and health facilities as indicators. He prepared a composite index of social infrastructure using principal component method. It was observed that though there had been remarkable progress in the availability of social infrastructure, the spread had been unequal across states. The heterogeneity was found to be more for health than educational facilities. A positive significant association was observed between level of social infrastructure and economic development of the states.

Queiroz and Surhid Gautam (1992) in their World Bank study, employed an empirical approach to explore the association between road infrastructure and economic development. Different regression analyses were carried out using GNP/Capita as dependent variable and selected indicators of magnitude and condition
of road networks as independent variable. Independent variables used in the analyses included: (i) spatial road density (i.e., road length per land area) of paved and unpaved roads classified in good, fair or poor condition; and (ii) road density or per capita length (km/million population) of paved and unpaved roads in good, fair or poor condition. The authors by Cross-section analysis of data from 98 countries, and time-series analysis of U.S. data since 1950 showed that there was consistent and significant associations between economic development (in terms of per capita gross national product), and road infrastructure (in terms of per capita length of paved road network). The data show that the per capita stock of road infrastructure in high-income economies is dramatically greater than in middle and low-income economies.

Arun Kumar, A.V. et al (1993) used Deprivation index by considering six infrastructural indicators and combined them to derive a composite indicator of infrastructure development using Principal Component method. He then ranked the 15 major states of India on the basis of this combined index and commented that the ranking are consistent with the general observation regarding the industrial progress of the states.

Ram, P. (1995) assessed the inter-district disparities in the levels of overall socio-economic development in Himachal Pradesh for the reference period 1973-74 to 1990-91. The study revealed that inter-district disparities in overall socio-economic development had shown a converging tendency over the reference period. Similarly the sector-wise inter-district disparities with regard to eight major sectors namely agriculture, industry, transport and communications, banking, power, medical and public health, education and demography also brought out a converging tendency over the reference period with the exception of agricultural sector where these disparities
traced on inverted ‘U’ shape curve. The author also observed that under-development was associated with smaller number of developed sectors and a higher level of socio-economic development was related to a greater number of developed sectors.

Subramaniam (1995) examined the inter-state differences in the level of family health in all the states including Nagaland (except Tripura). The study was based on data collected from National Family Health Survey (NFHS) 1992-93. A taxonomic approach was applied and Composite Index of family health for each state was constructed on the basis of ten important indicators pertaining to family health. The states were ranked on the basis of Composite Index of family health. Kerala state was placed at top and Bihar at bottom in the ranking. On the basis of Composite Index of family health, 23 states were classified into three categories – ‘high ranked’ states (Kerala, West Bengal and Tamil Nadu); ‘low ranked’ states (Nagaland, Rajasthan, Madhya Pradesh, Bihar) and other states were included in the category of ‘medium rank’.

Dalenberg, D. R. and M. D. Partridge (1995) used data from 28 metropolitan areas of U.S. over a fifteen year period to determine the impact of government spending, taxes and public infrastructure on total employment and disaggregated employment. They found that taxes are negatively related and educational expenditure is positively related to total employment. Moreover, changes in infrastructure were found to be negatively related to employment. They commented that infrastructures and employment are compliments at lower infrastructure levels but are substitutes at higher levels of infrastructure. They confirmed this notion by finding a positive coefficient of initial infrastructure level with employment growth. It was also pointed out that a substantial part of the effects of infrastructures spills over to surrounding
areas and is not contained within the government boundaries of metros- and so the actual contribution of infrastructure can not be easily measured.

**Kessides, Christine** (1995) reviewed the linkages between infrastructure and economic development on the basis of both formal empirical research and informal case studies. The main thesis is that economic benefits result from investments in infrastructure only to the extent that they generate a sustainable flow of services valued by users. Thus, an analysis of infrastructure’s contributions to growth must look at the impacts of services as actually perceived, not as indirect indicators that measure only aggregate provision of infrastructure capital. The paper notes that macro – and industry – level research, although having limitations of both methodology and data, suggest a positive and statistically significant relationship between infrastructure and economic output. However, the conclusions derivable from this research (most of which has been conducted on developed countries) provide little specific guidance for policy. To gain more practical insights about how infrastructure contributes to economic growth and to improve quality of life, and to understand the welfare costs of inadequate and unreliable infrastructure, it is necessary to look at microeconomic evidence. Developing countries provide particularly interesting illustrations of these relationships because they demonstrate a wide variance in the availability and quality of infrastructure. Some research on firms and households, as well as individual country experiences, are discussed which portray the ways in which distortions and inefficiencies in infrastructure affect the economy through the cost of production and prospects for international competitiveness; the potential for economic restructuring and technological change; macroeconomic stability (especially through the impact on fiscal balance); and the implications for poverty and the environment. Some lessons
are then drawn for public policy, strategy, and investment planning in the infrastructure sector.

