CHAPTER- 2

Review of Literature

2.1 Theoretical Review:-
A sound theoretical base for the kind of the study attempted here is a impetus to trace the trajectory of infrastructure development and human development in the growth of an economy or vice versa. From neo-classical economy to endogenous economic growth, in all the theories it has been found that infrastructure, economic growth and human development interact on each other. Various theoretical notes and growth models projects the need of optimum utilization of infrastructure facilities in order to overcome backwardness and to attain higher economic status.

Paul Rosenstein Rodan (1957), in his ‘Big Push Theory’ (which is a modern version of ‘External Economy’) explained three externalities-

1. Indivisibilities in production function:- According to Paul Rosenstein Rodan, indivisibilities of inputs, outputs or processes lead to increasing returns. He regards social overhead capital (SOC) as the most important instance of indivisibility and hence of external economies on the supply side. The services of social overhead capital comprising basic industries like power, transport and communications are indirectly productive and have a long gestation period.

2. Indivisibilities of demand:- The indivisibility or complementary demand requires simultaneous setting up of interdependent industries in underdeveloped countries.

3. Indivisibilities in the supply of savings:- A high minimum size of investment requires a high volume of savings.

Therefore, in Big Push Theory, Paul Rosenstein Rodan has focused on importance of social overhead capital.
Professor Gunnar Myrdal (1957) built his theory of economic development and underdevelopment around the idea of regional inequalities on the national and international planes. He said, "If things were left to market forces unhampered by any policy interferences, industrial production, commerce, banking, insurance, shipping, and indeed, almost all those economic activities which in a developing country tend to give a bigger than average return- and, in addition, science, art, literature, education and high culture generally would cluster in certain localities and regions, leaving the rest of the country more or less in a backwater."

According to his theory regional disparities are due to insufficient infrastructure facilities.

W.W. Rostow (1960) in his theory "The stages of economic growth" included social over head capital as one of the pre-conditions for accelerated growth of the economy. In any case, the process of creating pre-conditions for take-off from traditional society follows along these lines: "The idea spreads that economic progress is possible and is a necessary condition for some other purpose, judged to be good; be it national dignity, private profit, the general welfare, or better life for the children. Education for some at least, broadens and changes to suit the needs of modern activity. New types of enterprising men come forward in the private economy, in government, or both, willing to mobilize savings and to takes risks in pursuit of profit to modernization. Banks and other institutions for mobilizing capital appear. Investments increase, notably in transport, communications and in raw materials in which other nations may have an economic interest. The scope of commerce, internal and external, widens. And here and there, modern manufacturing enterprise appears, using the new methods."

Albert Hirschman (1961) propounded the theory of 'Unbalanced Growth' which is supported by H.W Singer, C.P Kindleberger, Paul Streeten, W.W Rostow. In this theory Hirschman explained two types of investment-
1. Convergent series of investment (CSI) (which are made in Directly Productive Activities (DPA))

2. Divergent series of investment (DSI) (which are made in Social Overhead Capital (SOC))

SOC refers to "those basic services without which primary, secondary, tertiary productive activities cannot function" i.e., it includes the basic services like transport, communication, power, education etc. According to Hirschman "some SOC investment is required as a prerequisite of DPA investment."

5. **The new endogeneous growth theory** explains the long-run growth rate of an economy based on endogenous factors as against exogenous factors of the pessimistic neoclassical growth theory. The endogenous growth models emphasize technical progress resulting from the rate of investment, the size of the capital stock, and the stock of human capital. With physical infrastructure, the role of social infrastructure is also very important. Human development through skills, training, education etc. helps the economy to develop from its core. The new growth theory basically focused on that and directed to grow economy not only with the help of physical capital but also with the help of human capital. There are several economists who gave different models of new endogeneous growth theory and the main models are given by Arrow, Romer and Lucas.

**Arrow's Learning by Doing model (1962):**

Arrow was the first economist to introduce the concept learning by doing in 1962 by regarding it as endogenous in the growth process. His hypothesis was that at any moment of time new capital goods incorporate all the knowledge then available based on accumulated experience, but once built, their productive deficiencies cannot be changed by subsequent learning.
The Romer Model (1986):-
He assumes creation of knowledge as a side product of investment. He takes knowledge as an input in the production function of the following form:

\[ Y = A(R)F(R_i, K_i, L_i) \]

Where \( Y \) = aggregate output

- \( A \) = public stock of knowledge from research and development (R)
- \( R_i \) = stock of results from expenditure on research & development by firm i
- \( K_i \) = capital stock of firm i
- \( L_i \) = Labour stock of firm i

According to Romer, it is spillovers from research efforts by a firm that leads to the creation of new knowledge by other firms. In other words, new research technology by a firm spillover instantly across the entire economy. In his model, new knowledge is the ultimate determinant of long-run growth which is determined by investment in research technology.

The Lucas Model (1988):-
Uzawa developed endogenous growth model based on investment in human capital, which was used by Lucas. Lucas assumes that investment on education leads to the production of human capital which is the crucial determinant in growth process. He makes a distinction between the internal effects of human capital where the individual worker undergoing training becomes more productive, and external effects which spill over and increase the productivity of capital and other workers in the economy. It is investment in human capital rather than physical capital that have spillover effects that increase the level of technology.

The theoretical inference so far underline the need for appropriate infrastructure (both physical and social) are needed for economic development and also brings a strong positive relationship between infrastructure and economic growth.

From the very beginning, when development economics had started to attract the attention of several economists the importance of infrastructure was identified to
fulfill the aim of economic growth, increasing productivity, increasing trade and transaction etc.

