Chapter - I

Introduction

1.1 Introduction

The term infrastructure is derived from Latin word “Infra” means “Beneath” and “structure” means to “construct”, which includes power, transport, telecommunication, provision of drinking water and sanitation and safe disposal of waste which are central to the activities of households and to economic production. Infrastructure refers to the facilities and services, which help development and operation of all the sectors of the economy. It is generally defined as the physical framework of facilities through which goods and services are provided to public. It also covers all those services that are required to create a modern economy. Infrastructure refers to all these activities and facilities, which help to generate, sustain and enhance directly or indirectly the process of economic growth at all levels. Further infrastructural facilities encourage production and income generation within the infrastructural enterprises themselves and also in the rest of the economy because of the multiplier effect. Infrastructural facilities are basically certain facilities and services rendered to society on which the structure of the economy largely depends.

1.2 Meaning

According to a few development economists namely Ragnar Nurkse, Rosenstein Rodan and Albert Hirschman, infrastructure is an umbrella term for several activities, which are necessary for the development of directly productive activities such as industry, agriculture, trade and commerce. De Vries, (1960); Nichollas, (1963), Ishikawa, (1967) recognize the “vital role that infrastructure plays in generating agricultural growth and disseminating the benefits of this growth to all sectors of the economy”. Youngson (1967) emphasized that, “infrastructure is not a set of things, but a set of attributes to the degree that a capital asset possesses the flexibility of attributes”. Von Thunen (1842) emphasized that the “pull of urban and rural growth centres of development on the rest of the economy also depends on physical linkages and critical role of transport and communication systems in the strength of that pull in explaining the geographic variations in the intensity of farming systems and productivity”. Mellor (1976) indicates that, “infrastructure plays a
strategic role in producing large multiplier effects in the economy with agricultural
growth”.

1.3 Classification of Infrastructure

Infrastructure can be commonly divided into two categories. They are “economic” infrastructure and “social” infrastructure. Economic infrastructure is directly concerned with the needs of such productive sectors as agriculture, industry, trade and commerce. It includes power, irrigation, transport and telecommunication, banking and insurance, science and technology and so on. On the other hand, social infrastructure includes the services such as health, education, drinking water, sanitation and housing. Kindleberger and Herrick (1973) introduced the concepts of “Economic Overhead Capital” (physical infrastructure) and “Social Overhead Capital” (social infrastructure).

Because of their unique management and executive structure, some infrastructural services like telecommunication can be provided on a commercial basis, whereas others like roads are expected to be fully provided by the state or at least subsidized. On the basis of characteristics and nature of their users, certain infrastructure services have open access to all the general public (for example roads, parks, flyovers) where as certain services have limited access, and are provided on the basis of a person’s ability to pay. Ex. banks, educational institutions, hospitals, etc. In such cases, the impact of infrastructure on different users would be different.

Recognizing infrastructure facilities as a crucial input for economic development, there is no clear definition of infrastructure according to the existing usage of the term in India. For the formulation of policy, setting of sectoral targets and monitoring projects, a clear understanding of what is covered under the fabric of ‘infrastructure’ is necessary to ensure reliability and comparability in the data collected and reported by various agencies over time. The National Statistical Commission headed by Dr. C. Rangarajan, attempted to identify infrastructure based on some characteristics.

1.4. Definition of Infrastructure

1.4. (a) Dr. C. Rangarajan Commission’s Notion of Infrastructure (2001)

The Rangarajan Commission indicated “six characteristics of infrastructure sectors, (a) Natural monopoly, (b) High-sunk costs, (c) Non-tradability of output (d)
Non rivalness (up to congestion limits) in consumption, (e) Possibility of price exclusion, and (f) Bestowing externalities on society. Based on these features (except b, d and e), the Commission recommended inclusion of following in infrastructure in the first stage:

- Railway tracks, signaling system, stations
- Roads, bridges, runways and other airport facilities
- Telephone lines, telecommunications network
- Pipelines for water, crude oil, slurry, waterways, port facilities
- Construction of canals for irrigation, sanitation or sewerage’’.

1.4. (b) Dr. Rakesh Mohan Committee Report (1996) and the Central Statistical Organisation (CSO)

Dr. Rakesh Mohan Committee in “The India Infrastructure Report” included Electricity, gas, water supply, telecom, roads, industrial parks, railways, ports, airports, urban infrastructure, and storage as infrastructure. Except industrial parks and urban infrastructure, all these sub-sectors are treated by CSO also as infrastructure.

1.4. (c) Reserve Bank of India (RBI) circular on Definition of Infrastructure

As per the RBI, a credit facility is treated as “infrastructure lending” to a borrower company which is engaged in developing, operating and maintaining, or developing, operating and maintaining any infrastructure facility that is a project in any of the following sectors, or any infrastructure facility of a similar nature;

- Road, which include toll road, bridges or a rail network system.
- Construction of highway and other activities are being an integral part of the project.
- port, airport, inland waterway or inland port.
- water supply, irrigation management, water management system, sanitation and sewerage disposal system or solid waste management system.
- Basic facilities such as postal services, tele-communication network, radio and other services.
- an industrial park or special economic zone or generation and distribution of electricity transmission or distribution of electricity by laying a network of new transmission or distribution lines.
- construction of agro-based processing units and supply of agricultural inputs.
> processing of agro-based industries such as fruits, vegetables and flowers including testing facilities for quality.
> construction and maintenance of educational institutions and hospitals.

1.4. (d) **Insurance Regulatory and Development Authority (IRDA)**

The IRDA (Registration of Indian Insurance Companies) (Second Amendment) Regulations, 2008 defined infrastructure to include following

- a road, including good quality of roads, bridges or rail network system.
- Construction of highway, port, airport, inland waterways, water supply project, irrigation management project, water treatment and management system, sanitation and sewerage disposal system or solid waste management system is the integral part of the infrastructural activities.
- industrial park, special economic zone, generation and distribution of electricity by laying a network of new grid of electricity lines, construction agro-based processing units and supply of agricultural inputs.
- construction of educational institutions and hospitals and other public facility of similar nature as may be notified by the Authority in this behalf in the Official Gazette.

1.4. (e) **Income Tax Department**

For an infrastructure company, Section 80-IA of the Income Tax allows inference of 100% profit from its income during initial 5 years of operation and then 30% inference of profit from income during another 5 years. For this purpose infrastructure covers electricity, water supply and management, sewerage disposal, telecommunication, roads and bridges, ports, airports, railways, irrigation management system, cold storage and industrial parks and Special Economic Zones.

1.4. (f) **World Bank**

World Bank consider power, water supply and management, sewerage disposal, communication of roads and bridges, ports, airports, railways, housing, urban services, oil or gas production and mining sectors as infrastructure.

1.4. (g) **Economic Survey of India**

The Economic Survey of India considers power, urban services, telecommunications, posts, roads, ports, civil aviation, and railways network are under infrastructure sector.
1.4. (h) Empowered Committee on Infrastructure

The Empowered Sub-Committee of the Committee on Infrastructure in its meetings held on 11th January, 2008 and 2nd April 2008 under the chairmanship of Deputy Chairman of Planning Commission discussed the subject matter and broad definition of infrastructure:

- Electricity (including generation, transmission and distribution) and Research and Management of power stations,
- Non-Conventional Energy (including wind and solar energy),
- Water management supply and disposal of sanitation (including solid waste management, drainage and sewerage) and street lighting,
- Telecommunications, Roads and bridges, Ports, Inland waterways, Airports, Railways, Irrigation facilities (including watershed development), Storage, networks of oil and gas pipelines.

1.5 Infrastructure and Economic Development

Infrastructure has two-way relationships with economic growth. Firstly, infrastructure provides impetus to economic growth and secondly economic growth brings about changes in infrastructure. The adequacy of infrastructural facilities helps to determine a country’s success or failure. The considerable role of infrastructure in the process of economic development has been well recognized by economists, planners and policy makers all over the world. The pace of economic growth of a region or a country cannot be accelerated in the deficiency of adequate infrastructural facilities. Infrastructure facilities contribute to the amenities that enhance the quality of life.

