Chapter III
III Industrial Location Theories : A Survey

III.A The Nature of Industrial Location Decision

III.A.1.(i)

Serious interest in the subject of Industrial Location dates back to 1909 when Alfred Weber, the German researcher, published his book on Industrial Location under the title of "Uber den standort der industries". It attracted greater notice when it was subsequently translated into English by C.J. Friedrich, University of Chicago in 1929 under the title of "Theory of Location of Industries". Weberian Theory, belonging as it does to the Normative School, is more relevant as a benchmark for triggering the interest of the Industrial researchers in the subject of Industrial Location Decisions. The explanatory framework underlying the Weberian analysis is somewhat flawed, as we shall see later, but those flaws or deficiencies are attributable to the fact that Weber's effort has its origins in the Least cost concept in the context of the single plant firm of the Western Industrial Societies of the late 18th and early 19th centuries. That scenario has substantially changed.

III.A.1.(ii)

As observed by Chapman & Walker, (op.cit.p. 3) "students of Industrial Location have always concentrated on manufacturing industry. Even though other 'industries' are sometimes considered, the main focus is not in dispute. The topic has traditionally been explored from two main angles: that of firms and that of places. In the first approach, interest centres on locational choices by the firm - why it locates at a particular site, where it might best locate and how it uses its sites. In the second, attention is given
to the nature of industries in an area (country, region or city) – how they relate to each other, and whether or not they are appropriate to the policy objectives of the Government. In both cases, analyses can be historical, descriptive and/or normative.

III.A.1.(iii)

In an evolutionary context, the subject of Industrial Location has emerged as an important inter-disciplinary school of thought. It is important because manufacturing industry is the engine of the economic vehicle of any nation/country/region. Further, it is inter-disciplinary in nature because it involves an interface between key variables of manufacturing activities, economics, geography, technological change, human and organisational behavior and the pre-dominant political philosophy of the Government. In this context, the observations of Chapman and Walker (op.cit.p.8) are significant: "It is clear that the role of manufacturing changes significantly as economies develop and yet it is also clear that this role is always central to the process of economic growth. Using the analogy of a motor car, manufacturing seems to function as an engine of varying efficiency and size relative to the economic vehicle it drives, but there is no sign of any revolutionary change which will lead to a new form of propulsion".

III.A.1.(iv)

As compared to the Weberian era, "firms now are increasingly multi-sectoral as well as multi-national, so it is difficult to understand their locational choices without considering the non-manufacturing elements of the firm (administration, research, business services, distribution). Moreover, industry is so bound up with national, regional and community
development policy that a broad view of the overall working of an economy is essential for astute planning. In fact, in many parts of the world, governments own manufacturing industry and themselves make locational choices according to broader criteria than those employed by the private sector. Add to this a further complication: industrial location can be studied from the point of view not only of firms but also of workers". (Chapman & Walker, op.cit. p.1)

III.B. Leading Theories of Industrial Location

In the foregoing context, the leading theories of Industrial Location are discussed in the following paras with a view to uncover the underlying approach and the explanatory framework of the respective theories and also highlight their limitations. Some of the empirical studies undertaken by the Industrial Researchers will also be reviewed in the light of the various leading theories. In the chronological context, it was the Normative school of Industrial Location Theory which was the first to emerge on the scene. Again, it was the Normative school which in an evolutionary sense, spawned several approaches to plant location and it is notable that the various approaches to plant location differ from each other according to the perspective of the respective theorists and researchers. No single theory, howsoever conceptually brilliant, can claim a monopoly of insight and has to be validated by experience in real life. In the Normative Industrial Location Theory, the approach is deductive in that it proceeds from a set of basic propositions regarding the objectives of those responsible for the industrial location decision, and normative, in that it
indicates the optimal outcome for the manufacturer which may be expected under a clearly defined set of conditions bounded by a series of simplifying assumptions. (see Chapman & Walker, op. cit. p.19) In this perspective, we propose to examine Weber’s Least Cost Theory of Plant Location.