On the one hand some economists like Hirschman, H.W Singer, C.P Kindleberger, Paul Streeten, W.W Rostow etc had explained the importance of ‘Social Overhead Capital’ in ‘Unbalanced growth theory’, and on the other, some other economists like Arrow, Lucas, Romer etc. in ‘new endogeneous growth theory’ depicts the importance of human resource development for modern economic growth.

There are several studies already exist which analyze the relationship between infrastructure and economic growth or productivity or income distribution or poverty alleviation and some other studies which relate human development with economic growth. Before we set out to carve a suitable methodology for our study, a quick review of the existing literature is the natural outcome.

A review of the research done in the area that one chooses to explore is very informative as it helps in placing each work in the context of its contribution to the understanding of the subject under review. Keeping in view the objectives of the present study, the review of literature has been broadly classified into three groups. The first group includes studies related to ‘infrastructure and economic growth’. The second group includes the studies related to ‘human development and economic growth’. The various related studies which do not fall in broad classification of the review of literature included in section entitled ‘miscellaneous studies’.
2.2 Infrastructure and Economic Growth:
John M. Antle (1983) in his “Infrastructure and Aggregate Agricultural Productivity: International Evidence” estimated a COBB-DOUGLAS production function for 47 developing countries and 19 developed countries for the year 1965 to study the impact of infrastructure (in particular road infrastructure) to agricultural productivity and he found a strong positive relationship between the level of infrastructure and aggregate agricultural productivity.

The model included the value of aggregate national agricultural production per capita as a dependent variable. The independent variables represented by the factors of production available at a national level and comprise agricultural land, active population in agriculture, consumption of nitrogen, phosphate and potash fertilizer and the stock of live animals.

L.N. Bhagat (1986) in his paper “Interregional disparities in agricultural infrastructure: A case study of Bihar” examined the extent of inter-regional disparity in the agricultural infrastructure in Bihar. He used cross-sectional data of thirty-one districts for the year 1976-77 to determine the agricultural productivity in the state. He made the composite index for infrastructure and used it to measure the relative positions of the overall agricultural infrastructure in the districts. Index number, correlation coefficients, log-linear regression, ordinary least square method etc. were used in this study. It was proved that there were inter-regional differences in the level of infrastructure facilities in the state. It was also observed that the infrastructure was a significant determinant of level of agricultural productivity in Bihar. It was recommended that as infrastructure contributes to modernize agriculture, a suitable policy for infrastructure was needed for economic development for the agriculturally backward economies.
World Bank's (1994) "World Development Report 1994: Infrastructure for Development", examined the link between infrastructure and development and explored the ways in which developing counties could improve both the provision and the quality of infrastructure services. In recent decades, developing countries had made substantial investment in infrastructure and achieved dramatic gains. According to WDR 1994, a 1 percent increase in the stock of infrastructure is associated with a 1 percent increase in gross domestic product across all countries. The kind of infrastructure put in place also determined whether with economic growth poverty also reduced. This report showed that even more infrastructure investment and expansion were needed in order to reach of services especially to people living in rural areas and to the poor.

According to the report most of the poor lived in rural areas and the growth of the farm productivity and of non-farm rural employment was linked closely to infrastructure provision. The urban poor often benefited most directly from good infrastructure services because the poor people concentrated in settlement subject to unsanitary conditions, hazardous emissions, and accident risks. Moreover, in many rapidly growing cities, infrastructure expansion was lagging behind population growth, causing local environment to deteriorate.

This report showed the quantity of investment could not be exclusive focus of policy. Improving the quality of infrastructure was also vital. Both quality and quantity improvement were essential to modernize and diversify production, helped countries to compete internationally and accommodate rapid urbanization.

David Canning and Peter Pedroni (1999) in their paper 'Infrastructure and Long run Economic Growth' had investigated the long run consequences of infrastructure provision (roadways, telephone connections and electricity) on PCI in a panel of countries over the period 1950-1992. A stylized growth model adopted from Barro(1990) was used here. To examine the long run impact of infrastructure on income non-stationarity & cointegration in the time series and
heterogeneity in both the short run & long run responses of countries were used. A great deal of heterogeneity in the result of cross countries was found. The result of the analysis indicated the causal relationship as well as the level of infrastructural stocks across countries under consideration. On one hand bi-directional causality between Gross Domestic Product (GDP) per capita and infrastructure was found and on the other it was proved that telephones & paved roads were provided at the growth maximizing level on average, but were under supplied in some countries and over supplied in others and electricity generating capacity was under provided on average.

**Fabrizio Felloni, Thomas Wahl and Philips Wandschneider (2001)** in their paper "Evidence of the effect of infrastructure on agricultural production and productivity: Implications for China" presented preliminary results from econometric analysis of cross-sectional data from 83 countries as well as for 30 provinces and municipalities in China to assess the effect of transportation infrastructure and electricity on aggregate agricultural production and land and labor productivity. The analysis suggested that significant return in terms of productivity of land and labor in Chinese agriculture could be expected from increased investment in infrastructure. Infrastructure would be crucial in the increasing provincial specialization of agriculture and in the transition from food crops to higher-value products.

As this paper tested the significance of infrastructure on aggregate agricultural production and it also attempted to explain the effect of the stock of roads and the availability of electricity on the productivity of land and labor it divided its methodological section in two sections-

(i) Gross product in Transportation and Energy Sectors and Agricultural Production- Cross Country Analysis:- A Cobb-Douglas function was estimated with data from 83 countries for the year 1991 and then coefficients of production
function, elasticity of dependent variable (agricultural production) with respect to explanatory variables and t-ratios were estimated.