**Gowda, M.V. Srinivasa** et al (1997) highlighted the different aspects of infrastructure in the Indian economy, viz. concepts, dimensions and significance of infrastructure, roles of private and public sectors in infrastructure building and operation; problems associated with investment in and operation of infrastructure projects. They urged upon the government to retain the responsibility of establishing and operating infrastructure especially economic infrastructure.

**Rana, R.K.** (1997) analysed the inter-state disparities on the basis of large number of social, economic, and infrastructural factors during the period 1971-95. Coefficient of variation figures worked out for selected indicators revealed that inter-state disparities widened in terms of economic indicators and the disparities widened in terms of economic indicators and the disparities reduced in social and infrastructural sector over time. The found that the pattern of development of Indian economy was not unison with respect to all the indicators rather it was of mixed nature. Some of the Indian states were found economically advanced and some were socially more developed. However, the states of Orissa, Bihar, Madhya Pradesh and Jammu & Kashmir were backward with respect to all the indicators. The study proved that economic development does not necessarily lead to social development and *vice versa*. The state of Punjab had real per capita income much higher than that of Kerala but the standard of living in Kerala was far better than that of Punjab as revealed from the values of Physical Quality of Life Index (PQLI).

**Ghosh and De** (1998) tested the relationship between physical infrastructure and regional economic development in the context of Indian States using OLS Regression.
method using data for the period of 1961-62 to 1994-95. They formulated a Physical Infrastructure Development Indicator (PIDI) for 26 states with the help of the Principal Component Analysis (PCA) method. The infrastructure-related variables used in the analysis are—railway route density, road length density, per capita electricity consumption, village electrification ratio, coverage of irrigation network and telephone line density. The data for the analysis was taken from government databases like estimates of State Domestic Products, Economic Survey, National Accounts Statistics and data published by Centre for Monitoring the Indian Economy (CMIE). With various unavoidable data limitations the results are significantly conclusive: first, regional disparity has been rising in recent period and plan outlay has not played any major role in this context; second, regional imbalance in physical infrastructure has been found to be responsible for rising income disparity across the states.

Canning (1998) which, is an outcome of a World Bank funded research project on infrastructure and growth describes an annual database of physical infrastructure stocks constructed for 152 countries for the period 1950-95. This paper presents correlation of infrastructure levels in 1985, regression of infrastructure on urbanization and log of population, GDP per capita, area for the year 1985. GDP growth regression indicate that the number of telephone main lines per capita has a significant effect on subsequent growth rates of GDP per capita but that the other infrastructure variables do not have.

Goswami, P.J. (1999) in his paper ‘Electrification in North-East India’ sought to analyse the gap between demand and supply of electricity in North-Eastern Region including Nagaland. He found that though it is very difficult to estimate precisely the
demand for electricity in the North-Eastern Region, it is definite that supply lags behind demand in this region. He opined that this gap will be widened in future with the rapid expansion of the electrification of unelectrified villages if proper measures are not taken to increase the generating capacity of the projects.

Fan, Shenggen et al (1999) showed a strong linkage between improved infrastructure and decline in rural poverty. The study highlights that increased government expenditure on infrastructure such as education, technology and rural health and poverty alleviation programme, leads to enhanced agricultural productivity, which in turn increases wages and reduces rural poverty.

Rao, Akkina Krishna (1999) tests various proposition of the neo-classical growth model of Solow and Swan to ascertain the role of infrastructure and power shortages on the rate of growth of per capita income using cross-section data on fifteen Indian states for the period 1970-90. Results confirm that absolute convergence of per capita income across states is not consistent, while condition convergence hypothesis is consistent.

Lall, Somik V. (1999) attempted to test the efficiency of public infrastructure investments in development pattern of Indian states. He used data for fifteen Indian states and fitted a Cobb-Douglas production function separately with labour, private capital, economic infrastructure and social infrastructure as inputs to panel data sets for lagging states, intermediate states and leading states. Results suggest that social infrastructure has a positive and significant impact on output while economic infrastructure does not. However these results seem implausible in the light of other studies.
Nanjundappa, D.M. (1999) has made a significant contribution to India’s infrastructure studies by indicating the index of infrastructure both in terms of economic infrastructure and social infrastructure, which reveals regional disparities after decades of development.

Ulieppa, H.H. (1999) discusses the regional disparities in transport and communications in Karnataka. He analyses that the development of transport and communication facilities in Karnataka is not governed by either area or density of population but through the well-governed infrastructural facilities.

