CHAPTER I

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I. THE CONTEXT

While tracing out the history of its origin in India, it is noticed that infrastructure was well recognised as a catalytic agent of development during the Nineteenth and early Twentieth centuries, when a large share of foreign investment was diverted towards building physical infrastructure particularly the railroads.\(^1\) Acknowledging it as a right step, a minimum level of infrastructure has been considered to be a pre-requisite for development of necessary spread effects in leading sector of the economy. But the scale of this minimum level is supposed to vary from economy to economy depending upon the differences in its history, geography, resources, etc.\(^2\)

It is also realised that infrastructure plays a pivotal role in promotion of accelerated development of backward areas. Although in some cases, it does not have a direct bearing on the final products, it permits and, in fact, invites directly productive activities to come in. In other words, the network of infrastructure is basic to every type of production — whether agriculture, manufacturing or service industry for the home or the export market.\(^3\) Besides, its role in restructuring of depressed or backward regions cannot be undermined. It promotes economic efficiency of such regions by enhancing accessibility to productive resources and physical mobility of raw materials, finished products and factors of production including labour. In other words, it stimulates economic growth by making both product and factor markets function more efficiently.
While highlighting the importance of economic components of infrastructure particularly roads, Michael Lipton has rightly argued that leaving aside the folly of anti-production propaganda by pseudo participation, it is silly to be against infrastructure. Isolation is bad, roads are good. A village with a road (or other relevant central physical grid infrastructure) and, therefore, able to exchange outputs and inputs with other villages is normally better off ceteris – paribus than a roadless, exchangeless village. Similarly, the power or electricity is also said to have even greater impact on development because it facilitates not only agricultural, industrial and other economic activities but also provides important direct consumption benefits.

On the other hand, turning to its social components, it is argued that educational institutions are required to educate people, enhance their knowledge/capabilities and finally transform human motivations and instill new values and a progressive outlook. Moreover, public health, safe drinking water and sanitation are needed to make people physically sound and more efficient members of the society and help enhance the level of their life expectancy.

Thus, in sum, infrastructure plays the most crucial and an activating role in the progress of both economic and social development. It increases the scale of production and helps in establishing strong inter-social linkages. Finally, it also enhances scope for adoption of the modern technology, higher growth and much needed diversification of demand for finished products. Obviously, these points go beyond penetration and highlight both need and urgency of ensuring adequacy of infrastructure at the micro-level for accelerating both pace and process of development especially in backward areas and thereby achieving the objective of balanced regional development through maximum possible utilisation of locally available resources.
Hence, realising the overwhelming importance of infrastructure, the public sector programmes in India have been primarily concerned with the allocations of Plan Outlays preferably to those activities, which are considered to be the sole responsibility of the Government. It is against this backdrop that its development whether road transportation and communication facilities, power generation and its distribution and construction of irrigation and drainage systems or establishment of educational and health institutions have been considered an appropriate field of public investment during the previous Plans in the State of Uttar Pradesh especially in its Eastern region. This is adequately supported by the fact that nearly 70 per cent of the total Plan Outlay earmarked to this region was spent on infrastructural development during the period starting from the Fourth Five Year Plan onwards.8

The above mentioned biased investment in favour of infrastructure development in Eastern Uttar Pradesh appears to be genuinely the need based because accessibility of an area to its core components was essentially required for gearing up the tempo of economic activities in this backward region. This was really a point of attraction to the social scientists that a numerous studies, analysing the relationship between individual components of infrastructure and development were carried out separately by them in the past.9 However, as transpires from the literature, the studies pertaining to the analysis of development taking into account an integrated view of infrastructure have hardly been attempted so far particularly in the context of Eastern region. Besides, the studies aiming at analysing the adequacy and performance of infrastructure in the context of Eastern region are especially lacking. The present study entitled as ‘Adequacy of Infrastructure for Industrial Development in Eastern Uttar Pradesh’ is, indeed, an attempt to bridge this gap.
II. ABOUT THE EASTERN U.P.

The Eastern U.P. also known as the Eastern region or Purvanchal, which presently consists of 27 districts, was long back identified as one of the backward areas of the State. It covers the total geographical area of 85,845 sq.km., and the total population of the region, according to 2001 Census, is reported to be 666.26 lakh persons, resulting in the population density of 776 persons per sq.km. of area. According to 2001 Census, the degree of urbanisation is calculated at 11.78 per cent and that of literacy rate is recorded as 56.47 per cent only.