(ii) Physical Infrastructure and Agricultural Productivity: Cross Country Analysis:

Value of Agricultural Production (USD)/Agricultural Land (1000 ha), Value of Agricultural Production (USD)/Active Population in Agriculture (‘000 people) were used as dependent variables and Fertilizer/worker, Tractor/worker, electricity per capita, Roads with respect to total area, high income countries (dummy variables are used) were used as independent variables in this analysis.

Results displayed a remarkable stability and showed that roads and electricity had a positive impact on productivity.

Markus Wauschkuhn (2001) in his paper “Telecommunications and Economic Development in China” discussed in detail China’s different measures to reform the telecommunications sector with the aim to introduce growth, innovation and competition in the market. The progress of China in telecommunication was analyzed by the tabular and graphical methods. The data like telephone lines per 100 inhabitants, number of calls (index 1990=100), relative growth of services by year, regional distribution of telephone subscribers 1998 (per 100 inhabitants) etc. were taken into account to examine China’s progress in telecommunications. It was concluded that ‘with a balanced system of reforms, restricted competition, controlled foreign influence, regulated prices improving and enforcement of the domestic equipment industry, China managed to increase products and services in both, quantity and quality.’

Anjum Aqeel and Mohammad Sabihuddin Butt (2001) in their paper “The relationship between energy consumption and economic growth in Pakistan” investigated the causal relationship between energy consumption & economic growth and energy consumption & employment in Pakistan. By using co-integration and Hsiao’s version of Granger causality test they had proved that
economic growth caused total energy consumption in Pakistan economy. Energy consumption was disaggregated into its components of petroleum, gas and electricity consumption. The empirical results inferred that economic growth caused energy consumption and lead to the growth of petroleum consumption also. Again, in the case of gas sector, neither economic growth nor gas consumption affected each other. In power sector, it was found that electricity consumption also directly causes employment. It was recommended that an energy growth policy in the case of gas and electricity consumption should be adopted in such a way that it stimulated growth in the economy and thus expanded employment opportunities.

Deepika Goel (2002) in her study “Impact of Infrastructure on Productivity: Case of Indian registered Manufacturing Sector in India” examined the impacts of the provision of infrastructure on the productivity of the registered manufacturing sector for the time period 1965-66 to 1998-99. Infrastructure was assumed to be a quasi-fixed input since its provision was done mainly by the public sector and it could not be instantaneously adjusted in the short-run. Total seven sectors of infrastructure (economic as well as social) with twenty three variables were considered and principal component analysis was done to estimate the weights of different infrastructure components. For this study a functional form of the cost function was specified to derive the productivity effects of infrastructure. The cost was assumed to be a function of prices of three variable inputs, capital, labour, intermediate inputs, and the quantity of quasi-fixed input(s), that is the infrastructure input(s) and output.

Three alternative specifications of the quasi-fixed inputs were explored. The alternatives were economic infrastructure, social infrastructure and aggregate infrastructure. Estimated results suggested that infrastructure provision enhanced the productivity in the manufacturing sector and it helped to lower the costs in the sector. Apart from this it also had several bias effects with respect to the variables inputs.
H. Prakash of Mysore University in his study “Evaluation of Institutional Base for Infrastructure in Industrial Development of Karnataka” (May 2003) considered the twin ingredients of the process of development - Infrastructure Development & Superstructure Development. According to H. Prakash Infrastructure was the “wheel of economic activity” and there was positive relationship between infrastructure investment and economic development. The industrialization in Karnataka was briefly presented under – Industrial units, Small-scale units & the letter of intents issued.

This study focused on the quality of infrastructure on one hand and the institutional base on other hand. It covered mainly the infrastructure facilities in Karnataka with nine major components of these facilities provided through an institutional base, primarily enquiring into present status and future recourse visualization from 315 respondents spread over in Karnataka. The results of the study were presented under profile analysis, comprehensive analysis, rating of infrastructure facilities, factor analysis, perception analysis and with presentation of preference analysis data collated as a stream to help the discussion of results. The major findings of this study divided into two groups- General findings and Empirical findings . According to general findings the social and economic infrastructure sector in Karnataka contributed 50.99% of GDP. The empirical findings denoted the perception of the respondents in various dimensions of infrastructure in Karnataka. It was proved in this study that the inadequacy of infrastructure had a telling effect on production schedules of industrial units and it has the highest mean value of 4.2. It was concluded that no nation can dare to attempt the development process by discarding infrastructure. In this study by analyzing the results, different deficiencies in infrastructure facilities were identified efficiently.
Cesar Calderon and Luis Serven (2004) in their study “The effects of infrastructure development on growth and income Distribution” examined the impact of infrastructure on economic growth and income distribution by using the panel data set of 100 countries for the years 1960-2000. These two economists found that

1. Growth was positively affected by the stock of infrastructure assets.
2. Income Inequality declined with higher infrastructure quantity and quality.

The infrastructure assets i.e., telecommunication, transport and power were considered in this study and both the quantity and quality of these infrastructure components were measured here. To account for potential endogeneity of infrastructure (as well as that of other regressors), GMM (Generalized Methods of Moments) estimators were used, which were based on both internal and external instruments, and the results are given by using both disaggregated and synthetic measures of infrastructure quantity and quality. This study was based on physical and economic infrastructure. Social infrastructure segment was totally ignored here though this is complementary of physical and economic infrastructure. Again in physical and economic infrastructure also only three sectors- telecommunication, transport and power are considered, the other sectors like agriculture, banking etc. which are also crucial, are totally ignored.

Baseerath Sultana of Mysore University had studied “A critical study of infrastructure development in Karnataka with special reference to Mysore District” in 2005. This study proposed to examine crucial issues which are very much relevant in the context of over all development for the period 1991 to 2001.

The main objectives of the study are-

a. To analyze the documented strategies of infrastructure development in independent India over a period of time with particular perspective on reform decade initiated since 1991
b. To evaluate the state level policies and programs pertaining to the infrastructure support.