Tiwari, A.K. (2000) attempts to measure the levels of infrastructural facilities and economic development and the precise linkage between these two at the district level in Himachal Pradesh at two points of time i.e. 1980-81 and 1990-91. Apart from the analysis of district-wise levels of economic development, efforts have been made by the author to identify some important dimensions of economic development with the help of varimax factor rotation. The indicator-wise analysis of relationship clearly reflected a positive association between infrastructure and economic development in almost all the districts. Secondly, the relationship on the basis of composite indices (based on first principal component analysis) revealed a positive correlation in seven districts, namely Bilaspur, Chamba, Kangra, Kullu, Sirmaur, Solan and Una. In case of the remaining five districts a negative relationship between infrastructure and economic development emerged. Finally, the analysis of dimensions of development shows that by and large a positive relationship exists between infrastructure and economic development in all the districts except Chamba. The same is true for the state as a whole.
Yoshida (2000) presented a positive analysis from various angles of the correlations between economic growth and the infrastructure in Japan, such as the energy, electricity, and transportation sectors over the last century in order to derive lessons that can be useful to developing countries. He divided Japan’s economic development phase into five with major characteristics, and discussed the patterns of demand and investment in infrastructure over one century. He found that the growth rate of demand in infrastructure was much higher than that of per capita GNP in the early stage of development and public investment in infrastructure was big. And he also found that infrastructure investment in rural area had a trend to correct the regional income disparities.

Fan and Hazzell (2000) made a most comprehensive study of the effect of infrastructure on poverty reduction. They estimate the effect of various types of government expenditure on poverty in India using a simultaneous equation model. The infrastructure stock variables considered are the extent of electrification in rural villages, the literacy rate of rural population, the availability of irrigation facilities and the density of roads in rural areas for the period 1970-93. The results show that a million rupees (at 1993 prices) spent on roads would lift 123.8 people out of poverty. In contrast, identical expenditure on education would lift 41 people out of poverty.

Deb, Kaushik (2000) reviews policy development in transport sector, and writes about liberalization, which according to him led to the state withdrawing gradually from several infrastructure sector, which has boosted the importance of private investments in infrastructure development.

Moitra, Biplab (2001) emphasizes the role of state in promoting economic development. He writes to cope with the widening horizons of the technology by
putting greater emphasis on the basic infrastructure like road network and rural transportation system. Author examines that development of rural roads infrastructure will not only attracts economic industrial and tourism development activities but also enhances the quality of better connectivity.

Roller and Waverman (2001) by making a cross-section study on the telecommunications industry shows that economic product increases at an increasing rate with the density of the telecommunication network. According to this study, not only does higher infrastructure spending result in higher income growth, but it also leads to a more intensive use of infrastructure facilities with the possible consequence of a rapid deterioration of facilities.

Nagar and Basu (2002), proposed a method to compute a composite measure of infrastructure development by combining the available services of physical infrastructure. They estimated the value of Infrastructural Development Index (IDI) for 17 major Indian states for the period 1990-91 to 1996-97. They also obtained the weights to be attached to different physical infrastructural services. The telecommunication services turn out to be the most dominant among the chosen infrastructure services, followed by the transportation facility and availability of energy/power services. A positive relationship could be established between the IDI (Infrastructural Development Index) and per capita net state domestic product (PCNSDP).

Majumder, R. (2003) made an attempt in analyzing a stock of the regional distribution of infrastructural facilities in India. It has been observed by the author that there exists considerable regional disparity in infrastructural facilities in India, not only among the states, but within states also. It is also noted the relative hierarchy of
the districts has remained quite sticky over time and infrastructural situation in India is far from comfortable.

**Bhakar, R.R. and P. Bhargava** (2003) attempted to find out inter-district disparities in infrastructural development in Rajasthan. The study is based on district level secondary data. In order to measure the inter-district disparities in infrastructural development, seven sectoral indices had been calculated and then at second stage composite index of infrastructural development was calculated by using the first principal component for four time periods. The results indicate that indices of infrastructural development of the state have increased from 29.44 in the period 1970-71 to 59.80 in the period 1997-98. The relative position of the districts regarding their level of development is almost the same throughout the period under study. The coefficient of variation reduced from 25.40 percent in 1970-71 to 13.55 percent in 1997-98, thus lending support to their finding that the inter-district disparities in infrastructural development have reduced. However, backward districts have registered no change.

**Fan, Shenggen** and **Xiaobo** (2004) observe that infrastructure affects rural development in India through many channels, such as improved agricultural productivity, increased rural non-farm employment, and rural migration into urban sectors. However, the role of infrastructure has not been paid enough attention in the literature due to lack of reliable data on various infrastructure indicators. By using newly available detailed data on rural infrastructure from the Agricultural Census and other official sources, this paper uses a traditional source accounting approach to identify the specific role of rural infrastructure and other public capital in explaining
productivity difference among regions, throwing new lights on how to allocate limited public resources for both growth and regional equity purposes.