The role of infrastructure interventions in economic development is complex and indirect. The theories of economic development focus sufficient attention on this discussion. Hirschman’s point of view was that “enlarged availability of electric power and transportation facilities are essential preconditions for economic development practically everywhere and investments in essential overhead capital is advocated because of its direct effect on final output and also its stimulus to other productive activities to come in” (Hirschman, 1958). In his theory of ‘Stages of Growth’, Rostow held similar views and measured social overhead capital, especially in transport and communication as one of the main pre-conditions for takeoff (Rostow, 1960). The role of social overhead capital in accelerating economic growth
and in enhancing public welfare is more obvious in developing economies as the
indivisibility in the social overhead capital has been identified as one of the main
obstacle of the development of under-developed countries (Rosenstein-Rodan).

Professor V.K.R.V.Rao argues “that link between infrastructure and
development is not a once for all affair. It is a continuous process and progress in
development has to be preceded, accompanied and followed by progress in
infrastructure if we are to fulfill our declared objective of self-accelerating the process
of economic development”.

The availability of adequate infrastructural facility is essential for the overall
economic development of a country. Adequacy of infrastructure helps to determine
success in diversifying production, expanding trade, coping with population growth,
reducing poverty and improving environmental conditions.

Adequate infrastructure raises productivity and lowers production costs, but it
has to expand fast enough to provide accommodation growth. While the accurate
linkages between infrastructure and development are yet to be firmly recognized that
infrastructure capacity grows step-by-step with economic output i.e., 1 percent
increase in the stock of infrastructure is allied with a 1 percent increase in GDP across
the countries. As countries develop, infrastructure must become accustomed to
support the changing patterns of demand, as the shares of power, roads, and
telecommunications in the total stock of infrastructural facilities relative to those of
such basic services as water and irrigation.

The infrastructure sector has both backward and forward association with the
agricultural and industrial sectors and therefore the development of infrastructure
sector is a pre-requisite for the overall development of the economy. Infrastructure in
general and rural infrastructure in particular, contributes to economic development
both by increasing productivity and by providing amenities, which enhance the
quality of life. Infrastructure development promotes economic growth in the
following ways.

- Output of infrastructure sectors such as power, water, transport etc are
  used as inputs for production in the directly productive sectors such as
agriculture and industry. (Barnes Douglas and Binswanger \(^1\) (1986) analyzed the data from 108 Indian villages for the period of 1966-88 to study the effects of electrification and infrastructure on agricultural productivity by bringing about improvement in irrigation through the use of pump-sets. Electrification also led to improvements in processing and technology transfer)

Wanmali Sudhir and Yassir Islam\(^2\) (1995), analyses the spatial distribution of rural services in selected regions of three states in India (Andhra Pradesh, Maharashtra, and Tamil Nadu), based on data collected over three decades. In all regions, there has been a tremendous improvement in rural services provision, since the late 1960s, especially in smaller sized settlements. The analysis suggests that how the concept and methodologies employed in this study might provide the basis for the more integrated regional approach to planning and policy formulation for rural service provision at the district level in India.

- Development of transport infrastructure improves productivity considerably
  Jacoby Hanan\(^3\) (1998) estimating the benefits from road projects at the household level using the relationship between the value of farmland and its distance to agriculture markets. The empirical analysis, using data from Nepal, suggests that providing extensive road access to markets would confer substantial benefits on average, much of these going to poor households.

- Infrastructure provides key to modern technology practically in all sectors
  Ali Rubaba\(^4\) (2000) enhances access to input and output markets and agricultural extension services may aid agriculture technology adoption. This paper uses quasi-experimental household panel survey data conducted in 1995/96 and 2000 (pre and post road improvement) for 753 project

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households and 325 comparable control households in Bangladesh. The result indicates that road improvement encourages households to increase aggregate rice acreage as well as acreage for high yield variety rice.

- There is a close relationship between infrastructure spending on the one hand and GDP growth on the other.

1.6 Importance of Infrastructure in Developing Regions

Infrastructure plays an important role in creating a good investment climate for the private sector. Private investors are always fascinated by areas with adequate infrastructure. Low-income countries can stimulate private investments by developing not only physical infrastructure but also by providing social infrastructure such as good governance and suitable institutional development. Such fostering of a favorable environment spreads private investments, employment generation and productivity improvements accumulating in national and regional economic growth. Considering the fact that majority of the population of the country being dependent on agriculture and living in the rural areas, the role of infrastructure assumes greater substance in a country like India where the development process is still on and has to continue if the citizens have to get good facilities and incomes. It is necessary that the rural infrastructure that creates basic direct economic activities and facilitates income generation need to be supported. The economists usually agree that investing in infrastructural facilities in urban and rural areas both stimulates the economy of that particular area/region and has a cumulative effect on the economy of the country as a whole.

Investment in the transport sector can improve access to economic opportunities by decrease in transportation costs. If markets are reasonably competitive, this can result in low prices for essential services like transport. The poor communication network in rural areas affects more the poor and the women residing in remote areas. The status of communication facilities available in rural areas can be characterized as under.

- Some communities are still inaccessible for a significant portion of the year without all seasonal road access.
- The majority of the movements by rural people are short, numerous and time consuming. They are generally engaged in crop production for subsistence
needs, collection of water and fuel, visits to hospitals and clinics, marketing of their agricultural produce etc.

- The use of motor vehicle by rural people is increasing which again underlines the need to improve the rural connectivity.

- The transport burden for many domestic tasks usually falls excessively on women.

- The above factors act as constraints to improving monetary and non-monetary dimensions of well-being and thus restrict the improvement in rural progress and therefore rural communication network are necessary to alleviate each of the above constraints.

In recent years infrastructure has received increasing attention of the planners and policy makers. The need to provide basic amenities of life has now become essential to improve human development index. There is a positive relationship between infrastructure development and economic development and human development.

1.6. (a) Infrastructure Interventions and Poverty Reduction

Given the above types of linkages, infrastructure development is important not only for economic growth but also for poverty eradication.

The impact of infrastructural intervention on poverty reduction takes place both directly and indirectly. The indirect impact is through its contribution to the growth of the economy. The most important infrastructural facilities that go long ways towards alleviating poverty in rural areas are transport development and irrigation management.

Development of the transport sector like other infrastructure sectors leads to an increase in factor productivity in various sectors by increasing accessibility and by reducing transport costs. In general, transport development focuses on increasing efficiency and growth, although in some cases like connecting rural link roads to tribal or remote areas it may directly focus on poverty reduction. It is, however, notable that even growth oriented transport development projects make important contribution to poverty reduction.
1.6. (b) Infrastructure Development and Agricultural Growth

Rural infrastructure development, like “irrigation, electrification, credit, roads and communication, regulated markets and agricultural research and extension are essential pre-requisites for transformation of agricultural growth in developing countries. The growth of agriculture, in turn, results not only in increasing the productivity and income of all categories of the farmers, but also in providing greater employment to rural labour. The employment elasticity of agricultural growth was found to be positive and quite high in almost all states of India during the post-green-revolution phase. However, recently, in some highly developed agricultural states like Punjab and Haryana and in Kerala, when wage rates are relatively high, labour is increasingly being substituted by capital and the employment elasticity of agricultural growth has become either very low or even negative” (Bhalla, S. 1998). Thus notwithstanding, agricultural growth induces growth to labour-intensive manufacturing activities in rural areas that provide employment to the poor in allied and non-farm occupations. There is sufficient evidence to indicate that the growth of agriculture has a significant impact on poverty reduction (Ahluwalia 1978).

Infrastructure lubricates and strengthens the engine of economic development and smoothen the functioning of the economy. Agricultural and industrial development, promotion of investment, employment generation, improvement in productivity, balanced regional development, social change, growth of GDP, development of trade and commerce are some of the advantages of good quality infrastructure. Infrastructure increases internal economies and in turns increases the economic growth rate. In addition, social infrastructure like health, education, sanitation have some direct impact on the working of a business enterprises and also important from social point of view.

1.6. c. Infrastructure and Balanced Regional Development

Regional disparities or imbalances refer to a situation where per capita income, standard of living, consumption situation, industrial and agriculture and infrastructure development are not uniform in different parts of a given region. Regional disparities are a global phenomenon. The problem of regional disparities in the level of economic development is almost universal. Its extent may differ in different countries. Most of the countries of the world are experiencing the problem of regional disparities. The problem is not a new phenomenon. There were differences in
the level of economic development in different parts of Europe, America, Asia and Africa. However, due to lack of statistical measures these imbalances didn’t attract notice. However, in recent years they have received a lot of attention because of their adverse implications for balanced economic development.