III.B.1. Weber’s Least Cost Theory of Plant Location: Characteristics & Overview

III.B.1.(a) Principal Costs in Weber’s Model

As already brought out in Para III.A.1(i), Weber was the progenitor of the Normative school and the Least Cost Theory of Plant Location when he wrote his treatise in 1909 under the title of "Uber den standert der industries". The principal element in Weber’s Least Cost Theory is that the Optimum Location, is the Least Cost Location as determined by the interaction between the following three principal costs:

i) Transport Cost,

ii) Labour Cost, and

iii) Cost due to excessive agglomeration (Dr. H. Sadhak, 1986, pp. 12-13)

In his analysis, Weber looked upon transportation, described as procurement & distribution costs, to be the most important general principle of location. In the Weberian Context, the primary step is to (deductively) compute the effect of transportation costs on location, and, then the least transportation cost location is identified, then successively
and deductively appraise the effect of other economic location conditions. Given the centrality of transportation costs in his analysis, Weber conceptualized that the two most significant factors of location were labour and external economies of scale.

In the Weberian Model, if freight rates are expected to vary proportionately with distance, the effects of transportation costs on industrial location depend on the nature of the physical attributes of inputs or raw materials. In terms of production technology/processing, Weber categorised the inputs as ubiquitous, or pure (which undergo no change in physical attributes during processing) and impure (which experience change in physical attributes during processing). In this context, it deserves to be highlighted that even with highly simplified assumptions about transportation costs, Location counts for the purpose of cost minimisation.

Thus, in a region where a plant caters to one market only and the plant utilises all ubiquitous inputs, the optimum location on the basis of Weber's cost-minimisation model is at the market itself as the market is the only location which minimises distribution costs while the procurement costs are zero everywhere. (see Fig: III.1)

Region with one market (S), Ubiquitous inputs

![Fig: III.1 Simple Weberian Transportation cost model with one Market & ubiquitous inputs. It is based on Hayter R. (1997:113)](image-url)
Similarly, in the case of a region which caters to one market(s) and utilizes one pure input (I), the optimum location is anywhere between I & S as shown in Fig: III.2.

Fig:III.2 - Simple Weberian Transportation Cost Model with one Market and one pure input. It is based on Hayter's R. (1997:113).

However, Alonso (1964:60) conceived of a little more complicated situation involving 7 consumers (K to Q). All the seven Consumers are distributed at locations along a linear highway which is 15 km long. The plant (e.g. a bakery wishes to locate itself along the highway in order to minimise distribution costs either in terms of consumer trips or visits by a salesperson making delivery to each consumer separately) (Fig: III.3)

Fig: III.3 Alonso's Least Cost Location Model with seven consumers on a linear highway with ubiquitous inputs. It is based on Alonso (1964:60)
A measure of centrality is the mean centre found, for example, by summing the distances each consumer is from either end, say K, and dividing this total (42 units) by the number of consumer (7) to give the mean centre in terms of number of units from K, which is 6 units or "0". In fact the best (least cost) location is N which is the median centre i.e. the location which bifurcates a distribution in half. Alonso, identifies and associates the advantages of large cities with this simple example "as large cities, in many regional contexts, constitute the median location for market oriented activities". We may now consider the case of one Market (S) & one impure input (I) which undergoes changes during processing. In processes which involve impure inputs which may lose weight, or bulk or perishability, procurement costs are more significant than distribution cost. Accordingly, the sources of these inputs exert a stronger "pull" on location than the location of markets. (see Fig. III.4).

![Region with one market (M). One impure input (I)](image)

Optimal location is either at I or S depending upon the change in the physical characteristics of I during processing.

Note: Factory location is based on minimizing transportation costs.

Fig: III.4 - Simple Weberian Transportation Cost Model with one Market and one impure input (I). This is based on Hayter, R. (1997:113).

The Converse is also true. The activities, which utilize inputs which gain weight or bulk or perishability, distribution Costs are more significant than
procurement Costs. Consequently, Weber (1929) evolved a simple index, the Material Index (MI) to predict input or output orientation:

\[
MI = \frac{\text{Weight of localized Materials}}{\text{Weight of Final Product}}
\]

If \(MI > 1\), then activity is input-oriented

If \(MI < 1\), then activity is output-oriented

III.B.1.(b) Weber's Model: Principal Factors

Weber's analysis was confined to the location decision of single plant manufacturing firms. "He does not assume homogeneous land and takes notes of the fact that the quantity and quality of raw material availability will differ from place to place. He however makes some specific assumptions. Thus, labour is considered by Weber to be immobile and as a result there is unlimited supply of labour at certain locations. He also assumed that there were no significant variations in interest rates. Climatic and management factors were disregarded. The places of consumption too were taken as given. With these assumptions, two factors emerge of prime importance in this theory. They are the transport costs and the labour costs". (Dr. M.D. Godbole, 1978, pp 24-26).