**Narain, Sharma, Rai and Bhatia** (2004) estimated the level of development of hilly states of the country with the help of composite index based on optimum combination of socio-economic indicators. The states of Arunachal Pradesh, Assam, Himachal Pradesh, Jammu & Kashmir, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, Tripura and Uttarakhand has been included in the study. The data for the year 2000-2001 on seventeen socio-economic indicators have been used. Out of seventeen indicators included in the study, five indicators are directly concerned with agricultural development and the rest twelve indicators describe the level of development in infrastructural service sector. The level of development has been separately estimated for agricultural, infrastructural and overall socio-economic fields. In case of overall socio-economic development, the State of Mizoram has been ranked first and the State of Arunachal Pradesh is ranked last. Positive significant association is found between the developments in infrastructural facilities and overall socio-economic fields. Literacy rate is also influencing the level of development in the positive direction. For bringing about uniform regional development, potential targets for various indicators have been estimated for low developed states.

**Calderon and Serven** (2004) provide an empirical evaluation of the impact of infrastructure development on economic growth and income distribution using a large panel data set encompassing over 100 countries and spanning the years 1960-2000. The two important results of their study are: (1) growth is positively affected by the stock of infrastructure assets, and (2) income inequality declines with higher infrastructure quantity and quality. A variety of specification tests suggest that these
results do capture the causal impact of the exogenous component of infrastructure quantity and quality of growth and inequality. These two results combined suggest that infrastructure development can be highly effective to combat poverty.

**Ghosh and De** (2005) attempted to measure Economic Overhead Capital (EOC) for 18 major states by considering six key infrastructure facilities. The variables include road and rail facilities, irrigation coverage, per capita electricity consumption, penetration of per capita telephone lines, credit/deposit ratio in nationalised banks and state’s own tax effort as proxied by tax revenue of the state as a proportion of net state domestic product. The analysis was conducted with the data sourced from Ghosh and De (2004), and four periods were considered—1971–72, 1981–82, 1991–92 and 1997–98. The analysis arrived at three major conclusions. First, the importance of the tax revenue variable increased over time. Second, transport facility and irrigation have not been of high importance. Finally, electricity and telephone infrastructure could significantly explain the variance of economic infrastructure across the states. The analysis identified Punjab, Kerala and Tamil Nadu as the toppers; while Uttar Pradesh, Jammu and Kashmir and Assam were marked with poorer facilities.

**Ghosh and De** (2005a) tries to find out the role played by economic and social infrastructure facilities in economic development across Indian states over the last quarter century. Infrastructure services have been indexed with the help of principal component analysis. Both parametric and non-parametric estimates are done to assess per capita income disparity. A comparative static framework is developed for testing the nature of movement of the development trajectory in income infrastructure plane over different time spans. The findings are statistically very significant to warrant new regional policies under the overall framework of globalisation in order to remove
rising regional disparities in both infrastructure and income. This has a strong bearing on the success of poverty removal policies under globalisation as the poor are regionally concentrated in such diverse and heterogeneous country.

**Majumder, R** and **Dipa Mukherjee** (2005) in their paper explored the association between infrastructural availability and development for the West Bengal economy using a multidimensional approach and a time series study. It is observed that both developmental and infrastructural indices have shown a continuously rising trend during 1971-2001. The causation seems to be stronger from infrastructure to development. The long run relationships suggest strong positive impact of infrastructural availability on development levels. Different facets of infrastructure seem to have different impacts on different dimensions of development. A segmented policy aiming at specific sectors need to be adopted, with the greatest importance being attached to those infrastructural indicators that have highest total impact and strongest ‘linkages’ across sectors. Only this can sustain the development ‘push’ generated in West Bengal. Otherwise, the superstructure will have only a weak base and will come crashing down any day.

**Agénor, P.R.** and **Moreno-Dodson** (2006) study the link between infrastructure availability and health as well as education of society that proves that infrastructure services are crucial for health and education quality and availability which to a big extent effects welfare.

**Kaur, Inderpal** (2006) studied the growth, direction and structural transformation in the infrastructural development of Punjab for the period of 1980-81 to 2001-02. The variables considered by him were consumption of energy, growth of transportation, communication facilities, banking services, electricity, gas and water supply etc., to
measure the growth pattern and study the status of infrastructure in the Punjab economy. The study concluded that the state of Punjab has witnessed a structural change in its GSDP at an impressive rate over a period of time. He also suggested that the quality of infrastructure including, education, power, roads and its continuous maintenance in the long run need an immediate attention and identified some of the main constraints in the process of economic development of the state.