In this study, it was tried to assess the role of Government of Karnataka in the reformation and the upliftment of the infrastructural development in the district. By analyzing the data of six different infrastructural sectors individually and their composite index, it is concluded that to overcome the problem of backwardness and poverty, building up of strong, good quality infrastructure plays a very important role. The backwardness of different sectors is due to lack of infrastructure facilities.

This study addresses only a limited aspect of the total development of the state. Infrastructural development is a partial pre-requisite for the general development of the country. It does not give the entire set of instruments and ecologies needed for the development. Again, this study focused only on physical and economic infrastructural facilities and ignores the social infrastructural facilities (except clean drinking water) which are also very important.

In January 2006 Seetanah Boopen's paper “Transport Infrastructure and Economic Growth: Evidence from Africa Using Dynamic Panel Estimates” was published in 'The Empirical Economics Literature'. The contribution of transport capital to economic growth was analyzed for two different data sets namely for a sample of sub-saharan African (SSA) countries and also for samples of small island states (SIDS) using both cross sectional and panel data analysis. In both the cases the analysis concluded that transport capital has been a contributor to the economic progress of these countries. Analysis further revealed that in the case of SSA, the productivity of transport capital stock is superior as compared to that of overall capital. Again, in the case for the SIDS transport capital is seen to have the average productivity level of overall capital stock.
Javed Iqbal and Nadeem Khurran's "Exploring causal relationship among social, real, monetary and infrastructure development in Pakistan" was published in "Pakistan Economic and Social Review (2006)". This paper examines the causal relationship among composite indicators for real, monetary/financial, social and infrastructure development in Pakistan for the period 1971-72 to 2003-04. Basically, the study provides evidence on the two highly debatable issues, i.e. money-real causality and socio-economic causality in a single multivariate framework. Large numbers of variables are used to construct the composite indicators of development in four major sectors of the economy- social development, Real economic development, monetary and financial growth and infrastructure development. The technique of factor analysis using principal component is employed to construct these indicators. The computed value of these indicators over the aforementioned time span constitutes the time series data. Using these time series data the paper assesses that a long run relationship exists among social, real, monetary and infrastructure activities. The Granger Causality test and Vector Error Correction model are applied and it is concluded that social development is caused by real economic development but not vice-versa, which is indicative of trickle-down development policies. It is also concluded that in the context of Pakistan no causal relationship exists between real economic development and monetary growth i.e., monetary development has no impact on the economic growth of the country. Both real development and monetary indicators appear exogenously in the system, which implies that these can be used as investment in developing social and physical infrastructure to boost investment and improving the quality of life of the people. It is concluded that to boost individual incomes and reduce poverty greater emphasis by both government and private sectors are needed which provide employment opportunities, so policies to enhance investment climate by improving infrastructure may be one such a venue to follow. But any definite solution has not been predicted in this study for economic progress and prosperity.
The study “Infrastructure and economic development with special reference to Transport and Communication in Karnataka” by Ms S. Surekha (2006) established the positive relationship between infrastructure variables and gross national income (GNI) and analyze the trend of different infrastructural variables with the help of statistical tables, graphs, charts, maps. Both analytical and descriptive methods are adopted in this study for addressing the set objectives. It has macro-approach in dealing with issues related to transport-communication facilities. Simple regression analysis is used here to relate the physical infrastructure with economic growth. In this study it is proved that Infrastructure variables namely road network, air passenger carried, registered air traffic carriers, air freight traffic, computer access, access to television by house holds, internet users, telephone mainlines are highly correlated with GNI ,which makes it clearer that better the infrastructure facility higher will be the income. It is concluded that there is a direct and positive relation between GNI and Transport and communication facilities.

The study “Impact assessment of irrigation infrastructure development on poverty alleviation: A case study from Pakistan” by JBIC Institute Team (March, 2007) provided an in depth understanding of the role of irrigation infrastructure development on poverty alleviation. The study used primary data collected through household surveys conducted three times during the year 2000-01, from a sample of 707 households, using a detailed multi-topic questionnaire. The sample areas for the study were selected in districts Mandi Bahauddin and Gujrat(Pakistan), based on several criteria. The result of this study provided strong empirical evidence on the role of irrigation infrastructure on poverty alleviation.

In Asia -Pacific Journal(2008) Kamal Raj Dhungel’s “A Causal Relationship Between Energy Consumption and Economic Growth” was published. In this paper, an attempt was made to examine the causal relationship between per capita consumption of coal, electricity, oil, total commercial energy and the per
capita real Gross Domestic Product (GDP), using co-integration and vector-error correction model. According to the researcher, the increase in real GDP, among other things, indicates a higher demand for a large quantity of commercial energy such as coal, oil and electricity which implies that the low infrastructure development limits the usage of commercial energy which may also hold back economic growth. Granger causality test is used to test the causality between per capita coal consumption, electricity consumption, oil consumption, total commercial energy consumption and per capita real GDP. The F values and the respective probabilities for the data of the time series during the period 1980-2004 with specific lag period are also being calculated. Empirical Findings reveal that there is a unidirectional causality running from per capita real GDP to per capita electricity consumption. The suggestion is given by the study is that input of per capita energy consumption stimulates enhanced economic growth in Nepal. This study is limited only in Energy Sector, but there are also some important components of Infrastructure which affect GDP growth effectively are totally ignored. Again, in Energy sector also the attention is limited in few elements - coal, electricity, oil and total of the energy consumption.