The studies on the process of economic growth show that economic development does not take place uniformly in all regions, when the process of development starts some areas are favoured, while others are neglected and hence regional disparities emerge and persist. There is no inherent mechanism to ensure that the benefits of economic development are distributed equally amongst all regions on a per capita basis, on the contrary development is likely to accentuate disparities amongst regions. No single country would be regarded as having a well-integrated economy as long as glaring disparities persist between the levels of development and standard of living in different areas within it. The same phenomenon holds good at state and district levels also. Hence, regional economic disparities are an inevitable consequence of the changing world. Therefore, now it is very crucial for the planners and policy makers to find out the causes for regional disparities and to put an end to this burning economic problem. One of the most pertinent reasons for widening disparities is difference in the development and availability of infrastructural facilities. Most of the studies observed that infrastructure development at regional level could provide a lasting solution to this problem. It means that local institutions of governance have to assume the responsibility and play a crucial role in infrastructure development.

1.7 Rural Infrastructure

Rural infrastructure is generally defined as the physical framework of facilities in rural areas through which, facilities and services are provided to the public. Rural infrastructure assumes great importance in India because of the country’s predominant rural nature, the crucial linkages of infrastructure to economic growth, poverty alleviation and human development. Rural infrastructure covers a wide spectrum of services such as transportation, power generation, transmission and distribution, telecommunication, port handling facilities, water supply, sewage disposal, irrigation, medical, education and other primary services.

Rural areas would have a high concentration of poverty given the existence of disguised unemployment in a big way in agriculture. Access to land and ownership
of land is the key to income differences since land is the major productive asset in rural areas. Rural areas may be more usefully viewed as concentration of poor resulting in little value for economic demand for infrastructural services. The fact remains that state interventions, despite their large scale of operations, never aimed at any basic structural changes in the agrarian society.

Given the low income in rural areas, the objective of the government is to provide universal access to the infrastructure services mentioned. Thus, the residents of every village should be able to access a common telephone. Each village should be able to connect to the electricity grid, have access to a road, and be close to a potable water source. However, universal access does not imply universal service, which suggests ensuring that each household consumes the infrastructure service. In other words, each household has an electricity connection, is physically and economically able to make phone calls, and use roads for motorized transport. Thus, universal service is something more than universal access.

Rural infrastructure is crucial for agriculture, agro-industries and overall economic development of rural areas. It also, incidentally, provides basic amenities that improve the quality of life. However, infrastructure projects, including those in rural sector, involve huge initial investments, long gestation periods, high incremental capital output ratio, high risk and low rate of returns on investment. All these factors are not conducive for private sector entry into infrastructure. As a result of this infrastructure services in the world are largely provided by the public sector.

Rural infrastructure development is a complex phenomena, due to the many attributes of infrastructure that make it difficult for individuals to design, construct, operate and maintain these services effectively and efficiently. Some problems stem simply from the fact that infrastructure facilities by nature have potentially long, useful lives during which the circumstances of users may change. Thus, decisions concerning their initial design and subsequent maintenance are extremely difficult to perfect. Even greater problems arise as sustainability of the bulk of the rural infrastructure in the developing world is influenced greatly by public sector decision-making. There are often good reasons for public sector involvement in the provision of rural infrastructure services however, in the production of such services there exists a role for other than public sector entities also.
Provision of adequate and quality infrastructure in rural areas is necessary for increasing the productivity and efficiency of agriculture in the form of improving the credit absorbing capacity, enhancing the productivity of crops and livestock, generating employment and increasing farmers’ income etc. Moreover, in the process, it makes a direct attack on minimizing the incidence of rural poverty. Integration of Indian economy with the global economy has put forth enormous opportunities as well as challenges to agricultural sector to become resilient, cost effective, and competitive and quality conscious in the international market. This challenge can be met only with a well-conceived perspective plan on rural infrastructure development.

1.8 Importance of Rural Infrastructure

The importance of infrastructure is also demonstrated by the positive influence that an increase in its stock has on the promotion of economic growth and decline in the incidence of absolute poverty. The increase in the level of rural infrastructure has two effects i.e., the promotion of economic growth and a decline in the incidence of absolute poverty. There are some empirical econometric studies, which is illustrating the strong relationships that exist between infrastructure and economic growth.

Infrastructure as a contributory factor to poverty reduction is illustrated by some surveys. 50 percent of poor Equadorian families see the improvement of basic infrastructure provision as the solution to poverty alleviation. A poor rural community in Nigeria regards lack of basic infrastructure services as the cause of their poverty.

Broadly speaking it can be said that development of infrastructure particularly rural infrastructure has a five-fold impact on the economy, that is

1) Creating better access to employment and providing further earning opportunities in rural areas.

2) Increases productive efficiency.

3) Creating access to previously inaccessible commodities and services.

4) Time saving which can be better utilized in productive activities.

5) Better health and physical condition of rural population.

The first and third channels correspond to better physical access facilitated by roads. The second channel is due to the improvements in the technology and mechanization facilitated by the spread of electrification and telecommunication. The
fourth channel corresponds to time saving from faster physical access to employment opportunities, goods and services and in creation of drinking water sources. The fifth results from the spread of quality sanitation and drinking water facilities. These five channels correspond to mechanism through which incomes of rural population can be raised and economic growth can be facilitated. When targeted to the poor sections of the population, it tends to reduce the extent of absolute poverty. Thus, the mechanisms through which the spread of rural infrastructure assists economic growth or helps in a decline in poverty are largely the same.

1.9 Rural Infrastructure and Rural Transformation

The spread of technology in agriculture depends critically on both physical and institutional infrastructure. It is also indicated that infrastructure plays a strategic role in producing large multiplier effects on the economy with agricultural growth. Rural infrastructure leads to agricultural expansion by increasing yields, farmers’ access to markets and availability of institutional finance. The kind of infrastructure put in place also determines whether growth does, all that it can to reduce poverty. Most of the poor are in rural areas, and the growth of farm productivity and non-farm rural employment is linked closely to infrastructure provision (World Bank, 1994).

The importance of infrastructure in agriculture and rural development is well predictable. It is estimated that 15 percent of crop produce is lost between the farm gate and the consumer because of poor roads and inappropriate storage facilities alone, adversely affecting the income of farmers (World Bank, 1997) strengthening rural infrastructure can help to lower production costs, which can further augment agricultural output and income for rural farming community. Rural infrastructure has its impact on attitudes and values of rural households as well. The most profound effect of infrastructure development could be on the values of rural households. Development of transport and communication infrastructure enhances the mobility of people and information through reduction in cost and time. The resulting increase in interaction contributes to changes in attitudes and human capital development.

Rural infrastructure plays a key role in reaching the large mass of rural poor. When the non-existence of rural infrastructural facilities the cost of marketing farm produce can be prohibitive for poor farmers. Poor rural infrastructure also limits the ability of traders to travel to and communicate with remote farming areas, limiting
market access from these areas and eliminating competition for their produce. Construction of rural roads almost inevitably leads to increases in agricultural production and productivity by bringing in new land into cultivation or by intensifying existing land use to take advantage of expanded market opportunities. In addition to facilitating agricultural commercialization and diversification, rural infrastructure, particularly roads, consolidates the links between agricultural and nonagricultural activities within rural areas and between rural and urban areas.

Improved infrastructure also leads to expansion of markets, economies of scale and improvement in factor market operations. The development of rural infrastructure helps to enlarge markets with greater access to factors of production. The female labour participation rate increases as traditional taboos against it are overcome. Easier access to market allows an expansion of perishable and transport-cost intensive products. It can also lead to a conversion of latent demand into effective commercial demand. These effects of infrastructure accentuate the process of commercialization in agriculture and rural sector. There is increased scale of trade too and helps in reduction of trading costs per unit owing to the economies of scale.

Improvement in rural roads facilities, it affects agricultural development followed by the development of social infrastructural services. It is observed that roads tend to have a greater initial impact on the production where cash crops are grown, because food crops, grown by small farmers have a lower price elasticity of supply than cash crops. Therefore, more developed the existing agricultural system, more significant and more faster is the response to road provision or road improvements within an area. Access to better health and education usually improves more rapidly along roads than elsewhere.