III.B.1.(c) Demand Aspects of Weber's Model

As indicated above, Weber "placed considerable emphasis upon the transport costs involved in assembling materials at the site and in delivering the finished product to the market, although Weber also recognised the influence of labour costs and the possibility that economies may be achieved as a result of agglomeration of several plants in close
proximity to one another. Despite the latter aspect of Weber's model, he took no account of the potential effect of location of competitors upon sales. Thus, demand was effectively held as constant and it was assumed that the manufacturer could sell all he produced regardless of his location and the actions of his competitors. Moreover, the location of demand was also endogenous to Weber's model". (Chapman & Walker, op. cit. pp. 18-19).

III.B.1.(d) Weber's Model: Material Index of Industries

Both Dr. Godbole, M.D. (op.cit.pp. 24-26) and Chapman & Walker (op.cit.pp. 36-57) concur that Weber, in his analysis, in the context of transport costs, made a significant distinction between material - oriented and market - oriented industries. As discussed. Material Index of an industry is the proportion of the weight of the localised material used to the weight of the product. If material index of an industry exceeds unity, it indicates material orientation of an industry. However, if the material index of an industry is less than unity, the industry should be treated as market - oriented and should be ideally located at the market. "Weber recognised that the cost of assembling the materials required by a manufacturing plant may encourage its location at the source of those materials. This effect depended upon the nature of the materials, which Weber characterised as either ubiquitous or localised. The former are available at similar cost everywhere whereas the latter are only available at specific locations" (Chapman & Walker; op.cit. pp: 36-37). Further, localised (viz; non-ubiquitous) materials are again sub-classified into pure and gross
materials. It is in the nature of pure materials that the whole weight of each unit of input passes into the finished product while a part of the weight of gross material is wasted in the production process. It can therefore be safely inferred that gross localised materials have the attribute of attracting industries to locations at their point of production of the localized materials, thus making the industry *material oriented*. By the same logic, by enhancing the weight of the product wherever it is produced, ubiqitities may encourage *market orientation*. Placed as Weber was, he failed to foresee the pace, direction and magnitude of technological change and the effect it could have on the formulations propounded by him. Change in the processes of technological production could render the market-oriented industry and the *material*-oriented industry as purely relative and interchangeable. Further, a progressively increasing proportion of plants in many modern industries commence their operations not with basic raw materials *but with semi-finished items or components*. On these, there is almost no weight loss and therefore negligible tendency to material orientation. Moreover, such materials are frequently obtained in urban centres which also operate as markets for the finished goods. In these circumstances, the same place is both a *material* and a market location. On the other hand, hardly any items these days can be described, without any reservations, as ubiqitities. For example, there is a deficiency in *water supply* in many areas. In most developed countries, it could be looked upon as ubiqituous for work centres like machine shop or a bakery where the water consumption is intrinsically low *but it is certainly not a ubiquity* for a steel mill. Similarly, electricity can be treated as a ubiquity in
developed economies but not so in the case of an aluminium smelter which is a highly energy-intensive technology. In developing countries, nothing can be regarded as ubiquitous. There are no ubiqutities in the developing economies.


The other principal locational factor in the Weberian approach is the labour cost. In his work, Weber concludes that cheap labour cost can be instrumental in diverting a potential factory location from the Least Transport Cost Location. In this context, he has relied on the index of labour costs which is based on the average cost of labour required to produce one unit weight of output. On that basis, he computes the 'pull of labour' and arrives at the labour coefficient of a given plant location. The labour coefficient, in terms of Weber's analysis, is the ratio of Labour Cost per unit of product weight to the total weight of material and product to be transported.