In terms of economic infrastructure, Eastern region is equipped with 78 per cent villages electrified to total inhabited villages, 69.2 per cent irrigation coverage and those available per lakh of population include 70.98 km. of pucca roads, 0.11 industrial estates/areas, 5.3 scheduled commercial banks, 0.13 land development banks, 18.4 post offices and 0.7 telegraph offices. Whereas in terms of social services, the region enjoys the facilities per lakh of population of 59 Junior Basic Schools (JBSs), 13 Senior Basic Schools (SBSs), 2.87 allopathic hospitals/ dispensaries, 2.13 primary health centres, 12.29 maternity-cum-child welfare centres or sub-centres, 0.13 industrial training institutes and 0.05 polytechnics.

However, in spite of the said availability of infrastructure, the pace and the process of industrial development in the region is found to be far below from the desired level and exhibits a disquieting feature, as witnessed by the lowest number of working factories per lakh of population, lower value of industrial produce per capita, low productivity, low employment, low capital intensity and low level of technological advancement. No doubt, there could be numerous factors responsible for this poor and disappointing state of art of industrial development in the region, but inadequacy and poor performance of infrastructure appears to be the most crucial.
III. **OBJECTIVES**

The present study, therefore, aims at analysing the inter-relationship between infrastructure and industrial development and identifying the role of the former in promoting the latter, using the relevant data and information available for different districts of Eastern region at the selected two points of time, i.e. 1990-91 and 2000-01, besides evaluating the extent of adequacy/inadequacy and performance of the created infrastructure. Within the framework of this broad objective, the specific objectives, as set out for this study, are listed below:

1. To study and analyse the current state of art of the Eastern Uttar Pradesh;
2. To analyse the changes in status of manufacturing industries during the reference period in the Eastern U.P. : A disaggregative analysis;
3. To assess and analyse the inter-category differentials in levels of both infrastructure and industrial development in the Eastern U.P.;
4. To study and analyse the functional relationship between the dependent or explained variable (industrial development) and certain selected independent or explaining variables including infrastructure;
5. To assess and analyse the district-wise extent of adequacy/inadequacy of existing economic infrastructure and suggest prioritisation for the Eastern U.P.;
6. To assess and analyse the district-wise index of efficiency use of investment (IEUI) made on economic infrastructure; and,
7. To suggest measures for strengthening adequacy and improving efficiency of infrastructure with a view to accelerating the pace and the process of industrial development at the micro-level in the Eastern region.
IV. ISSUES/HYPOTHESES

The specific issues/hypotheses, which have been examined and analysed during the course of the study are listed below:

1. There exists a direct and positive relationship between the levels of infrastructure and industrial development in Eastern U.P.;

2. Whether enhanced level of infrastructure has gone in favour of industrial development during the reference period;

3. Whether infrastructure enjoys the highest relative importance among the set of independent variables selected for analysing their functional relationships with industrial development as a dependent variable; and,

4. Whether inadequacy of economic infrastructure and its low efficiency use of investment have adversely affected the process of industrialisation in the Eastern region.

V. CHOICE OF CONCEPTS

A. Infrastructure

The word infrastructure originated as a military term, for invasion of France during the Second World War and was applied to such items as oil pipelines, broadening subsequently to include various other capital goods, while attempting to define the term, the whole structure of an economy may be divided into two; infrastructure and super-structure. The former is just like a foundation of the building, which supports and sustains its superstructure. To elaborate it further, the term infrastructure may be defined in the following four ways:

First, infrastructure may be defined as comprising those basic services and public utilities, which are essential for various kinds of economic activities in primary,
secondary and tertiary sectors. Thus, it includes all public services starting from law and order through education and public health to transportation, power and water supply, as well as such agricultural overhead capital as irrigation and drainage systems, which provide sustenance to income and employment generation in the rest of the economy rather than the same thing within the infrastructure enterprises themselves.

Second, the two basic channels of investment, as identified in the sphere of planning and development are social overhead capital (SOC) and directly productive activities (DPA). The former is, often, called infrastructure, which is, in other words, defined as capital goods used directly or indirectly in the production of goods and services.

Third, it is also conceived as a diversified investment in the general growth of the economy, such as railroad system and electric power rather than the investment in the growth of one specific activity.

Fourth, the term infrastructure is constituted by those items and activities, which fulfill at least four basic conditions: (i) They facilitate or are in some sense basic to the carrying on of a great variety of economic activities; (ii) They are provided by the public agencies free of charge or at rates regulated by them; (iii) Normally they cannot be imported; and (iv) The investment needed to provide the services is characterized by 'lumpiness.'

In addition, the term infrastructure, as defined by Michael Lipton in a comprehensive manner, covers the four major aspects: First, the services that are usually – (i) Hard-ware based; (ii) Supplied publicly; (iii) In part tax financed rather than user financed; (iv) Used in consumption as well as production; (v) More valuable to users to the extent that they 'hook into' national grids communicating to central facilities (e.g., capital cities, central stores, docks, etc.).
Typically, these include roads, railways and airports, telephone systems, usually electric power, often drinking water, and some public buildings and works, notably stores; Second, law and order (mainly police and defence); Third, human and social (mainly health and education); Fourth, producer-sector specific (mainly in agriculture, research and irrigation). Most of the latter three are also part and partial of the centralized grids. But they are software grids for less costly than the hardware grids for roads or electric power.