Randall Eberts (2009) of W.E. Upjohn Institute in his paper “Understanding the contribution of Highway Investment on National Economic Growth: Comments on Mamuneas’s Study” discussed the broader role of transportation in shaping development and environment. According to this paper transportation investment is now more for capital enhancement rather than for capital expansion. Though, exploring the economic effects of transportation different types of data on regular basis are needed but deficiency in data is a major problem. Again, analytical approaches for estimating the effect of transportation investment on economic development is now coming into grips with transportation infrastructure as a spatial concept rather than as cost–benefit analysis. It was pointed out that transportation investments are increasingly becoming more complex. Decision makers must take into a wider range of factors for it.
Amar Kumar Mohanty, Narayan Chandra Nayak and Bani Chatterjee (April, 2009) in their paper “Infrastructure Development Across Districts of Orissa” examined the extent of infrastructure development in Orissa and its consistent districts on the basis of composite indices. District level data for all the 30 districts related to various indicators of infrastructure were collected from District Statistical Handbook of Orissa.

In this paper, Principal Component Analysis is used to prepare the composite indices of infrastructure. It is concluded that while districts in the coastal belt perform well in infrastructure, the districts located in the central plain have moderate level of development. The districts falling under southern region and in hilly regions have continued to lag behind. It is suggested to implement public-private-partnership model for the development of infrastructure in the state.

In Rudra Prakash Pradhan’s (June, 2010) paper ‘Transport Infrastructure, Energy Consumption and Economic Growth Triangle in India: Cointegration & Causality Analysis’ the nexus between transport infrastructure (road & rail), energy consumption (oil & electricity) and economic growth in India are explored for the period 1970-2007. The econometric techniques like cointegration, granger causality tests were used here. It was found that there is unidirectional causality from transport infrastructure to economic growth, from economic growth to energy consumption and from transport infrastructure to energy consumption. The paper suggested that energy and transportation policies should recognize the transport - energy consumption-growth nexus in order to maintain sustainable growth in the country.

The above studies by different economists mainly focus on infrastructure and economic growth. But there are several studies in which the issues related to human development and economic growth are discussed. In modern era of globalization, human resource development is a crucial issue and an effective infrastructure is needed to achieve the above goal.
Some important studies are discussed below relating to human development and economic growth.

2.3 Human Development and Economic Growth:-

In 1930 Schultz’s research in agricultural production evolved into a study of economic growth. In 1940, he came to see “acquired ability of labour” as a major source of the unexplained gains in productivity. To study the investment in man, a new concept of capital was needed. Schultz recognized that many eminent economists before him (e.g. Adam Smith, Irving Fisher and Frank Knight) considered human abilities as a capital. Schultz spent the last 40 years of his career understanding investments “in man”. Human Capital to Schultz was the acquisition “of (all) useful skills and knowledge …… that is part of deliberate investments”. Schultz’s research on human capital sought to clarify the investment process and the incentives to invest in human capital. He studied mainly formal education and organized research. The application of the investment approach in the intervening 40 years expanded to consider an array of different forms in many vistas.

In the beginning of 1960’s the emphasis was shifted from material capital to human capital. According to New endogenous growth theory, growth rate should be determined endogenously and it focused on human development. Human beings are considered as human capital in modern economic literature. Improved skill, training, higher education, healthy life, new modern technologies, research and development, proper nutrition, food, sanitation etc are required for actual economic growth. The developing countries, like India, should concentrate in human capital formation to converge its economy with developed countries.

According to Swarnalekha Bihari’s study “Human Resources for Economic Development with reference to India” (1974), there is positive effect of Human Resources on economic development. According to her study, not only due to lack of natural resources but due to lack of potentiality in human resources, most
underdeveloped countries can not develop further. Though economic
development in underdeveloped countries is directly linked with investment in
capital goods as an essential pre-requisite, but until we develop skill and
knowledge of the people, capital equipments remain ineffective. The lack of
trained manpower can often led to serious bottlenecks in the development
process. It is proved in her study that Human Resources are important both
quantitatively (the size of the population, total working force and working hours)
and qualitatively (skill, knowledge and capability to do work).

In this study, mainly the educational trends (primary, secondary, graduation,
vocational etc.), the returns from education, unemployment rates are analyzed
for (1950-51 to 1970-71). The returns from education are calculated by the
lifetime earning of an educated man. The increase in income of an educated man
can be measured by his earning after he has completed the course of education
and training, with the income of a person who has no such education or training.
The difference in the two will give the actual increase in income by education.
In this, study only the education and employment sectors are considered as the
elements of human resources. But to study the impact of human resources on
economic development more elements are required because both the concepts
i.e. human resources and economic development are very wide.

In 1976 P R Gopinathan Nair studied “Education and Economic
development in Kerala”. In this study the relationship between Education and
Economic Development in Kerala is examined and the socio-economic
compulsion programmes under which education is progressed in Kerala at a rate
higher than in the rest of India are also assessed. It is also discussed that what
are the indirect benefits of education and the observed decrease in mortality and
fertility rate is attributed to the spread of literacy or not. The magnitude of primary
education (Enrolment ratio), drop outs, stagnation rates etc are analyzed. Simple
Markov Chain model used to portray the pattern of student flows in the system
for estimating the class wise rates of stagnation and dropouts. The analysis
explains the mechanism by which in Kerala the rate of growth of literacy of both males and females outpaces that in other states which show higher rate of growth of Enrolment. Though the pattern of educational development follows in this state has led the emergence and growth of social process, many of which have conferred significant benefit on the society, but the growth of educated unemployment is higher than unemployment in general, which implies, educational development can play only a limited role as a catalyst for promoting economic equality. Though the study is relevant and contributes a lot, but no policy recommendation is given here to overcome the problem of educated unemployment of the state.