III.B.1.(f) Weber's Model: Agglomerating Tendencies

Weber has taken due note of the impact of agglomerating tendencies and concludes that industries will tend to locate "where extra labour costs/transport costs are equal to savings in terms of economies of Scale through agglomeration". Thus, Weber does not rule out a situation where a potential factory location may be diverted from the least transport cost points. He however considers it as a less prominent type of orientation.
III.B.1.(g) Weber’s Model : Critical Assumptions

Some of the assumptions critical to Weber’s Least Cost Location model are:

i) multiplicity of consuming centres

ii) Uneven deposits of fuel and raw materials etc.

iii) Immobility of labour

iv) Transportation cost and their proportionality to the weight of the product and the distance it is carried ignoring completely the complexities of transport pricing.

v) Spatial uniformity of demand conditions.

vi) Constancy of technological and production processes.

vii) Constancy of business organisations like partnership firms with unlimited financial liability thus effectively ruling out the emergence of joint stock companies with limited financial liability.

viii) Constancy in speed of transportation of men and materials.

ix) Implicit belief that means of communication and computing and speed of transmission of voice, data and visuals will remain static and frozen at the level found by Weber in 1909.

III.B.1.(h) Inherent Limitations of Weber’s Model

Weber’s model suffered from inherent limitations for which he has been severely criticised by Hoover (1948), Losch (1954), Isard (1956), Beckman, (1968), Greenhut (1956,1964,1974), and Smith W. (1955), and Smith, D. M. (1966 & 1981). Thus, Weber’s approach was at best a "partial
cost analysis" as highlighted by Dr. Godbole, M.D. (op.cit., p.26). Yet, the immortal merit of Weber's theory remains in the powerful stimulus it provided to researchers in the identification of Industrial Location factors and the analysis of decision-making in industrial locations with a given set of simplifying assumptions.

Despite all the shortcomings, limitations, and the constraining assumptions, Chapman & Walker (op.cit; p. 39) hail Weber "as the most influential of the early contributors to the development of the Normative Location Theory".

III.B.1.(i) Hoover's Approach & the Centrality of Transport Costs

The centrality of transport costs in Weber's model attracted the special notice of Edgar Hoover (1948, The Location of Economic Activity, New York, Mcgraw Hill, pp. 15-66). Weber's emphasis on transportation costs was not matched by a particularly realistic view of actual transport costs. As mentioned earlier, Weber worked on the basis of costs being directly proportional to the weight of the product and the distance it was carried, an assumption frequently invalidated in the real world (Chapman & Walker, op.cit; pp.41-44). Hoover (1948,op.cit; pp.15-66) provides a useful overview of the complexities of transport pricing, pointing out that costs include more than just freight rates and are influenced by such aspects of service as insurance and speed. Important elements in Hoover's analysis of freight costs are given below:
a) The location and orientation of transport networks is a significant factor in the real world.

b) Such infrastructure is expensive to build and confers special benefit on specific locations.

c) Industrial areas within cities such as Chicago which experienced rapid economic growth during the 19th and early 20th centuries, were frequently located adjacent to canals, navigable rivers and railway lines.

d) Road transport is more important today and a good road network is frequently taken for granted-almost as a ubiquity in the modern industrial economy.

e) Expressway junctions are cost-saving locations which often attract industrial development, especially activities associated with distribution. This highlights the agglomerating aspect of transport networks.

f) In developing countries, where transport links are frequently limited, the relative advantages of the few locations served by a primitive infrastructure may be even more pronounced.

g) Transportation makes its mark on location in part simply providing opportunities selectively. These variations translate themselves into costs.

h) In transportation of raw materials/finished goods, economies of scale operate ruthlessly and where infrastructure is dense, competition gives alternatives and keeps costs down.
i) Weberian calculations are also upset by the general tendency for long hauls to cost less per unit weight than shorter ones. This is due to fixed costs, especially terminal charges, which must be spread over the journey and therefore are less per mile or kilometre for longer journeys. For shipping especially, and also for rail, these costs may be considerable. Harbours, storage spaces, rail routes and the like are not cheap to build. Such a freight rate pattern encourages longer journeys and discourages the splitting of journeys into shorter stretches. For example, it is possible as a result of Weberian analysis to find that the least cost location is situated at neither a material nor a market point, but an intermediate location. In reality, however, the nature of freight costs makes this unlikely unless there is also an enforced change of transport mode such as at a port.

j) Ports sometimes benefit from their break of bulk characteristics, especially in the context of imported material such as grain, sugarcane, or petroleum as highlighted by Hoyle & Pinder (1981). On the other hand, the expansion of trucking since 1945 has given much greater flexibility in short hauls, because a truck is filled by a much smaller quantity of goods than a boat or train. Thus, the disadvantages of an intermediate location are substantially reduced.

k) Motor transport has freed most plants from railside locations, which were characteristic of the nineteenth century industry,
and, since the second World War, it has increasingly dominated goods movements in most market economies. The impact of the truck on industrial location has been considerable.