Finally, while focussing on infrastructure, World Development Report defined it as those services flowing from – (i) Public utilities – power, telecommunications, piped water supply, sanitation and sewerage, solid waste collection and disposal, and piped gas; (ii) Public Works – roads and major dams and canal works for irrigation and drainage; and (iii) Other transport sectors – urban and inter-urban railways, urban transport, ports and water ways and airports.

Thus, infrastructure is an umbrella term for many activities referred to as “Social Overhead Capital” by such development economists as Paul Rosenstein-Rodan, Ragnar Nurkse and Albert Hirschman. Neither term is precisely defined, but both encompass activities that share technical features (such as economies of scale) and economic features (such as spillovers from users to non-users).

One of the common characteristic identifiable from the above mentioned definitions is that infrastructure acts as a catalytic agent in carrying out a great variety of economic activities. More precisely in an abstract sense, the term infrastructure may be conceived as a family resemblance word; like ‘blood’ among the members of a family, ‘constructiveness’ is also common among all types of infrastructural components. The list of such components can be made as comprehensive as possible, but it can never be exhaustive.
The major components of infrastructure may be grouped into two categories, i.e., economic as well as social. The core of economic components comprises road transport, power, water and banking institutions, whereas those encompassing social components include education, public health, sanitation and drinking water. However, as stated earlier, since the present study aims at analysing the industrial development, taking into account an integrated view of infrastructure, the level of the latter for each district of Eastern region has been represented by its composite index based on the total vector of 12 indicators, which are described in the following Chapter II.

**B. Industrial Development**

As transpires from the literature available on the subject, different scholars have defined the concept of industrial development in different manners to suit their purposes and meet their requirements. For example, in the Marxist literature when industrialisation is used in narrow sense, it is applied to establishment and development of industries producing the means of instruments of production.\textsuperscript{15} Generally, the industrial development refers to the growth of industry and increase in its share in total economy.\textsuperscript{16} Sometimes, it is represented by the rising share of manufacturing in gross domestic product (GDP).\textsuperscript{17} In many studies, on the basis of Clark-Fisher Theory, any movement away from primary activity is termed as industrialisation.\textsuperscript{18} Besides, the industry is also defined as that trait, which makes up the characteristic mode of production based on machine and fuel power. Industrialisation would then become a process involved in creating and maintaining industry. Moreover, industrialisation has also been defined by many scholars as diversification of employment. However, it is argued that although industrial activity and factory employment are closely related, they may not move together.\textsuperscript{19} These definitions are, no doubt, sound on theoretical plane, but their operational merit is rated to be limited and not up to the mark.
As a matter of fact, it appears that with a view to improving objectivity of the concept so that it can stand with the test of empirical analysis, industrial development has, usually, been conceived in narrow sense of contribution of industrial sector to total net domestic product, value of industrial produce per capita/per industrial worker or index of industrial production. But this way of defining the term in narrow sense takes into account only performance aspect of industrial sector and the other equally important aspects like concentration, technology, and input uses have not been considered for their inclusion in its conceptualisation. Therefore, with a view to analysing the inter-category and inter-district relationship between infrastructure and industrial development, the latter in the present context has been conceived in broad sense of composite index of the selected indicators concerning its concentration, technology and input uses, which have been spelled out in subsequent Chapter-II. Besides, both the terms industrial development and industrialisation have been used inter-changeably through out the dissertation from beginning to the end.

VI. METHODOLOGY

A. An Operational Area and the Reference Period

The whole of Eastern region has been considered as an operational area of the present study. The districts have been taken as units of analysis for procurement of data from secondary sources. Besides, the analysis pertaining to the relationship between infrastructure and industrial development has been carried out at the two selected points of time, i.e. 1990-91 and 2000-01. Thus, the analysis, as envisaged in the present case, happens to be both temporal and cross sectional in nature.

B. Methods to be Followed

Methods commonly in vogue for construction of the composite index are mainly those of ranking, index and principal component analysis. All these methods
are criticized on one or an other ground owing to inherent weaknesses. Summingly, it is researched that they conceal more and reveal less. It is, however, interesting to add that based on the previous studies, the results arrived at by application of these methods demonstrate marginal differences only. Therefore, for the sake of simplicity and convenience, ‘index method’ has been applied in the present study for construction of district-wise composite index of industrial development (CII) as well as composite index of infrastructure (CI) with the help of the selected indicators.