"Education and Human resource development in Rural Punjab : A study of Bathinda District" by Parminder Kaur (Punjabi university, patiala, 1991) contributes effectively in the field of human development and economic growth. This study has been conducted to examine the significance of educational input to the development of human resources in rural area for the period 1980-1988. In this study, both primary and secondary data are used. The stratified sampling design has been diffused to four categories- Big farmers, Medium farmers, Small farmers and other communities. The statistical techniques like- mean, coefficient of correlation, regression equation, test statistics (t-test, chi-square test and F-test) are used. The study concludes that the rural areas can be developed to infinite limits, if infrastructure for education is provided and positive action is taken to make them receptive to education. The spread of education will initiate them to introduce changes for optimizing the results in their own field.

Though the aim of the study is to examine the impact of education in human resource development in rural Punjab, but it is limited only on one district-Bathinda. But for studying entire rural area of Punjab the study of only one district cannot give the overall idea of entire rural areas in the state in practical.
Delano Villanneva (1994) had studied “Openness, Human Development and Fiscal Policy: Effects on Economic Growth and Speed of Adjustment.” This paper presented a simple neoclassical growth model with endogenous technical change and contrasted its equilibrium properties with those of the more standard growth model. The data, except for foreign trade flows, were drawn from Orsmond (1990), which were based on the IMF’s Government Financial Statistics and International Financial Statistics. Foreign trade flows were taken from the World Economic Outlook data base. The sample consisted of observations averaged over the period 1975-86 for 36 developing countries. The model developed here postulated that learning through experience raised labour productivity with three major consequences. First, the steady state growth rate of output became endogenous and was influenced by government policies. Second, the speed of adjustment to steady-state growth increased, and enhanced learning further reduces adjustment time. Third, both steady-state growth and the optimal net rate of return to capital were higher than the sum of the exogenous rates of technical change and population growth. Simulation results confirmed the model’s faster speed of adjustment, and regression analysis found that a large part of the divergent growth patterns across countries was related to the extent of economic openness, the depth of human development, and the quality of fiscal policies. It was found that, contrary to the predictions of the Solow-Swan model, the equilibrium growth rate of per capita output was influenced in a systematic way by changes in the private rates of saving, depreciation, and population growth, as well as by changes in public policies regarding trade liberalization, fiscal deficits, spending on human resource development (HRD), and net investment.

In Divya Singhal’s study “Human Development in Rajasthan- The Education Challenge” (2003), the major hypothesis was that ‘Education has enhanced Human Development in Rajasthan.’ According to her study, education is a catalyst of human development. The researcher on one hand examined the progress made in implementing the changes in human development through
education and has suggested the ways and means to strengthen the programmes and also has effectively contributed in policy planning on the other. The study also helps to understand whether the efforts of government in education increase the intrinsic value or extrinsic value.

This study is based on primary and secondary data. 350 beneficiaries of literacy campaigns were selected from rural areas of Ajmer, Jaipur and Udaipur district to fulfill the proposed objectives of the study. Three components - Productivity, Health and Empowerment were considered to measure the effect of education on Human Development in Rajasthan in this study.

For the analysis of collected data, both descriptive and inferential statistics are used. In order to explore the effect of Government programs of education on different dimensions of human development, the description is made through the statistical techniques like: frequency distribution, percentage, simple mean, weighted mean, standard deviation. Analysis of variance (ANOVA) is also used to find out the independent and interactive effects. The overall study reveals that after associated with literacy campaign especially rural people of the state raised demands for initiating development work. It is also found that there is considerable improvement in relation to girls and other deprived class. The t-test result of impact of education on productivity, health and empowerment reveals that education has enhanced better human development of women in Rajasthan than males. There is significant relation between impact of education and empowerment with reference to sex in Rajasthan. To support findings the interaction effect of different related variables are presented through ANOVA tables. The ANOVA description confirms that education has increased productivity.

However, the impact of education on human development is analyzed deeply in this study but it is also required to analyze it with respect to the variables like caste, economic status, marital status, occupation and family size. Again, this
study is based on only three districts of Rajasthan, though consideration of other districts in the study is also required in wider sense.

“Health, Poverty and Economic Growth in India” by P. Duraisamy and Ajay Mahal (2005) contributes efficiently in the existing analyses of the health-poverty-income nexus by examining these relationships at the state level in India. This study examined the relationship between economic growth and health using a panel data of 14 major Indian states for the period 1970/71 to 2000/01. The association between initial per capita income, growth rate and health across the states was examined in this study. It was found that there is strong association between per capita income and health status of population.

Madhusudan Ghosh (2006) studied “Economic Growth and Human Development In Indian states.” This paper evaluated the relative performance of 15 major Indian states on human development, and examined the two-way nexus between economic growth and human development i.e. Economic Growth(EG) to Human Development(HD) and from Human Development(HD) to Economic Growth(EG) for the period 1981 to 2001. In order to get a clear idea about the nature of change in the degree of regional inequality in HD, Absolute and Conditional β convergence were considered and examined to what extent the selected indicators of human development alternative to per capita income were converging or diverging across the states over time. A strong tendency of convergence was found in HDI, and its two other components Literacy Rate(LR) and Life Expectancy at Birth(LEB).

The two-way causality between EG and HD was estimated by using the data for a panel of 15 major Indian states. Economic growth was measured by average per capita SDP (PCI) and human development by HDI and two other indicators, viz, LR and LEB. In the absence of continuous time series data on HD indicators, the two-way relationship in a cross-sectional setting was examined, by testing causality using appropriate leads and lags in the dependent and independent
variables, respectively. To study the causality running from EG to HD, the effects of average PCI over the preceding five years (t-5) on HD indicators in a year(t) was examined. The independent variables were per capita income, social sector expenditure and two dummy variables D1 and D2 which were time dummies and determined the change in the structure of relationships across time. In the same way the impact of HD on EG was examined with human development, D1 and D2 as independent variables. In both ways significant positive relationship was found.