I) In the twentieth century, freight costs on finished products have risen more rapidly than those on raw materials. This has had a tangible influence on the relationship between transport costs and industrial location. Bulk shipments of cheap raw materials cost much less as compared to those of finished products as the former require less care and special handling. Such shipments can benefit from economies of scale associated with increasing ship sizes or using unit trains that carry one product directly from point to point. The increasing size of ocean-going bulk carriers for commodities such as iron ore and petroleum has had important effects on the location of the steel plants and refineries which process these materials (Chapman & Walker op. cit; pp. 35-44).

m) The dramatic expansion of oil-refining capacity in Western Europe & Japan during the 1950’s & 1960’s was, for example, facilitated by the advent of the supertanker, which greatly reduced the real costs of shipping crude oil from the principal raw material sources in the Middle East. (Frankel, P.H. and Newton W.L.1968)².
The cost of moving equivalent quantities of refined products such as fuel oil is significantly higher thus encouraging the location of oil refineries near to their markets rather than their source of raw material. This example is fairly typical, and the finished products of many industries require special attention, have high insurance rates and are more expensive to ship per unit size or weight than the materials from which they are derived. Thus, the tendency is to ship raw materials further, perhaps to the market area, and cut down on shipments of finished products. (Chapman & Walker, op. cit; pp. 35-44).

In the light of the incisive and comprehensive analysis of freight costs by Hoover and the technological changes down the line, we find that locational rigidity of Weber's model has given way to locational flexibility. We agree with Norcliff, G.B. (1975)^9 when he states that "it is generally acknowledged that transport costs are a less significant influence upon contemporary patterns of industrial location than is implied by their central place in normative theory". The locational flexibility, as just referred to, is further reinforced by the technological revolution that is underway in the areas of communication and computing. "Worldwide Communications, visual as well as oral, is possible, while data can be quickly transferred from one plant to another. A larger firm may now follow locational factors to the far corners of the earth without losing its internal cohesion" (Chapman & Walker, op. cit; pp. 4-17). Locational flexibility has thus come to stay in the modern era.
However, researchers like Dr. M.D. Godbole (op. cit; pp. 25-26) have highlighted the basic limitation of Hoover's approach by holding that he is more concerned with cost than with the demand factor. Similarly, Greenhut, M.L. (1970, A Theory of the Firms in Economic space. Meredith Corporation, p. 266) has observed that "the greatest weakness in Hoover's work is the failure to probe deeply into locational interdependence. He does not explain the whys from the standpoint of locational interdependence (demand)". Thus, Hoover shares with Weber his neglect of the demand factor. Greenhut (op. cit) laments that in the Least Cost approach of Weber and Hoover's approach, "location is seen largely as a product of spatial cost differences with variation from place to place with sales potential virtually ignored".