Shah, Farida and Naresh Kumar Patel (2006), attempted to highlight the trend and pattern of development of economic infrastructure that has taken place in the country. For estimating trend and pattern of development of economic infrastructure compound growth rate have been calculated and for highlighting regional disparities in development of economic infrastructure in India a composite index of economic infrastructure have been constructed on the basis of selected indicators. The main findings of the study are i) there exists a positive and significant correlations between economic infrastructure and per capita income and human development of the country; ii) though the significant development of economic infrastructure has taken place in the country during planned period, the emergence of regional disparities in this has slowed down socio-economic development of the country.

Lall, Soumik V. (2007) examined the contribution of publicly supplied infrastructure to sub-national regional growth in India. For that purpose he first developed and numerically examined a regionally disaggregated model of economic growth to understand the dynamics of private capital and public infrastructure. For the empirical analysis, he used a pooled data set for Indian States to examine if publicly supplied infrastructure is a significant determinant of regional growth and whether there is spatial variations in the productivity effects of infrastructure. The main findings are
that transport and communications infrastructure expenditures are significant determinants of regional growth and the positive benefits accruing from these expenditures come not only from investments made by individual states, but there are positive externalities from network expenditures made by neighbouring states. Finally, the out of sample simulated regional growth predictions show divergence in private capital formation between lagging and leading states.

**Lalli, Salim Ahmed** (2007) evaluates the importance of infrastructure in agricultural development in Haryana, the spatial dimensions in its distribution over time and study interlinkages in agricultural facilities available in the state. It is found that agricultural infrastructure is a necessary but not a sufficient condition for development in agriculture, implying the role of some other factors in the process of development. At the same time, it brings out that provision of more agricultural infrastructural facilities leads to an increase in productivity levels in all the districts and delineated productivity regions. It is found that disparities in the distribution of agricultural infrastructural tended to result in inequalities in the agricultural productivity and a decline in disparities in its distribution tended to narrow down inequalities in agricultural productivity among the districts and delineated productivity regions. The study also highlights the fact that disparities of agricultural infrastructural facilities are found to be relatively more acute at the district level than at the level of delineated productivity regions. The study, further, revealed that technological inputs are found to have strong correlation among themselves and with agricultural productivity and cropping intensity, respectively; and most of the infrastructural indicators are also found strongly correlated with the technological inputs. As a policy implication infrastructure, being a necessary condition for development of agricultural sector, has to be strengthened in all the districts and productivity regions in Haryana so that
effective and efficient delivery of technological inputs is ensured for better results in agriculture."

India Rural Infrastructure Report – 2007 dealt with four rural infrastructure sectors – telecommunications, power, roads and transport and water supply and sanitation. The report made concrete policy recommendations regarding the mode of provision, the amount and types of financing needed and the appropriate forms of governance and regulation. Desirable policies for different sectors had a lot in common. This commonality had been stressed in the report. The report relied on both primary and secondary data. The report also sought to resolve some of the contradictions that had stymied the expansion of infrastructure into rural India. At present, rural infrastructure is largely owned and run by the government but the access of the rural population to infrastructure facilities in most sectors is poor. Therefore, it is necessary to encourage private participation in all four of the infrastructure sectors. This is also somewhat problematic, as private funds are attracted only in those areas where rates of return are at least reasonable: places where population density and incomes are relatively high. To resolve this contradiction, the report proposed the forming of public-private partnerships, in which the government would subsidy the private sector at a rate that would take account of the level of development in rural areas. It also advocated greater decentralization of regulation and ownership; greater reliance on user fees to recover costs and provided for sustainable operation and maintenance; and greater use of micro-finance to build demand for services. The summary of policy recommendations at the opening of the report described the breadth of the new approach. It is intended to encourage balanced regional growth of infrastructure and to ensure that even villagers in the remotest areas will attain access to infrastructure facilities.
Pradhan, Rudra Prakash (2007) examines the role played by infrastructure in determining the level of urbanization in India and across its states. The analysis is based on construction of composite infrastructure development index by applying principal component analysis and then integrates the same with degree of urbanization. The author has used cross-sectional data of Indian economy and it pertains to past quarter decades. The findings confirmed that infrastructure has a significant role in determining the level of urbanization in India.

De, Prabir (2008) constructs an economic infrastructure index (EII) for 29 states with 14 key infrastructure variables through Principal Component Analysis (PCA). The identified state-level variables include railway and inland container depot density (Ministry of Railways); road and port density (Ministry of Shipping, Road Transport and Highways); airport density (Ministry of Civil Aviation); SEZ density (Ministry of Commerce and Industry); electrification density (Ministry of Rural Development, Ministry of Power); irrigation density (Ministry of Agriculture); telephone, post office and Internet usage density (Ministry of Communications and Information Technology) and presence of the banking sector (Reserve Bank of India). The time period considered for the study is 2004. The study noted that Delhi, Goa and Punjab top the list, while Meghalaya, Arunachal Pradesh and Jharkhand are placed at the bottom.