The classification of the states based on their performance on HD and EG revealed that while only four states were under virtuous cycle category, as many as seven states were under vicious cycle. The results suggested that the sequencing of policy should be such that the HD-induced growth process has to be strengthened for lifting the states from the vicious to virtuous cycle category.

In Vijayamohan N. Pillai’s “Infrastructure, Growth and Human Development In Kerala” (2008), seven sectors of infrastructure (transport, communication, irrigation, electricity, banking, education and health) were considered for the period 1960-61 to 2000-01. To establish the causal relationship between infrastructure and economic growth Markov Chain causality analysis was done. In this research work human development is considered as an intimately integrated component with infrastructure development and standard of living with economic growth. An attempt is also made to correlate quality and freedom in the context of infrastructure development in Kerala. A proposition of ‘chain interaction’ between human development and economic growth is suggested whereby the human development in Kerala was achieved by means of infrastructure development propelled economic growth which in turn has led to further human development. It was concluded that in the state Kerala, infrastructure facilitates human development by providing better education, clean drinking water, sanitation, medical facilities, better transportation etc. and helps in increase in standard of living. The concept of Adam Smith’s ‘Invisible Hand' was
used here to translate the individual’s self-interest into coherent social interest in explaining the development experiences of Kerala. The aim of this study was to analyze the development experiences of Kerala and to examine what worked behind these experiences.

In this paper it is argued that Kerala achieved the ‘quasi-capability’ enhancement in the field of infrastructure and the state was yet to strive for true development or the freedom from quasi freedom.

According to this paper, in the given time period (1960-61 to 2000-01) the state was with a high social infrastructure, but its economic infrastructure was weak. There were lots of educated unemployed in the state. Instead of high human development index the per capita income of the state was comparatively low. So the state was required to invest in its economic infrastructure and it was also required to improve the quality of its infrastructural capital.

But the actual reason behind the disparity between social and economic infrastructure has not been discussed in the paper. The relationship between economic growth and human development is also ignored in this study.

Rudra Prakash Pradhan (2009) in his paper “Education and Economic Growth in India: Using Error Correction Modelling” investigated the causal relationship between education and economic growth in India during 1951 to 2000. In this paper it was specifically attempted to trace the causality between GDP and Government Expenditure in education. Co-integration, error correction model, Granger causality tests were used in this study. The unit root test clarified that both economic growth and education are non stationary at the level data but found stationary at the first differences, indicating that they are integrated of order one. The cointegration test confirmed that economic growth and education are cointegrated, indicating an existence of long run relationship between the two. The Granger causality test finally confirmed that there is uni-directional relationship from economic growth to education. But there is absence of reverse
causality between those two variables. The error correction model further confirmed that there is a short run dynamics between education and economic growth in India and that has been corrected to bring them into a steady equilibrium position in the long run.

Sacchidananda Mukherjee and Debashis Chakraborty (May, 2010) in their paper "Is there any relationship between Economic Growth and Human Development? Evidence from Indian States attempted to analyse the relationship between economic growth and human development for 28 major Indian States during four time periods ranging over last two decades: 1983, 1993, 1999-00 and 2004-05. To construct Human Development Index for Indian States, the National Human Development Report 2001 methodology was considered. The objective of this exercise was to understand at what degree and extent the per capita income (as an indicator of economic growth) influenced the human development or vice versa across Indian States. Regression equation with double log model was used here to estimate the per capita income elasticity of human development across states. The Human Development Index was constructed for rural and urban areas separately for each of the States to understand the rural–urban disparity in the achievement of human development. The result showed that that though there was significant positive relationship between per capita income and human development across states but the coefficient of per capita income was decreasing across time i.e. it was not translating into human well being. This perhaps in another way might signify the rising influence of other variables in determination of the HD achievements of a state. The result shows the need for further investigation to determine the underlying factors (other than per capita income) which influence HD achievements of a State.
2.4 Miscellaneous studies:-
Federic Harbison and Charles A. Myres (1964) in their paper “Education, Manpower and Economic Growth: Strategies of Human Resource Development” analyzed economic, political, and social development from the perspective of the education, training, and energizing of human resources. They focused on formal schooling and on-the-job apprenticeship across seventy-five nations. A composite index was used to rank the nations was based entirely on the proportion of school-age persons enrolled in high school and university. The composite index of formal education was used to group the seventy-five nations into four levels of human resource development. The nations under first group called "underdeveloped," second group called "partially developed, third-level nations are termed "semi-advanced" and the fourth level, termed "advanced". Policy recommendations focused on broad education, retraining, and periodic refresher courses to increase flexibility necessary for rapid technological change. The study dealt with the four levels of development across seventy five nations under consideration which were most useful in providing a broad view of the state of education throughout the world and provided a basis for further comparative analysis.

Alex Anas, Kyu Sik Lee and Michael Murray(1996) in their study “Infrastructure bottlenecks, Private provision and Industrial productivity” collected the data from a sample of manufacturers in Indonesia and Thai cities on infrastructure deficiencies in electricity, water, transport, telecommunications and water disposal and compare their results to the findings of Nigeria. They found that on one hand Thailand and Indonesia offset the infrastructure deficiencies by participating themselves in infrastructure up gradation, on the other Nigeria lags behind in infrastructure up gradation due to public sector monopolies in infrastructure. It is concluded that Government’s policy toward the industrial organization and pricing of infrastructure sectors can significantly help a developing economy realize the benefits of private sector participation in provision of infrastructure services.
“Privatization and basic infrastructure services for the urban poor” by World bank (2001) examined the impact of infrastructure privatization on the poor in Latin America. It reviewed the transmission mechanisms through which infrastructure reform may affect the poor, focusing on microeconomic issues related to the poor’s access to the infrastructure services and the affordability of those services. Using household survey data from twelve countries, the study reviewed the trends in access to infrastructure services, examining whether poor are benefiting from increases in connections. It also looked at the policy options for improving access and ensuring affordability of service and assessed how priorities should be set. The study found that in many cases the poor benefited from utility reform, but there was a little doubt that more could be achieved if reform focused more explicitly on poverty from the outset. The study also confirms the positive relationship between infrastructure and economic growth and development. Furthermore, the causality between income levels and infrastructure stocks run in both directions, but the long run effect is from infrastructure to income.