1.10 Decentralized Infrastructure: Linkages and Spillover Effects

Rural infrastructure contributes to economic development by increasing productivity and by providing amenities that enhance the quality of life. Its linkages to the economy are multiple and complex. It affects each of economic activities such as production, consumption, distribution, trade etc directly or indirectly having both the positive and negative externalities. The availability of adequate infrastructure facilities is imperative for the overall economic development of a country. Infrastructure adequacy helps to determine success in diversifying production,
expanding trade, coping with population growth, reducing poverty and improving environmental conditions.

1.10. (a) Growth with Equity

Growing with equity has become the avowed objective of development and planning in most developing countries. The basic aim of infrastructural development is to promote growth and to the extent, the infrastructure is located in rural areas, which generally have higher incidence of poverty, any gains in productivity consequent to the increased investment in infrastructure are going to benefit the poor also.

1.10. (b) Increasing Productivity

Developing counties are characterized by low levels of productivity of land, labour and capital in almost all sectors of the economy, in particular, agriculture and allied sectors in rural areas. Infrastructure development does not directly raise productivity but provides the necessary preconditions for increasing it. Given an appropriate institutional set-up infrastructural investment help to shift the production frontier outwards. Infrastructural interventions like investment in rural transport, irrigation, rural electrification, rural credit, roads and communication, regulated markets, agricultural research and extension, land reforms, education and health, and investment in common property resources are universally acknowledged as the most important sources of increasing productivity of resources in both farm and non-form sectors in rural areas.

1.10. (c) Access of Women to Infrastructure

It has been found that in spite of the existence of physical and social infrastructure, certain disadvantaged groups like poor children and some women are unable to make use of infrastructure services like education and health care. For poor children, education does not become available because they have to work for living. For women, social prejudices preclude them from making use of these services. The result of their inability to access the social services is increased morbidity, lower education, and continued ill health. Consequently, improving the access of women to education and health infrastructure is recognized as one of the important measures to improve socio-economic conditions of women.
1.10. (d) Market Extension

Infrastructure investment in rural roads, transport and communication has profound effect in establishing links between rural and urban areas and thereby augmenting existing production activities through input, output and consumption linkages. This takes place through diversification of economic activities, income in mobility and accessibility of both output and factors of production. The most important impact is because of the increase in labour mobility due to increased accessibility and the establishment of road networks. This enables workers to move to higher wage occupations in non-farm urban labour markets and results in increase in rural wages.

1.10. (e) Environmental Sustainability

Sustainable development is the development that lasts. Keeping in mind that sometimes growth can be unaware to environmental consideration and that environmental degradation makes the future generation worse off by degrading the earth’s resources and polluting the earth’s environment, the objective of sustainable development has been universally accepted. It is also increasingly appreciated that the cost of maintaining the sustainability of the environment ought to be borne by the present generation.

However, sometimes-local communities are also likely to take a shortsighted view regarding environmental implications because of lack of awareness and high value accorded to present income as against future income. The environmental benefits and costs may not be measurable in all cases; therefore, it is difficult to put an economic valuation on their outcome. However, the costs should be made as explicit and transparent as possible to enable the policy makers to form informed judgments. Generally, for any major project where environmental effects are likely to be large, and for specific projects designed to improve the environment, any economic valuation should include environmental sustainability.

1.10. (f) Income Redistribution and Augmentation

Historically, in almost all countries, public works programmes like the building of roads or canals have been initiated during periods of distress to provide employment to poorer people. This continues even today in the modified form of special employment programmes, which are designed in many countries to help the rural poor. It is done either through the provision of assured minimum earnings like
food for work or through employment generating schemes including employment guarantee schemes. Special anti-poverty programmes have also been designed with a view to improving the productive base of weaker sections. For small and marginal farmers, quite often, inputs like fertilizers, water for irrigation, electricity and credit are supplied at subsidized rates.

1.10. (g) Provision of Minimum Needs

Investment in social infrastructure aimed at providing basic minimum needs indirectly leads to poverty eradication by providing a better working and living environment, physical health and human capital formation amongst the poor. In most cases, poverty itself is manifest in inadequate social infrastructure services like safe drinking of water, sanitation, housing, health, family welfare, rural electrification, rural schooling and training institutions. For example unsafe drinking water, lack of sanitation and unhygienic housing are directly related to the prevalence of water-borne, human waste related and air-borne diseases like dysentery, cholera, diarrhea, tuberculosis, bronchitis, influenza, malaria and measles. Therefore investment in water supply, sanitation and housing shall considerably augment the earning capabilities and nutritional status of the population not only through reduction in the incidence of disease and morbidity but also through reduced birth rate, better physique, saving on medical costs, expanding working time and minimizing productivity losses. Similarly human capital formation through formal education and training is considered to be the most potent weapon against poverty.

1.10. (h) Improvement in Common Property Resources

Income flows from village common property resources like village common land, woodlands and local forests, grazing lands, water resources and village ponds. Inland and coastal fisheries are an important source of supplementary income for the rural poor. The main objective of investment in these resources is to augment the flow of benefits to the village population in general and to the poor, in particular. Most of these investments, like those in forests and common property right, not only augment income but also help to check degradation of the environment and other natural resources.

1.10. (i) Empowerment of Local Government and Community Participation

The local bodies at the grass root level can be expected to undertake infrastructural and other employment generating activities for helping the rural poor.
Construction of rural roads, hospitals, schools and bridges provide employment opportunities to the local people, and they can generate additional source of income and ultimately it increases the per capita income and standard of living of the rural population. The Panchayats and Panchayath Samitis (elected bodies at the village level and at the level of cluster of village) have been given necessary powers and authority to enable them to function as institutions of self-government with the responsibility of preparing plans for economic development and social justice and implementing them. It is such institutions which can be expected to undertake infrastructural and other employment generating activities for helping the rural poor.

Infrastructure investment constitutes the hardcore of national planning and large proportion of plan resources are generally devoted to its development. Since these projects operate at different layers of government and indifferent agro climatic regions, there is a need for careful selection of projects and their proper integration with the national plan. These are all the factors, which directly influence the linkages of rural infrastructural development facilities.

1.10. (j) Role of Government

In view of the huge extent of resources involved in infrastructure projects, governments the world over have to prioritize. An overarching policy issue is to apply benefit-cost analysis to rank alternative infrastructure investment strategies and projects. With limited public resources, several countries in the developing regions are undertaking important reform processes in order to promote private investment in the provision of infrastructure. But along with these reforms governments have to develop robust mechanisms for ranking alternatives in infrastructure investments.

Intended benefits from investments in infrastructure cannot be reaped unless infrastructure is managed properly—from the design and location decision to implementation, to operation and maintenance. All these issues interact with each other in a mutually reinforcing way and in this linkage governance plays a major part. There is strong link between infrastructure and governance: good governance is necessary for the successful implementation of infrastructure programmes, and infrastructure programmes can be important vehicles in the improvement of governance. When good infrastructure such as roads and transportation, electricity is put in place, the efficiency and effectiveness of local government and administration are greatly enhanced. The converse is also true: without broad participation in
decision making in terms location, design and nature of infrastructure, without the local community’s involvement in the implementation and operations and maintenance, infrastructure can neither provide maximum benefits nor even be sustainable. Governance of infrastructure requires institutional reforms and capacity development. In sum, governance plays a major role in providing better and improved infrastructure services. First, with improved governance, there is an increased efficiency in resource use, with less waste in form of leakages and corruption. Second, with better governance, efficiency in service delivery also improves. This maximizes the effects of infrastructure. Third, better governance also ensures transparency and accountability. Furthermore, governance plays a major role in the scaling up process of the infrastructure.

1.10. (k) Structural and Operational Challenges

The indicator of inefficient performance by an infrastructure system is the extent of output lost in delivery. Distribution losses in water and power supply systems are the prominent examples. Inefficient use of labour is especially common and costly in infrastructure. Many public utilities in infrastructure are overstaffed. At the same time, in construction and maintenance of rural infrastructure, often equipment-based methods are used rather than employment intensive methods that can produce high quality results, while being more consistent with relative capital and labour costs.