Straub, Stephane et al (2008) examined whether infrastructure investment had contributed to East Asia’s economic growth using both a growth accounting framework and cross-country regression. For most of the variables used, both the growth accounting exercise and cross-country regressions failed to find a significant link between infrastructure, productivity and growth. The authors suggested that
infrastructure investment may have had the primary function of relieving constraints and bottlenecks as they arose, as opposed to directly encouraging growth.

**Basavaraj, S. Benni** (2008) made an effort to quantify regional infrastructural development disparity among the districts of Karnataka state. The author tried to rank the districts on the basis of composite development index and to know the status of development among the North and South district of Karnataka state. The study reveals that the state has wide regional variation which calls for a deliberate policy action and initiatives to reduce regional variation in the state.

**Tiwari, A.K.** (2008) brings out an assessment of the progress of economic infrastructure and agricultural development in Himachal Pradesh during 1981-2001. In this paper, two major components of development, viz. the agriculture and economic infrastructure have been analysed at district level in the State using principal component analysis based on 23 indicators. The study reveals that a positive significant correlation between economic infrastructure and agricultural development in all the districts of Himachal Pradesh in the study period.

**Sarkar, S.** (2009) made an attempt to make a detailed district level analysis. Some statistical techniques like ranking, co-efficient of variation, Principal Component Analysis/Factor Analysis and Rotated Factor Matrix (Kaiser Varimax Method) etc. have been used to show inter-district disparities in infrastructural development. The study finds that there are sharp disparities among the districts in the State of West Bengal.

**Chakraborty** and **Guha** (2009) exert that there is an urgent need to re-energise India’s rural economy, including both agricultural and the non-farm sector. A number
of recent initiatives undertaken intend to augment the rural infrastructure level, which could contribute positively in this regard. Infrastructure development is also likely to contribute in improving the poverty scenario. Looking at the village-level infrastructural scenario for the states, the current analysis attempts to create a composite index of the infrastructure enjoyed by them, which in essence reflects their future growth potential. The analysis is performed separately for the bigger and the smaller states, and then the infrastructural scenario is compared with the state GDP and per capita state GDP growth pattern. The paper concludes by acknowledging the potential role of private and public entities in this regard.

**Ray Chaudhuri and Haldar** (2009) investigated the nature and possible reasons for disparity among West Bengal’s 17 districts in the last fifteen years or so. The findings clearly show a rising disparity among the district in the first half of the present decade after a continuous decline in the last decade of the last century. A similar and concurrent movement is noticed in the composite physical infrastructure index of the districts although the social infrastructure index of the districts does not show a similar movement.

**Bhattacharya, Govind** (2009) analyses the intra-state disparities in government expenditure in six states, Bihar, Uttar Pradesh, Jharkhand, Chhattisgarh, Madhya Pradesh and West Bengal, based on the actual treasury data on government expenditure made in the social sectors of education, health and supply of drinking water, captured from the databases of the accountants general of these states. The disparities that it finds within most of these states are shocking, to say the least.

**Kaur, Gaganpreet and Ranjit Singh Ghuman** (2009) attempt to investigate the extent and determinants of inter-state disparities in socio-economic infrastructure in
India during the pre and post-reform period, based on 22 indicators of infrastructural development, across 15 major states of India. The state level composite indices of infrastructural development have been constructed using the correlation weights. On the basis of this analysis, the states have been classified into three different groups according to their level of infrastructural development. The study shows that relative ranking of the states in terms of infrastructural development remained, more or less, the same at all the three reference points (1981-82, 1991-92 and 2001-02). It has also been found that the states in India converged in terms of infrastructural facilities during 1980s whereas a trend of divergence could be seen during 1990s.

Tiwari, A.K. (2010) made a commendable attempt to explain the role of infrastructure in rural development both theoretically and empirically. He has applied the most appropriate research technique of Factor Analysis for the construction of Composite Index of Development to analyse the levels of economic development and the availability of infrastructural facilities in Himachal Pradesh. He categorized the districts as very highly developed, highly developed, moderately developed and less developed. His study points to an imperative need for a speedy rural development through greater government intervention of the six least developed districts and eight moderately developed districts.

Sharma and Vashist (2010) studied the trends in the growth of socioeconomic infrastructural facilities and inter-districts infrastructural disparity in Himachal Pradesh for the period 1993-94 to 2007-08. For the purpose of the present study, a set of 15 indicators related to economic and social infrastructure have been selected. On the basis of this study it can be concluded that the socio-economic infrastructural facilities in Himachal Pradesh have achieved remarkable progress during the period of
study, however these facilities have witnessed uneven growth and development in various districts of the State.

**Dutta, P.C.** (2010) make an attempt to bring out disparities among eight northeastern Indian States based on economic as well as social infrastructure. The performance of States across various sub-sectors, be it transport, power, health or education related, reinforce each other. According to him, to some extent, disparity in performances among states may accounted for by extraneous factors but largely can be attributed to governance and delivery of services.