Ravindra H. Dholakia in his paper “Economic Reforms and Development Strategy in Gujarat” (December, 2002) examined the development strategy followed by Gujarat state Government during the time period 1955 to 1991. It focused on the strategy of industrialization and urbanization ever since its inception in 1960. Economic reform measured at the Centre with an explicit emphasis on trade and industry considerably benefited Gujarat making its economic performance outstanding. The development strategy in Gujarat State was very clear and unambiguous ever since its inception in 1960 in according a high priority to industrialization. The state made a clear choice of encouraging the secondary sector activities over the primary and tertiary sectors’ activities. It was a well-known fact that Gujarat lags behind several states in the country in terms of human capital and related indices. Between the human capital and physical capital related government expenditures also, the Gujarat government was consistently accorded higher priority to the latter. Thus, the development strategy
of the Gujarat State for industrialization was unbalanced growth with emphasis on directly productive activity (DPA) rather than on creating social overhead capital (SOC).

In the industrial policy of Gujarat State during the nineties, the major instrument used by the state was reduction, exemption or deferment of sales tax by the new business and industry to encourage them to locate in the state.

Eight incentives were declared in the state's Industrial and Agro Industrial Policies, 2000. The incentives were- Interest Subsidy, Research & Development Subsidy, Quality Improvement Assistance Backward Area Development, Capital Subsidy, Environmental Protection Assistance, Land Provision, Air Freight Subsidy and Project Report Preparation Assistance.

Gujarat Industrial Development Corporation (GIDC) was provided comprehensive infrastructural facilities to the industrial units through their estates and sheded in selected locations in the state. It also started handing over the management of these estates to the users.

Since mid-nineties, however, when the reform process at the Centre slowed down, the state government in Gujarat started taking major initiative to liberalize and reform its policies further. In this process, the focus of the development strategy seemed to have shifted away from the organised manufacturing to the unorganised sectors and giving protection to the small and medium enterprises. It was concluded that Gujarat made subtle and significant changes in its policies to supplement the economic reforms initiated at the central government level.

Sudha Venu Menon (2008) of ICFI Business school in their article ‘Drivers of Economic Growth in Gujarat’ examined the growth experience of various sectors like energy, oil & gas, agro & food processing, Textiles, diamonds, petrochemicals etc. and also the medium & long term growth potential of the
economy in Gujarat. The article attempted to identify principle drivers of the economy and their contribution to economic growth. According to the article, the main drawback of the Gujarat model is its negligible performance in agricultural sector and regional imbalance in development. Again, the state cannot achieve remarkable success in social and human development. The limited achievement of the state in the field of employment, poverty alleviation and human development are closely linked to the macro development path.

Hrima H. Thaker and R.L. Shiyani (2009) in “Socio- Economic Development in Gujarat: Rosy picture with concerns” examined the socio-economic development and regional disparities of the state Gujarat. The socio-economic development of the state was measured with the help of 57 indicators for the period 1991(pre-reform) and 2001(post-reform) using factor analysis technique. The findings revealed that the development is biased in favor of the Golden Corridor i.e, from Vapi to Mehsana. All the district of Saurashtra except Rajkot, the districts Banas Kantha, Patan, Narmada & Kachchh may be considered as low developed. It was suggested to tackle this grave concern of regional imbalances.

Douglas H. Brooks and Susan F. Stone (2010) in their paper “Infrastructure and Trade facilitation in Asian APEC” examined trade facilitation among the Asian members of Asia Pacific Economic Cooperation and the role of hard and soft infrastructure in improving its performance. Computable general equilibrium analysis indicated that even a modest reduction in trade costs can yield significant gains. According to them the changes in transport technology, notably improvements in air freight and containerization, have amplified these trends, particularly for time sensitive goods. Multimodal shipping and improvements in logistics services have made it possible to trade with more destinations in less time and often at lower cost.
It is clear from the above discussion that, though the studies related to ‘Infrastructure and Economic Growth’ mainly focus on role of infrastructure development on economic growth, but most of them concentrate on one or very few components of infrastructure. On other side most of the studies related to ‘Human Development and Economic Growth’ either focus on education or health. Again, except Pillai N., Vijayamohan’s “Infrastructure, Growth and Human Development in Kerala” (2008), no study has been considered infrastructure, economic growth and human development together. In this study, it is reported that human development is the outcome of infrastructure development and causes growth in economy, which causes further human development. So there is ‘chain interaction’ between human development and economic growth. But the deficiency of the study is that the association between human development and economic growth has not been empirically proved here. In fact the concept of human development is replaced by social infrastructure here.

In our study components related to all the important seven sectors of infrastructure- transportation, communication, energy, banking, irrigation, education and health has been considered. The concept of human development index has been clearly discussed with respect to different relevant indicators. The district-wise (Gujarat) human development index has been calculated and association with economic growth has been established. Further, there is no study conducted on “Infrastructure, Economic Growth and Human Development in Gujarat”. So it is relevant to do such study on the state.