III C. Demand-based Approach and Locational Interdependence School

III C.1. Evolutionary Context

This is an approach based on demand for finished goods and is a response to the explanatory weaknesses of the Weber's Cost minimisation model which focused exclusively on the cost side of plant location. As a consequence, some of the economic researchers like Fetter F. (1924)^4 allowed demand to vary but assumed that costs were fixed. The latter assumption was found to be unrealistic. Interest in the subject then shifted to the manner in which the markets are shared spatially and on the location which best captured sales. This has come to be known, in economic literature, as the Market Area Approach. Another group of writers led by Hotelling H. (1929)^5 also assumed zero costs so that their
work resembles with the Market Area approach. In an analogous manner, in the locational Interdependence school of Weberian Cost minimisation theory, the principal explanatory emphasis is on how competition of similarly placed firms (competing firms) influences the location and market areas of plants. The traditional theories illustrating this approach acknowledge spatial variations in demand and characteristically overlook spatial variations in costs. According to Hayter, R (1997), though Christaller’s Central Place Theory (1966) has its conceptual origins in the context of service activities, the emphasis of the Central Place Theory on distribution costs and inter-firm rivalry introduces general principles of location which are relevant to manufacturing activities. In the context of the normative approach, there are several manufacturing activities, like many service sector units, the locational orientation of which is predominantly influenced by the need to access spatially distributed demand. The locational aspects of the problem of a hypothetical plant having ubiquitous inputs and catering to one market is the simplest model shown in Fig: III.1. The principal point of reference for the Central Place Theory is locational situation of a plant producing a single good (e.g. cakes, a beer or ice-cubes etc. ) and catering to a spatially distributed population [Fig:III.5(a)]. Assuming that the entrepreneur is Homo Economicus and, again, assuming a homogeneous plain in which inputs are ubiquitous and equal transportation costs in all directions, the plant can be located anywhere depending on the extent to which the territorial range of a good embraces the threshold population. In terms of the central place theory, the range of a good demarcates the maximum distance consumers are willing to travel,
or in the alternative narration, the maximum distance the good can be economically transported to consumers. As costs of transportation are additive to the price of the good, in obedience to the law of demand, demand will decline with distance from the plant. The threshold population is a proxy for the minimum level of demand necessary to sustain plants of at least the minimum economically viable size, which may be taken as the size where economies of scale are first fully realized. The inner range of a good indicates the distance within which the threshold population exists. If one plant cannot cater to all demands within a region or if surplus profits arise, under free competition, additional factories can emerge till all demands within a region are satisfied, and surplus profits are absorbed by the additional plants. In a Christallerian landscape, where demand is distributed evenly over a homogeneous plain and there are several competing plants each manufacturing an identical good more plants are set up by competing entrepreneurs to ensure that the threshold population is fully satisfied within the inner range of the good. [Fig:III.5(b)]. This kind of marketing model is predictive of an optimal locational pattern which minimises distribution costs which serve market areas that are hexagonal in shape, thus fulfilling all demands which arise within a spatially distributed market [Fig:III.5(c)].
The Christaller's theory seeks to relate Central places to their hinterlands and defines a central place as a settlement providing services for the population of its hinterland. However, of considerable importance is the
explanation of the size and spacing of settlements within a region. "It may be pointed out at the outset that the theory is only concerned with the intensity and location of service industry – only one of the basic elements – and as such can only provide a partial explanation of the regional structure". (Menon, K.S.V., 1979). It was later refined by Losch, A. (1954) who in fact combined all the preceding approaches and propounded a general theory of plant location with demand as the major spatial variable. Losch (1954) argued that the least cost point of Weber was not necessarily the same as that of maximum profit, which is what a producer is seeking. Again, as observed by Smith David M. (1971)7.

"Losch rejects the least cost approach of Weber and his followers, and the alternative of seeking the location at which revenue is greatest. The right approach, he says, is to find the place of maximum profits where total revenue exceeds total cost by the greatest amount". Smith (op. cit) further observes that "Both Christaller and Losch employed a deductive method. They based their models on three fundamental factors, viz., existence of space exploiting activities, transportation costs & economies of scale".


In building up their theories, they made several somewhat simplified assumptions. These were:

i) even distribution of natural resources,

ii) equal population density at each centre

iii) similar consumer preferences at each centre
iv) same production technique for each plant
v) different demand function for each product
vi) completely rational behavior of all producers and consumers (see Dr. M.D. Godbole, op.cit;pp.26-28)

As a part of his conceptual framework, Losch noted that every production point has an element of spatial monopoly in that it can best serve itself.

The incorporation of transport costs to more distant markets increases the delivered price to customers, so that the quantity demanded gradually declines until it is zero (Fig.III.6(a)). Given a homogeneous people, a demand cone may be constructed around a production point, defining the market area and the quantity sold (Fig. III.6 (b)). Competition will turn this circle into a hexagon, part of a series serving the region perfectly efficiently, as long as the assumptions of Losch's model are met. These assumptions, which involve neglecting real-world cost elements and allowing the costs of serving the market to dominate the situation, are most appropriate for service activities and for widely produced consumer
goods such as fresh bread or manufactured ice. (Foust, J.B. 1975). Although, many firms adopt a policy of uniform spatial pricing within national markets in which customers pay the same regardless of their location relative to the factory as affirmed by Greenhut, M.C. (1981) and Norman, G. (1981), there is abundant evidence of a marked distance decay effect in the shipment of industrial goods and a tendency for firms to have higher market shares within the vicinity of their plants as observed by Dorward, N.M.M., (1979). This evidence emphasizes the validity of Losch's ideas and the danger of regarding the market as a point and assuming a fixed level of demand regardless of price. (Chapman and Walker, op. cit).