**2.2 Review of Some Important Studies on Inter-State and Intra-State Regional Disparity:**

There are several studies available on socio-economic front in which researchers considered socio-economic indicators for explaining inter-state or intra-state regional disparities. Some them are as follows:

**Shri Prakash** (1977) examined the extent of inequalities in the availability of infrastructural facilities in India. According to his findings, inequalities are low or decreasing in the field of installed power capacity, buses, good vehicles, road lengths, and post office and bank offices. High and increasing trend in inequality are exhibited by agricultural implements, per capita consumption of power, power consumption by industries, population served per bank and per capita credit and deposit ratios. He also commented that different states showed different ranking with different indicators and suggested that instead of labeling states as developed or underdeveloped in blanket terms, it is better to work at individual areas of deficiency and propose appropriate policy.
Gulati, Rajinder Kumar (1999) studied the nature, pattern and magnitude of regional disparities in economic development with special emphasis on change in sectoral development pattern of Indian states during 1961-91 and since 1991 onwards under the new policy regime. The study brought out that considerable regional disparities in overall economic development existed amongst the states in India during the study period, despite the efforts made the central and state governments for balanced regional development. However, regional planning achieved some success in secondary sector during 1971-81 and in case of tertiary sector in 1990-91 in reducing the gaps amongst the states.

Mallikarjun, M. (2002) attempted to measure regional disparities at sub regional levels in Andhra Pradesh. Three alternate methods for the construction of composite index of development were used considering 50 developmental indicators divided into nine sectors. Techniques like ANOVA and Discriminant analysis were used for measuring significant differences across the districts in each sub region as well as across the sub regions in the state. It was observed that there were significant differences across districts in each sub region but intra regional differences were insignificant.

Agarwala, A. K and P. L. Hazarika (2002) attempted to analyse the inter-district development in Assam which is known as one of the backward states of the country. There are, at present, 23 districts in Assam. An analysis of the disparities in different sectors of the state economy such as agriculture, industry and Basic Infrastructure and Services (BIS) at the inter-district level is attempted through secondary statistics at inter-district level in the three sectors: Agriculture, Industry and Basic Infrastructure and Services. Only three districts viz. Kamrup, Jorhat and N.C. Hills are found
relatively or moderately developed in respect of overall economic development and of the remaining 20 districts some are found developing, some are backward and some are very backward.

**Dholakia, H. Ravindra** (2003) examined the trends in regional disparity in India’s economic and human development over the past two decades, and the direction of their causality. The Indian regional data suggested a two-way causality between human and economic development. The paper argued that the Planning Commission and the Finance Commissions need not be unduly concerned about regional imbalance in human or economic development. Emphasis on economic growth is likely to address the issue of disparities in income and human development speedily.

**Dutta, P.C.** (2003) also observed that in the era of globalization, rapid socio-economic transformation has been taking place in Indian economy with addressing the problems of regional disparity, for which he argued that the States of NER are suffering from paucity of funds to improve their socio-economic backwardness. The study reveals the States of NER are far behind from other states of the Indian Union so far as the basic amenities of life such as health, education, safe drinking water, food security, banking facilities, communication, etc. are concerned.

**Sidh, Shiv Narayan** (2006) examined the impact of reforms on the balanced regional development of the states with the help of “Standardization Method” (Z-Score) and Gini coefficient to measure the extent of disparities over three points of time 1981,1991 and 2001 and covers 15 major states. GIS had been used to represent the results effectively. Analysis of data clearly established that there are considerable regional disparities in socio-economic development across the Indian states. While advanced industrial states have tended to leapfrog in the reform years, other states
have lagged behind. The poor states have not only performed poorly but their utter failure to stem population growth has left them in an even worse position. The growing regional disparities in the post-reform period are now a matter of serious concern. With deregulation and private investment, faster growth will induce more investment, and this in turn will further accentuate regional disparities. The causes for the aggravated regional disparities can be chiefly attributed to various factors viz. natural, social, demographic and economic.

2.3 Review of Important Studies conducted in Nagaland

It would be in the place to elaborate at some length the relevant research studies conducted in Nagaland. Although there are only limited studies on the theme and area, yet the few available studies conducted, highlighted the role of infrastructure in the process of economic development are as follows:

**Laxminarayan, H** (1970) observed that like other hilly areas of the country, Nagaland too has a favourable land-man ratio, social ownership of property, over dependence on agriculture, primitive techniques of production, poor facilities for education and health, lack of monetization and very limited financial resources available for economic development. According to him, until recently very little attention was paid to the socio-economic development of this state. He suggests that alternative schemes will have to be formulated for further economic development of the state. The author has stressed on building up of road transport and communication.