Closely related to operational inefficiencies is lack of maintenance: roads deteriorate, irrigation canals leak, water pumps break down, sanitation systems overflow, and installed phone lines fail. Capacity is then lost, output declines and substantial additional investment is needed simply to sustain existing levels of service. In road sector, inadequate maintenance imposes large recurrent and capital costs. Neglect of routine maintenance can compound problems to such an extent that the entire surface of a road has to be replaced. Maintenance expenditures are often not allocated by economic priorities. In irrigation, too, poor maintenance is costly and results in distribution channels being filling up with silt and weeds, canal linings cracking at an increasing rate, and outlets breaking or being bypassed. Drainage also fails, causing salt build up in the soil. Worldwide, works covering 60 percent of the irrigated area require upgrading to remain in good working condition. Inadequate maintenance is a problem in rural water supply and power sector also. Sometimes
1.10. (l) Public-Private Partnership in Infrastructure Provision

The recent years have also shown a perceptible shift in government approach to infrastructure development. Concerns were raised about escalating costs and inefficiencies in infrastructure projects. It was recognized that due to lack of cost consciousness and subsidizing of infrastructure facilities to the consumers, projects and services were unable to generate the resources required for their own maintenance and expansion, let alone producing a surplus for the others. Hence, private initiative was sought to be encouraged in creating infrastructure and the area that was highly considered to be solely in public domain. Consequently, during the nineties, infrastructure services, which had been previously provided by the public sector so far, were swept by the new wave of privatization and deregulation. Several factors led the State to consider enhancement in commercialization of infrastructure provisions.

The advantages that Public Private Partnership (PPP) offers in terms of cost saving, access to specialized expertise and proprietary technology, sharing of risks with private sector and the ability to take up a larger shelf of infrastructure investments, Government of India is actively encouraging them. The shift towards PPPs is primarily driven by the inadequacy of budgetary resources. However, an enlarged role of PPPs also provides an opportunity to introduce competitive suppliers of infrastructure services leading to improvement in the quality and services and reduction in costs. PPPs also ensure the sparing of sparse public resources for other sectors where private sector would be relevant to go.

1.11 Review of Literature

For the thorough understanding of the problem, there is a need for a critical review of the available literature. For the convenience, it has been divided into two parts.

- In the first part studies relating to rural infrastructure development, its impact, governance and institutions have been reviewed.
- In the second part, the studies on rural development and studies highlighting the role of rural infrastructure in the same are reviewed.
Part - I

Studies relating to rural infrastructure development, impact, governance, and institutions are presented in the below paragraph

*Barnes Douglas and Hans Binswanger* (1986) in their paper “*Impact of rural electrification and infrastructure on Agricultural changes, 1966-1980*”, has “observed that tremendous capital investments in rural electrification have had the desired impact on rural areas. This study empirically examined what agricultural impact electricity and other infrastructure improvements have had on 108 villages in three states. The conclusion is that rural electrification has had a direct impact on agricultural productivity through private investment in electric pumps. Although rural electrification has had a significant impact on agriculture, there has been no explosive growth as was anticipated by many of the early planners”.

*Tilak Jandhyala B.G* (1993) in his paper “*Financing of Education in India: Principals, Practice and Policy Issues*”, states that the “financing of higher education in India has been a complicated problem due to theoretical and practical problems. It has been largely a state funded activity with about three quarters of the total expenditure being borne by government. The shares of nongovernmental sources such as fees and voluntary involvement have been declining. At the same time, the needs of the higher education system have been increasing rapidly. It is being increasingly realized that public budgets cannot adequately fund higher education, particularly when sectors of mass education are starved of even bare needs. Hence, numerous policy proposals are made, including privatization. This article critically reviews the proposals and argues that the Indian higher education system is not yet ready for privatization. At the same time the needs for experimentation with several alternatives, including student’s fees, student’s loans, graduate tax, and privatization in general is emphasized”.

*Shah Ajay and Shuvam Misra* (1997) in their paper “*Designing India’s national Information Infrastructure*” explains the current policy debates in India concerns the needs for a “national information infrastructure(NII)” and how it should be built. This paper sketches some key principles, which a strong NII should satisfy. In order to yield the maximum impact upon productivity growth of India’s economy at the lowest possible cost.
Shivamaggi H.D (1997) in his paper “Banking infrastructure of Rural sector” focus the quantitative approach to rural banking, focusing entirely on the number of institutions rather than the quality of services, has given rise to an infrastructure which has not attracted sufficient interest, what can be done to remedy this situation.

Dutta Amitava (1997) in his paper “The Physical Infrastructure for Electronic Commerce in Developing Nations: Historical Trends and the Impact of Privatization” states that the importance of telecommunications infrastructure in physical foundation for electronic commerce (EC). This infrastructure facility has historically been inadequate in developing nations, and these services are limiting their participation in EC both domestically and globally. Recognizing the consequences of these inadequate facilities, many developing countries have recently implemented policy reforms for this sector, with the general objective of increasing private sector participation. However, there is an improvement in different component of telecommunications infrastructure facilities has not been uniform and it varies from country to country. He author first examines the historical data from twenty-three countries over a twenty-three-year of period (1972-94) to catalog inadequacies in basic infrastructural facilities compared with industrialized nations. He author then analyzes the data on sectoral reforms in seven developing countries, identifying improvements in basic services such as mobile cellular, paging, and other infrastructure components. The impact of reform is quantified, and the analysis suggests that how privatization efforts might be sequenced and targeted to improve EC infrastructure in developing countries.

G. Jacoby Hanan (1998), in his paper “Access to Markets and the Benefits of Rural Roads: A Nonparametric Approach”, This paper gives highlights on implementation method for non-parametrically estimating the benefits from road projects at the household level using the relationship between the value of farmland and its distance to agricultural markets. The empirical analysis, using data from Nepal, suggests that providing extensive road access to markets would confer substantial benefits on average, much of these going to poor households. However, the benefits would not be large enough or targeted efficiently enough to appreciably reduce income inequality in the population.
Amitabh Kundu, & Debolina Kundu (1999), in their paper “Regional Distribution of Infrastructure and Basic Amenities in Urban India: Issues concerning Empowerment of Local Bodies” Examine the class wise analysis of the level of urban basic amenities reveals that disparities are extremely high in the nineties. The government and para-statal institutions have not exhibited sensitivity in favour of backward states, small and medium towns and the poor. Presently, privatization, partnership arrangements and promotion of community-based projects have emerged as the only options for undertaking investments in basic amenities due to resource crunch in the government. This changed perspective and a consequent decline in public investment, however, are likely to accentuate the disparity in the levels of amenities across the size class of urban settlements.

Bhatia M.S. (1999) in his paper “Rural Infrastructure and Growth in Agriculture” an attempt has been made to build a composite index of rural infrastructure state wise and examine the relationship between infrastructure development and levels of production and growth in agriculture.

Bhatia R.S (1999) in his paper, “Rural infrastructure and growth in Agriculture” attempts to build a composite index to rural infrastructure statistics and examines the relationship between infrastructure development and levels of production and growth in agriculture.

Hazell Peter and Sukhadeo Thorat (2000) in their paper “Government Spending, Growth and Poverty in Rural India:”, estimate the direct and indirect effects of different types of government expenditure or rural poverty and productivity growth in India. The results show that in order to reduce rural poverty, the Indian government should give higher priority to additional investments in rural roads and agricultural research and rural education.

Deb Kaushik (2000) in his paper “Private Investment and Policy Developments in Transport Sector” states that the liberalization has led to the state withdrawing gradually from several infrastructural sectors even as it has pushed up the requirements of capital for economic development. This has boosted the importance of private sectors investment, especially in infrastructure development. This paper reviews policy developments in the transport sector in this new environment.
Hendrick Roller Lars and Leonard Waverman (2001) in their paper “Telecommunication infrastructure and economic development: A simultaneous approach” they investigate how telecommunication infrastructure affects economic growth. They use evidence from 21 OECD countries over 20 year’s period to examine the impacts the telecommunication development may have had. They jointly estimate a micro model for telecommunication investment with the macro production function. They find evidence of significant positive causal link, especially when a critical mass of telecommunication infrastructure is present. Interestingly critical mass appears to be at a level of telecommunication infrastructure that is near universal service.

Sekar T.V. and K.N.M. Raju (2001) in his paper “Fertility Transition in Karnataka: Levels, Trends and Implications”, this paper traces fertility transition of Karnataka and explains factors responsible for slow pace in comparison to other south Indian states using data from official statistics, census, and surveys. There exist considerable regional disparities with regard to health and demographic indicators. Fertility decline has been faster in southern and coastal regions, and at a tardy pace in backward northern districts characterized by low literacy, low female age at marriage, poor health, infrastructure and low status of women.