III.C.3. Christaller & Losch Models – A Comparative Analysis

The differences between the Christaller Model & Losch Model arise from their different ways of treating the combination of market areas. Hermansen T. (1973) in his critical evaluation observes that "Christaller starts with the good that has the widest spatial range and develops his organisation from above, while Losch starts at the bottom with the good having the smallest spatial range and consequently drives the organisation from below ...... the two models apply to different types of goods; Losch Model to transportable commodities and Christaller's to immobile services".

As regards the Christaller Model, Hermansen (op.cit.) has drawn pointed attention to the basic weakness of the Model in that it does not allow for
specialisation among places or division of labour other than that represented by the supplying higher order centres of good to lower ones. Thus, all centres are service centres. The applicability of this model is therefore limited to the service sector. Dr. Godbole M.D. (1978; op.cit) has strongly advocated the view that the following conditions must be satisfied in the Losch Model to achieve equilibrium:

i) The location of every individual must be as advantageous as possible in terms of profits for the producers and gains for the consumers.

ii) The production locations must be so numerous as not to attract any new firm.

iii) No firm makes any abnormal profits to induce entry of new firms.

iv) The areas of supply, production and sales must be as small as possible.

v) At the boundaries of market areas, consumers are indifferent as to which of the two neighboring producing locations they get their supply from.

Dr. Godbole (op. cit) holds forth that to any discerning observer the inherent constraints in the foregoing conditions must be obvious.

III.C.4. **Christaller & Losch Models : An Evaluation**

i) Both the models have attracted criticism based on their neglect of spatial cost variations, demand being the sole determinant of
location of producers. Transport cost has the effect of only limiting the size of the market area.

ii) The other main criticism of the Christaller – Losch approach is that it is a static one and fails to explain the dynamics of economic development. **These theories** do not elucidate how the centres flourish, stagnate or how the growth impulses are transmitted through space. (see Godbole, M.D. op.cit;pp.24-41) We also find that Chapman & Walker (op.cit; pp.35-56) substantially concur with this view when they observe: "It should be noted here that normative location theory paid no explicit attention to dynamic aspects of plant location. The relevant location factors were considered at one time so that it was not necessary to examine how decisions from one period affected those in the next, whether in the context of a firm's own development, of the impact on and reaction of other firms, or of long term changes in the cost and availability of necessary factors of production: This neglect of the dynamic context has played a major role in the necessary evolution of new approaches to studies of industrial location."
III. D Integrated or Profit Maximization Approach

III.D.1. Greenhut's Model

i) As we have seen, the principal weakness of the Weberian Theory was that it was cost-centred and operated to the utter neglect or exclusion of the demand factor.

ii) Similarly, the major deficiency of the Christaller & Losch models was the neglect or exclusion of spatial cost variation, demand being the sole determinant of plant locations.

iii) The preceding models and theories as in sub-paragraphs (i) & (ii) above belong to the normative school of thought of Industrial Location Theory and constitute themselves represent the broad spectrum of the Normative Theory. Chapman & Walker (1991, op. cit.; pp.18-31) have reported that "Losch did in fact recognise that the goal of the rational entrepreneur should be to select the location at which profits are maximised and that, in reality, neither demand nor costs are spatial constants as assumed by the Least Cost and Interdependence schools respectively. However, Losch maintained that a model which simultaneously relaxed both of these assumptions, to define the optimum location at the place at which total revenues minus total costs is greatest, was impossible to construct". The frustration of Losch was noticed by the Integrationists or Profit Maximisers and thus an Integrated or Profit Maximisation Approach was born. The initiative in this regard was led by economists like Greenhut (1956, 1963) & Isard (1956) with a view "to derive more ambitious theoretical representations of
location which incorporated the variables influencing both cost and revenue sides of the equation. (see Chapman & Walker, 1991, op.cit.; pp.18-31) The first significant attempt at integrating the two approaches was made by Greenhut, M.L. (1956) in his work. Greenhut’s detailed Typology of Location Factors is shown in Table III.1.