Moreover, the method of ‘Deprivation Index’, as recorded in HDR-1990 of the UNDP,²⁰ has been used to find out the district-wise inadequacies or shortfalls in levels of achievements pertaining to the selected components of infrastructure during 2000-01. For this purpose, the core of methodology followed here involves primarily the two basic steps. The first step is to define a measure of deprivation that a district suffers in respect of each of the selected indicators constituting the composite index of infrastructure (CI). Thereafter, the maximum and the minimum values are determined for each of the selected indicators, given the actual values. The deprivation measures then place a district in the range of zero and one, as defined by the difference between the maximum and the minimum. Thus, Iij would be the deprivation indicator for the jth district with respect to ith indicator, which has been defined as:

\[
I_{ij} = \frac{(\text{Max. } x_{ij} - x_{ij})}{(\text{Max. } x_{ij} - \text{Min. } x_{ij})} \quad \ldots \ (1)
\]

The second step is to define an average deprivation indicator (ij), which has been worked out by taking a simple average of the deprivation indicators of CI as follows:

\[
I_j = \frac{\Sigma I_{ij}}{N} \quad \ldots \ (2)
\]

Where N is the number of deprivation indicators.
Besides, inter-district disparities in levels of infrastructure as well as industrial development has been measured, using the formula of coefficient of variation (C.V.). Theoretically, a higher value of C.V. would indicate a higher magnitude of inter-district disparities and vice-versa. In addition, the multiple regression model of both linear and log-linear formulation has been used to examine the functional relationship between the dependent variable (composite index of industrial development) and the selected independent variables like urbanisation and composite index of infrastructure (CI), with a view to assessing the relative contribution of each one of the latter to the former.

Furthermore, with a view to evaluating the performance of infrastructure, an index of efficiency use of investment (IEUI) for different districts of Eastern region has been worked out for the year 2000-01, using the formula of \((\frac{CII + CI}{\text{X}}) \times 100\), where CII denotes composite index of industrial development and CI stands for composite index of infrastructure. Higher the value of IEUI, higher would be the performance and vice-versa.

Finally, to make the analysis of inter-relationship between the dependent and independent variables better revealing and rewarding, all the 27 districts of Eastern U.P. have been divided into 4 categories of ‘High’, ‘Medium High’, ‘Medium Low’ and ‘Low’ in terms of composite index slabs in descending order of hierarchy. For example, if A, B, C & D are the lower limits of the intervals in descending order, then A & C have been obtained as arithmetic mean values of the composite indices for the districts falling respectively above and below the regional level arithmetic mean (X). Moreover, the value of ‘B’ has been determined by working out arithmetic mean value of composite indices for the districts falling in the range of A – X. Obviously, ‘D’ would be the lowest value of the composite indices across the districts. The four
categories, thus, arrived at have been constituted by the districts falling between (i) ‘A & above’, (ii) ‘B & A’, (iii) ‘C & B’, and (iv) ‘D & C’.\textsuperscript{21}

VII. SOURCES OF DATA

Besides consulting the relevant literature available on the subject, the study involves collection of data/information from the secondary sources only. For this purpose, the secondary sources, which have been tapped for procurement of the required data, consist of mainly Census, Government of India, New Delhi; Central Planning Commission, Yojana Bhawan, New Delhi; UNDP, New Delhi; Development Commissioner, SSIs, New Delhi; and Lucknow based Department of Planning, State Planning Institute and Directorates of Agriculture, besides Directorate of Industries, Kanpur.

VIII. ORGANISATION OF THE DISSERTATION

The present dissertation has been arranged in seven chapters. Apart from describing scope and need of the study, its objectives, issues/hypotheses and methodology followed are narrated in this introductory chapter. Efforts have been made in the second chapter to describe various concepts of ‘infrastructure’ and ‘industrial development’ so as to search out the operational definitions of these terms for use in empirical analysis of this study, whereas the third chapter endeavours to narrate the current state of art, particularly the existing geo-physical and socio-economic conditions of the Eastern U.P.

The next three chapters primarily concern with findings of the study. The fourth chapter is devoted to analysing the changes in status of manufacturing industries disaggregatively in the Eastern region. In the fifth chapter efforts have been made
through application of both linear and log-linear multiple regression models to assess and analyse the contributions of explanatory variables to industrial development separately for backward and forward categories of districts in the Eastern U.P. Whereas the sixth chapter aims at assessing and analysing the availability of and inadequacy or shortfalls, if any, in economic infrastructure, besides evaluating the performance of infrastructure in terms of efficiency use of investment (EUI) made on it. Finally, the seventh chapter endeavours to derive certain significant conclusions and suggest some policy measures for accelerating the process of industrial development in the Eastern U.P.
REFERENCES

15. G.K. Shirokov, Industrialisation of India, Progress Publisher, Moscow, 1973, p.3.