Soumen Bagchi (2001) in his paper “financing capital investments in urban infrastructure: constraints in accessing market by local bodies” examines the recent years arranging funds for agricultural facilities, particularly urban basic services, has become the major plank of urban development policy in India. In the absence of a current account surplus, governments needed for urban basic services. This paper examines the nitty-gritty of alternative modes of financing infrastructure, particularly, urban basic services in the country and analyses their feasibility in the current urban context.

Rajasekhar & Gagan Bihari Sahu (2004) in their paper “The Growing Rural – urban disparity: some issues;” critically examines the understanding, approach and indicators that have been to measure the degree of disparity. It is true that disparity exists everywhere. However, this paper focuses on disparities existing between rural and urban areas. In this context, it talks about “why” & “how” disparities exist between rural and urban areas. The study suggests that income is not a sufficient indicator to capture the magnitude of disparities at any level.
Fan Shenggen and Xiaobo Zhang (2004) in their working paper “Infrastructure and Regional Economic Development in Rural China” states that infrastructure affects rural development through many channels, such as improved agricultural productivity, increased rural non-form employment, and rural migration to 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. This paper approaches to identify the specific role of rural infrastructure and other public capital in explaining productivity differences among regions and throwing new lights on how to allocate limited public resources for both growth and regional equity purposes.

Shenggen Fan, Somchai Jitsuchon, Nuntaporn Methakunnavut (2004) in their paper “The Importance of Public Investment for Reducing Rural Poverty in Middle-Income Countries: The Case of Thailand”, This study estimates the impacts of different types of government expenditure on agricultural growth and rural poverty in Thailand. The results show that, despite Thailand’s middle-income status, public investments in agricultural R&D, irrigation, rural education, and infrastructure (including roads and electricity), still have positive marginal impacts on agricultural productivity growth and rural poverty reduction.

Bajpai Nirupam and Ravindra H (2005) in their working paper “Scaling Up Primary Health Services in Rural India” they attempt to address the two key questions in this paper: 1) In terms of state-wide scaling up of rural services (in Uttar Pradesh, and Madhya Pradesh) in the area of primary health services. In addition to this what policy, institutional setup and governance reforms may be necessary so as to ensure proper service delivery which merely setting up more institutional facilities such as health services, public investments in these areas needs to be accompanied by systemic reforms that will help overhaul the present service delivery system, including issues of control and oversight of health services.

Bery Suman, et al, (2007), in their paper “The nature of rural infrastructure; problems and prospects” looks at rural infrastructure facilities in India, the lack of which is demonstrated to be an impediment to sustained economic development. He argues that the problem of rural infrastructure provision is different from those of the urban, given the smaller size, density and per capita income of rural agglomerations.
Niranjan Pants (2007) in his paper “Some Issues in Participatory Irrigation Management” these articles shortlists the conditions for success of participatory irrigation management along with an analysis of the impediments in its path. It warns that countries should be cautious of the financial accruements of funding agencies because participatory irrigation management seems to suffer from a number of infirmities that cannot be easily resolved.

LomBard and Coetzer in their paper “The estimation of the impact of rural road investments on Socio-Economic Development” proposes a Socio- Economic development and subsequent economic growth including the lack of adequate roads infrastructure. The aim of this paper is to discuss the impact of rural road investment on socio-economic development. The paper also indicates the benefits of rural road investments as well as the types of mechanisms used in practice to estimate its impact.

Thorat Sukhadeo et. al, (2007) in their paper “Investment, Subsidies, and Pro-Poor Growth in Rural India” This paper reviews trends in government subsidies and investments in pro-poor growth in rural India. The development of agriculture sector is a conceptual framework and model to assess the impact of various subsidies and investments on agricultural growth and poverty reduction and presents several reforms option with regard to reprioritizing government spending and improving institutions and governance.

Meenakshi Rajeev (2008) in her paper “Ensuring Rural infrastructure in India: Role of Rural Infrastructure Development Fund” proposes an inclusive economic growth is the most talked about issue in India. This is due to the fact that the impacts of the recent spectacular growth have not been able to percolate down to various segments of population, most importantly to the rural population. Rural infrastructure in India have still remained far from satisfactory and amongst others, lack of funds in one critical reason for this. The study finds that many projects remain incomplete even after receiving funds under RIDF and certain measures and necessary to ensure proper utilization of funds as well as to reduce infrastructure rural disparity in India.

Amrith Sunil S (2009) in his paper “Health in India since Independence” suggests that history is essential to an understanding of the challenges facing health policy in India today. Institutional trajectories matter, and the paper tries to show that
a history of under-investment and poor health infrastructure in the colonial period continued to shape the conditions of possibility for health policy in India after independence. The focus of the paper is on the insights intellectual history may bring to our understanding of deeply rooted features of public health in India, which continue to characterize the situation confronting policymakers in the field of health today.

*Mavalankar Dileep V and K.V. Ramani* in their paper “Building the Infrastructure to Reach and Care for the Poor: Trends, obstacles and Strategies to Overcome them”, explains the critical part of health delivery in any country. Availability, accessibility, affordability, equity, efficiency and quality of MNH(Maternal Neonatal Health) services highly depend on the distribution, functionality and quality of infrastructure. Most of the developing countries have invested substantially in developing health infrastructure in rural areas which provides a base for extending MNH services to the poor. Still, there is clear evidence that in many countries there are gaps and inadequacies in health infrastructure. The paper also reviews impacts of reforms on infrastructure and provides some recommendations for improvement of infrastructure management so as to ensure better services to the poor.

*Swapna Banerjee, Guha* in his paper “Neoliberalising the urban: New Geographies of Power and Injustice in India Cities”, examines the active engagement of neoliberalism that is not only molding the concept of urban but is simultaneously intensifying unevenness in inter urban and intra-urban developments. The paper illustrates the process of restructuring in a few cities in different states, most importantly, in Mumbai, the country’s budding “international financial centre”, with a focus on specific development projects.

**Part - II**

Studies on rural development and highlighting the role of rural infrastructure are

*Nadkarni M.V* (1982) in his paper “Rural Underdevelopment and the Cluster Approach: A Review of Tumkur Studies”, reviews the studies of rural development carried out in Tumkur district, using the 'cluster approach to rural development'. It traces the various parameters that are seen to agricultural development and recommends the viability of this (approach within the present economic and political
system. Nevertheless, in the long run, the success of the cluster approach, too would depend on how far the property relations and power structure in the rural sector are altered towards a more egalitarian and homogeneous rural community.

_Nadkarni M.V_ (1984) in his paper “Irrigation and Rural Development. A skeptical view” explains that the impact of irrigation in terms of a comparison of output and income from irrigated and dry plots within a holding or irrigated and dry holdings within a village is likely to given an exaggerated picture of its role. The approach here instead is through a comparison across villages, because irrigation should be expected to have an impact on the development of the village as a whole including is weaker sections.

_Rao V.M and S. Erappa_ (1987) in their paper “IRDP and Rural Diversification: A study in Karnataka”, is based on the data collected from IRDP beneficiaries in Karnataka supplemented with data from the government records on the anti-poverty programmes, and the study finds that, a) The anti-poverty programmes remain preoccupied with the objective of providing relief rather than making the poor viable and development-oriented issues. Moreover, IRDP remains weak as thrust for widening the base of rural economy through substantial addition of non-agricultural activities. b) In terms of a number of implementation, acceptability and impact criteria, IRDP in Karnataka can be regarded as reasonably effective. C). these characteristics of IRDP derive from the features of the national economy and its ruling elites posing rigid barriers to a diversified and growth-oriented rural economy.

_Sarkar P C_ (1994) in his paper “Regional Imbalance in Indian Economy over plan periods” proposes the framework of the Five- year plans, as a devise to measure and assess the formal distribution of resources among the states have been corrected and there has been noticed reduction in regional imbalances and changes in the placement of the different states according to the degree of development.

_Purkayasta P_ (1995) in his paper “Infrastructure Sector and Withdrawal of the State” states that the large scale of reorganization that is now being introduced in the power and telecom sectors, the overriding consideration is one of the ensuring profits. Concern for consumers is not on the agenda. The electric supply industry is being restructured to make it commercially viable with guaranteed profits for the private investors. Similarly, the entire thrust in telecom is how to make private entry
more attractive. What is necessary is not merely to expose the current reforms as promo monopoly and pro-multination, as they undoubtedly are, but to project true agenda for reforms.