**Shri Prakash and Dulal Roy** (1987) examined the developmental of a variety of infrastructural and socio-economic activities of Zeliangrong tribes in the Zeme Naga villages in the State of Nagaland. They considered eleven indicators such as density of
population, distance of the motor road from the village, distance of middle school from the village, distance of high school from the village, distance of dispensary from the village, distance of PHC from the village, distance of veterinary hospital from the village, distance of fair price shop from the village, distance of electric line from the village, distance of post office from the village, distance of government seed farm from the village. In order to assess growth performance of a rural unit in the given fields of socio-economic development, the authors also estimated composite developmental index. The results of the study were as follows:

i) Population size and economic development are highly positively related.

ii) Economic development is an inverse function of remoteness of rural areas.

iii) The composite indicator of development reveals a low degree of inter-village inequality.

Saleh, Swabera Islam (1989) made a systematic study of the economic development of Nagaland. She made a critical analysis of the transition of Nagaland’s economy from a primitive to a modern economy including primary, secondary and tertiary sector. She also put equal emphasis on economic development of Nagaland during the Third, Fourth and Fifth Five Year Plans and highlighted the infrastructure development of Nagaland from 1960 to 1980. Among the several constituents of the infrastructure of the economy of the state, she brought about the positions of infrastructural facilities like transport and communications, power supply, financial and credit institutions and facilities of education and public health spanning from 1964 to 1980.

Jamir, B. Kilangla (2006) in his article “Status of Infrastructure in Nagaland: Strategies to Strengthen Infrastructures for Economic Development” argues that the
creation of social overhead capital (infrastructure and services) is critical for economic growth in Nagaland because their relationship is one of complementarities. Investment in social overhead capital induces investment and growth in other productive sectors like agriculture, industry, trade etc and enhances productive capacity and physical health of human resources. In turn, economic growth creates new infrastructural facilities and brings about new demands. The process of economic development is thus sustained.

Patikar and Deka (2009) made a comparative study of different states of northeastern region including Nagaland. They conclude that the present scenario of infrastructure in this region is unsatisfactory excepting the area of education, because of several problems that retard infrastructure development. The problems are social, economic or political in nature. The geographical location is also a hurdle for infrastructure development.

Baishya and Deka (2010) examine the existing scenario of infrastructure facilities in Nagaland by considering transport and communication, power, financial institution, education and health. The main findings of the study are i) the present infrastructure facilities in the State is inadequate and ii) it need to be strengthened to suit the ever increasing demands of the people belonging to various sectors of the State.

Nakhro (2010) made a study on the role of infrastructural facilities in rural development of Nagaland. His study on distributional pattern and locational characteristics of infrastructural facilities/services for the development created in the State of Nagaland for the year 1997 reveal the following facts:

i) According to a criterion given by the Government of India for optimizing the service pattern, the State of Nagaland needs more number of health, postal and bank service centres.
ii) Districts of Mokokchung and Kohima are more exposed to urban taste and are served by these facilities and are able to provide better services to the remote areas. The conditions of Zunheboto and Tuensang districts are deplorable.

Neogi, D. (2010) makes an attempt to determine the extent of inter-state disparity of the seven sister-states of the Northeast India (including Nagaland) especially on the socio-economic front. As many as fifteen parameters on different socio-economic aspects are selected to judge the relative progress of the states for two specific period of time i.e., 1995 and 2005. In order to find the overall socio-economic reality of the individual states, a Composite Socio-Economic Index has been constructed incorporating all the indicators. He concludes that though many of the states have apparently shown improvement on various accounts, the socio-economic development of the North Eastern region as a whole has deteriorated, by a very narrow margin, in the 2000s as compared to that in the 1990s. It is manifested when the averages of the composite indices for the two periods are compared. It indicates a moderate deterioration, by 2.65 percent, from mid-1990s to mid-2000s. More significant part is that all the states, instead of converging towards each other, has actually diverged on these development parameters over the time.

2.4 Research Gap

Reviewing the regional infrastructural literature on Nagaland, it has been found that there had been a few studies dealing with development of infrastructure in Nagaland. Moreover studies related to total assessment of infrastructure in Nagaland is rather limited and partial. They are limited in the sense that they lack comprehensiveness either in the selection of indicators or scope of the study or methodology. They are partial in the sense that they mainly cover certain aspects of
infrastructural backwardness of the State. However, there have been no/limited studies on broad coverage of the important sectors of infrastructure combining economic and social infrastructures of the State. A comprehensive and systematic study on district-wise infrastructure development of the State, a susceptibility of the development of rural-urban areas at districts level is still very much lacking. The present study is an attempt to fill these gaps and to give a full fledges explanation on development of infrastructure in the districts of Nagaland covering its rural-urban areas of the districts so that disparities and trend can be examined.