Wannali Sudhir and Yassir Islam (1995) in their paper “Rural Services, Rural Infrastructure and Regional Development in India”, This paper analyses the spatial distribution of rural services in selected regions of three states in India (Andhra Pradesh, Maharashtra, and Tamil Nadu), based on data collected over three decades. In spite of economic disparities between regions, Christaller's Central Place Theory provides a framework in which to examine demographic, functional and spatial characteristics of settlements in these regions. In all regions, there has been a tremendous improvement in rural service provision, since the late 1960s, especially in smaller sized settlements. Over time, services that are more complex and they have become more widely available. The analysis suggests that how the concepts and methodologies employed in this study strength of the providing the basic infrastructural facilities to more integrated regional approach of planning and policy formulation for rural service provision at the district level in India.

Annapurna Shaw (1996) in her paper “Urban policy in Post Independent India: An appraisal” develops an analytical frame for reviewing urban policy in India in order to enable a clearer understanding of why it was fashioned the way it was and through this to draw policy lessons which could be useful for the future.

Ghosh Jayanthi and Abhijit Sen (1997) in their paper “All dressed up and Nowhere to Go: India infrastructure Report” explains the basic strategy proposed in India Infrastructure report prepared by the expert group on the commercialization of infrastructure projects appointed by the ministry of finance is for the government to retreat as investor, to facilitate and provide numerous financial crutches for the private sector, but even all of these were expensive measures do not guarantee that the private sector would respond positively to invest areas which are risky and not so profitable.

Ghosh Buddhadeb and Prabir De (1998) in their paper “Role of infrastructure in regional Development: A study over the Plan Period” estimates the impact of public investment and physical infrastructure on the private investment behavior and regional economic development has been found to be highly significant
and positive. The latter hypotheses are tested here on Indian sates over the plan period using OLS regression. For this purpose, a physical infrastructure development indicator is formulated with the help of principal component analysis. 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 regard, second, regional imbalances in physical infrastructure has been found to be responsible for rising disparity across the states.

Dasgupta Dispankar and Pradip Maiti (2000) in their paper “Growth and Interstate Disparities in India” offers an analytical description of the economic performance of Indian states as reflected in their per capita (net) state domestic product. Statistical analysis of data for the period 1960-61 to 1995-96 shows the clear tendency for Indian state to diverge in per capita SDP, but converge in shares of different sectors in the SDP.

Kurian N.J. (2000) in his paper “Widening Regional Disparities in India: Some Indicators” explains that the interstate economic and social disparities in the India have been increasing in spite of various governmental measures to develop backward areas. This article assesses disparities in terms of demographic indicators, female literacy, and state domestic product and poverty, development and non-development expenditure by state government, shares in plan outlay, investments, banking activities and infrastructure development.

Panchamukhi P.R (2000) in his paper “Social Impact of Economic Reforms in India: A Critical Appraisal”, is focusing on the impact of economic reforms on the social sector in India by comparing the data of the pre-reform period and the reform period, the paper notices a declining trend in the budgetary allocations of both central and state government for various sub sectors of the social sector, especially health and education.

Globerman Steven and Daniel Shapiro (2003) in their paper “Governance Infrastructure and US Foreign Direct Investment” examine the statistical importance of governance infrastructure as a determinant of US foreign direct investment (FDI). In broad terms, governance infrastructure represents attributes of legislation, regulation, and legal systems that condition freedom of transacting, security of property rights, and transparency of government and legal processes. Our
econometric analysis uses a two-stage estimation procedure. In the first stage, the probability that a country is an FDI recipient is estimated. The results indicate that countries that fail to achieve a minimum threshold of effective governance are unlikely to receive any US FDI. Countries that receive no US FDI are typically countries that do not promote free and transparent markets, that have ineffective governments, and that often have legal systems that are not rooted in English Common law. In the second stage, the analysis is restricted to those countries that did receive FDI flows. The estimated equations focus on the determinants of the amount of FDI received. Given that a country is a recipient of US FDI, governance infrastructure - including the nature of the legal system - is an important determinant of the amount received.

Ghosh Buddhadeb and Prabir De (2004) in their paper “How do Different Categories of Infrastructure affect Development Evidence from Indian States” is explores the role played by the infrastructure in determining the level of economic development across the states over different time spans during the past quarter century. A comparative static framework is developed in order to test the movement of the development trajectory of the states in the infrastructure income plane. The findings of the paper are statistically significant and have serious implication for future regional policies. It shows that interstate disparities in physical, social and economic infrastructure facilities have remained at an alarmingly high level. There are also indications that interstate differences in infrastructure are responsible for growing regional income disparities.

Prabir De and Buddhadeb Ghosh (2005), in their paper “Effects of Infrastructure on Regional Income in the Era of Globalization: New Evidence From South Asia”, tries to find out the role played by infrastructure facilities in economic development across South Asian countries over the past quarter century. The findings are statistically very significant to warrant major changes in future regional policies in order to remove rising regional disparities in both infrastructure and income. This also has a strong bearing on the success of poverty removal policies as the poor are regionally concentrated in such a diverse and heterogeneous region of the world, where market imperfections abound and heterogeneities are undefeatable.

Nemes Gusztáv (2005-06) in his paper “Integrated Rural Development the Concept and its Operation”, offers analytical models of integrated and non-integrated
rural development systems and illustrates the argument through some examples taken from the community initiatives and the precessions policies of the European Union. The study is in two halves. The first half elaborates the concept of ‘integrated rural development’, based on international literature. The second part offers a few new conceptions, as a contribution to the ‘new rural development theory’ and simple models of integrated and non-integrated development.

*Keshab Das* (2006) in his working paper “Electricity and Rural Development Linkage” discusses the criticality of electricity, the vital modern economic infrastructure, concerning its role in and nexus with rural development, introducing broad issues in rural infrastructure and local development, emphasis has been laid on the role of electricity as a multi-sectoral catalyst.

*Gilberto M. Llanto* in his discussion paper “Infrastructure Development: Experience and Policy Options for the Future” explains that global markets for goods and services have opened for countries that have made substantial investments in technological innovations in transportation, communications and production techniques, inventory management and the rapid rate of innovations in financial instruments among others. This study presents in broad strokes a chronicle of infrastructure developments in the Philippines in the last twenty five years. It covers the infrastructure experience across the Marcos regime to the Estrada administration.

*Sharath Kumar* in his article “Role of Planning: A Comment” has observed that a review of the role of planning should look at the possibility of expanding its role to municipalities, districts and panchayats rather than limiting it.

*Pierre-Richard Agenor* (2006) in his discussion paper “A Theory of Infrastructure-Led Developments” proposes a theory of long-run development based on public infrastructure as the main engine of growth. The government in addition to investing in infrastructure sounds on health services which in turn raise labor productivity and lower the rate of time preference. Infrastructure affects the production of both commodities and health services. As a result of network effects, the degree of efficiency of infrastructure in none linearly related to the stock of public capital itself.

*Rauniyar Ganesh* (2009) in his paper “Conceptualizing Inclusive Development: with Applications to Rural Infrastructure and Development
Assistance”, brings together two companion papers on inclusive development. The first paper uses the global literature to formulate a conceptualization of inclusive development and inclusive growth, and to put the conceptualization through its paces by applying it to the specific case of donor assistance to rural infrastructure. The second paper conducts a detailed review and a synthesis of Asian Development Bank literature on inclusive growth and inclusive development, to see how one particular international organization has addressed, and attempted to resolve, the analytical and operational issues associated with inclusive development.

1.12 Research Gap

Based on the review of literature, a few issues are identified for the study. The reviews are clearly reveals that there are less number of studies analyzing the geographical analysis of provision and use of economic and social infrastructural services in backward rural regions. These issues need to be addressed for strengthening the spatial and functional advantages to promote decentralized economic growth. In this direction an effort is made to examine the effects of decentralized of economic infrastructure, such as roads, electricity, irrigation and banking etc., and development of social infrastructural services, such as housing, health, education, sanitation and other supportive facilities. The study intends to examine their combined impact on regional development.

1.12. (a) Researchable Issues

- Spatial analysis of decentralized infrastructure in terms of development, availability and access.
- Examining the linkages between infrastructural facilities and regional advantages
- Examining the impact of infrastructural facilities at household level
- Alternative methods of developing and providing rural infrastructural facilities

1.13 Importance of the Study

The Government of India and the Government of Karnataka aim to achieve a high growth rate in the coming years, across all sectors of the economy including infrastructure. The targets are expected to be achieved by facilitating investment and rapidly upgrading technology. The Government of India and Karnataka recognize that high level of economic and industrial growth can be achieved only if infrastructure develops at a commensurate pace. The Government of Karnataka has also recognized
the substantial role of infrastructure in regional development. Therefore, the right policies and frameworks leading to adequate investments at the decentralized levels are necessary. This requires a spatial analysis of infrastructure development taking district as a unit of analysis.

The study presents a geographical analysis of the provision and use of economic and social infrastructural services in rural regions of Chamarajanagar District of Karnataka state, India. The study examines the demographic, spatial, and functional features of the study region. It has also identified service center hierarchies in the study region based on the provision of both economic and social rural infrastructural services. It also identifies the gaps in the provision of these rural infrastructural services within the study region.

1.14 Objectives of the Study

The objectives of the study are

1) To examine the role of government and other institutions in the development and governance of rural infrastructure in the study region
2) To examine the present position of rural infrastructural services in the study region and regional variations among the different taluks of Chamarajanagar district
3) To examine the linkages between rural infrastructure and economic development in the study region (Using district level data)
4) To examine the distributional impact of rural infrastructure development in the study region

1.15 Hypotheses

1. The distributional impact of infrastructure development depends on the volume of public expenditure on the same
2. Infrastructure interventions have positive impact on regional economic development

1.16 Methodology

1.16. (a) Study Area

The study pertains to one district i.e. Chamarajanagar district. It may not be a representative district of the state as it is unique with respect of geographical,
economical and social aspects. As such, the study is region specific and generalization is too limited to other districts of the state.

For the study, a few indicators to examine the intra-district variations in the development of infrastructure and their implications for regional economic development are used.

1.16. (b) Sources of Secondary Data

The present study is both descriptive and analytical based on both primary and secondary data. The secondary data have been collected from publications of Government of Karnataka, like Directorate of Economics and Statistics, Karnataka at a Glance, District Statistical Report, Census Report, Human Development Report, Five Year Plan Documents, Annual Plan Documents, books, periodicals, journals, newspapers, websites etc.

In addition to this spot visit to Zilla Panchayat, taluk Panchayat and Grampanchayat offices in the study area are resorted to. Some factual opinions are collected from the various functionaries involved in infrastructural development programmes in the district, taluk and gram panchayath level. Some beneficiaries of infrastructure development programmes have been interviewed and information is gathered. Zilla panchayath, taluk panchayath and gram panchayath records pertaining to specific activities, plan outlays, areas of allocation have been also persuaded to collect necessary information. In some cases, some beneficiaries have been interviewed through telephonic conversations. And some high level officers who are involved in infrastructure development activities have been also interviewed and valuable information is gathered.

The study deals with the distributional impact of rural infrastructural facilities among the regions of the Chamarajanagar district. The study has selected 1 village from each taluk of the Chamarajanagar district. The district has four taluks namely Chamarajanagar taluk, Gundlupete taluk, Kollegala Taluk and Yelandur taluk. The sample villages are Kempanapura village from Chamarajanagar taluk, Begur village from Gundlupete taluk, Palya village from Kollegala taluk and Kesthur village from Yelandur taluk. The sample villages are having above 4000 population and multi caste peoples are living in the sample villages of the study region.
1.16. (c) Sources of Primary Data

The primary data have been collected through direct interview of the respondents of the household, and they are aged above 18 years in the sample villages of the Chamarajanagar district. The 100 respondents of the household is interviewed in Kempanapura village of Chamarajanagar taluk, 100 respondents of the household were interviewed in Begur village of Gundlupete taluk, 100 respondents were interviewed in Palya of Kollegala taluk, and 100 respondents were from Kesthur village of Yelandur taluk are interviewed to examine the distributional impact of rural infrastructural facilities in the region.

1.16. (d) Data collection Method

The study adopted mainly on two methods for data collection i.e., interview and observation methods. The interview method was used to collect the information on respondents sex, age, educational level, religion, caste, occupation of the respondent, and annual income of the respondent, access of road, access of electricity, agriculture and irrigation facility, access of markets facility, access of banking facility, drinking water facility, fuels used for cooking, sanitation facility, accessibility of schools and health services. The observation method is used to identify the type of houses that, the respondents of the household were living.

1.16. (e) Sample Size

The sample size for the study is 400 households in the rural area of the study region. In that, 100 (25%) households were interviewed in Kempanapura village of Chamarajanagar taluk, 100 (25%) household were interviewed in Begur village of Gundlupete taluk, 100 (25%) households were interviewed in Palya village of Kollegala taluk and 100 (25%) household are interviewed in Kesthur village of Yelandur taluk.
1.16. (f) Sampling

The simple random sampling method was used to select the villages and household for the primary data.

1.16. (g) Sampling Technique

The simple random sampling method was used to select the villages and household for the primary data.

1.16. (h) Variables chosen for Primary the study

The study used eight variables such as access of road, access to electricity, agriculture and irrigation, access of market facility, access to banking facility, drinking water facility, fuels used for cooking, sanitation facility, accessibility of schools and health facilities.

1.16. (i) Statistical Tools and Techniques for Data Analysis

The data analysis have been carried out by using simple statistical methods like percentages, averages, annual growth rate and compound annual growth rate, and these have help us to understand the grassroots level realities. In addition to this simple regression model have been worked out to understand the extent of the relationship between infrastructural linkages and interventions in the development of a region.
1.16. (j) Simple Regression Model

In the present study, both economic and social infrastructure facilities have been considered. Under economic infrastructure, the facilities such as roads, banks, irrigation and electricity are selected, and in social infrastructural facility health, education and drinking water are selected. To estimate the influence of infrastructure facility on regional economic development, the study has regressed with GDDP(Gross District Domestic Product) on infrastructure development using time series data between the years of 2001-02 to 2012-13 by using simple regression model. The model is specified as follows.

\[ Y_t = \beta_0 + \beta_1 X_t + U_t \]

Where \( Y_t \) is GDDP of Chamarajanagar district.
Where \( X_t \) is individual total of infrastructure development indicators.
Where \( U_t \) is disturbance term, which has usual properties of estimation.
Where \( \beta_0 \) and \( \beta_1 \) are parameters to be estimated.

The study has also measured the relationship between the investments on infrastructure facilities and economic development with PCI (Per capita Income) by using simple regression analysis for the period of 2001-02 to 2012-13.

\[ Y_t = \beta_0 + \beta_1 X_t + U_t \]

Where \( Y_t \) is PCI of Chamarajanagar district.
Where \( X_t \) is individual of infrastructure investments made by Zilla Panchayath of Chamarajanagar district.
Where \( U_t \) is disturbance term which has usual properties of estimation.
Where \( \beta_0 \) and \( \beta_1 \) are parameters to be estimated, \( \beta_1 \) measures the relationship between investment on infrastructure facilities and per capita income of the district (economic development).

1.16. (k) Unit of Analysis

The household is the unit of analysis for the study.

1.16. (l) Sampling Frame

The 2011 census list of taluks, villages of Chamarajanagar district served as the sampling frame for the study.
1.16. (m) Time Period

The study has covered a period of 12 years i.e, from 2001-02 to 2012-2013.

1.17 Organization of the Study

The present study is organized and presented in eight chapters.

- The first chapter is introductory in nature and spells out the objectives of the study, hypotheses and methodology used in the study. This chapter serves as the foundation, based on which the other chapters of the study are developed.

- The second chapter provides a theoretical framework and empirical perspective of the research problem.

- The third chapter is an attempt to explain the role of government and other institutions in the development and governance of rural infrastructure in the study region.

- The fourth chapter makes an attempt to examine the status of rural infrastructure in the study region and also analyses the regional variations in the same.

- The fifth chapter contains the linkages between rural infrastructure and regional economic development using the secondary data.

- The sixth chapter presents the distributional impact of infrastructural interventions in the study region.

- The seventh chapter presents the issues and challenges in rural infrastructure development and governance at the various levels of the study region.

- The eighth chapter presents the summary, major findings, and conclusions.