His theory embodied mainly the following factors:

i) **Cost factors of location** (land, labour and management, materials and equipment and transportation)

ii) **Demand factors of Location**

   a) Locational interdependence of firms
   
   b) The shape of demand curve for given product
   
   c) The location of competitors, which in turn partially determines.
      - the magnitude of the demand;
      - the cross-elasticity of demand at different places
   
   d) The significance of proximity, type of service, and speed of service; prejudices of consumers;
   
   e) The relationship between personal contacts and sales;
   
   f) The extent of the market area which itself is determined by cost factors and pricing policies
   
   g) The competitiveness of the industry in location and price; certainty and uncertainty.
Table III.1: Greenhut’s Typology of Location factors

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Factor Type</th>
<th>Factor Characterisation &amp; Conditionalities</th>
</tr>
</thead>
</table>
| I.      | Demand Factors | 1. The shape of demand curve for a given product.  
|         |              | 2. The location of the competitors, which in turn partially determines  
|         |              | a) the magnitude of the demand  
|         |              | b) the cross elasticity of demand at different places  
|         |              | 3. The significance of proximity, type of service, prejudices of consumers  
|         |              | 4. The relationship between personal contacts and sales  
|         |              | 5. The extent of the market area, which itself is partially determined by cost factors and pricing policies.  
|         |              | 6. The competitiveness of the industry in location and price, certainty and uncertainty  
| II.     | Cost Factors | 1. The cost of land which includes  
|         |              | a) the rent of the land  
|         |              | b) the tax on land  
|         |              | c) the availability of capital, which partially depends upon  
|         |              | i) the banking facilities and financial resources  
|         |              | ii) personal contacts  
|         |              | d) the cost of capital, which is also partially dependent upon  
|         |              | i) the banking facilities and financial resources  
|         |              | ii) the type of climate  
|         |              | e) the insurance rates at different sites, which in turn partially dependent upon  
|         |              | i) the banking facilities and financial resources  
|         |              | ii) the police and fire protection  
|         |              | iii) the type of climate  
|         |              | f) The cost of fuel and power, which is partially dependent upon  
|         |              | i) natural resources  
|         |              | ii) topography  
|         |              | iii) climate  
|         |              | 2. The cost of labour and management, which is influenced by  
|         |              | a) the health of the community, the park and education facilities, housing facilities, wage differences etc.  
|         |              | b) state laws  
|         |              | 3. The cost of material and equipment, which is partially determined by  
|         |              | a) the location of the competitors (sellers and buyers)  
|         |              | b) the price system in the supply area (f.o.b. mill, equalising or other forms of discriminatory delivered prices)  
|         |              | c) the extent of the supply area, which in turn is partially dependent upon  
|         |              | i) personal contacts  
|         |              | ii) price policy  
|         |              | 4. The cost of transportation, which is partially determined by  
|         |              | a) the topography  
|         |              | b) the transport facilities  
|         |              | c) the characteristics of the product  

continued...
Table III.1 continued

<table>
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<tr>
<th>Sr. No.</th>
<th>Factor Type</th>
<th>Factor Characterisation &amp; Conditionalities</th>
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<tbody>
<tr>
<td>III.</td>
<td>Purely Personal Factors</td>
<td>1. The importance of psychic income (size of plant)</td>
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<tr>
<td></td>
<td></td>
<td>2. Environmental preferences</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. The security motive.</td>
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</tbody>
</table>

Source: Greenhut, 1956.

iii) Purely personal factors like the importance of psychic income e.g. size of plant; environmental preferences of entrepreneur; and the security motive of entrepreneur.

Greenhut's typology of Location factors as shown in Table III.1 is sufficiently detailed based as it is on the work of Greenhut (1956). Both Demand factors and cost factors have been divided into sub-groups and projected as locational variables. In addition to cost and demand factors, Greenhut identified and introduced a third broad spectrum category under the description of "personal factors". This is founded on the conclusions of his empirical research which threw up for consideration diverse location factors which did not neatly fit into his economic categories (Greenhut, 1956, pp. 233-47; Greenhut & Colberg, 1962). As Chapman & Walker (1991, op.cit;p.49) have highlighted that "numerous surveys have emphasised the importance of such considerations, and the existence of an attractive environment or climate may be decisive in the choice between two locations with similar economic attributes – (see Dean, 1972; Spooner, 1974, Nicholas, 1974; Foster, 1977)".
Greenhut's Model, in essence, "aims at maximisation of total profits rather than minimisation of costs or maximisation of revenues. He (Greenhut) regards transportation cost as the determining factor of location only when the cost of transportation forms a substantial part of the total costs. In such a case, the production will be located nearer the market or source of raw materials. Nature of product can also be a factor in deciding location. As regards demand, it is the elasticity which is of crucial importance. The more elastic the demand for a firm's product, the more dispersed production will be. The size of the unit is also of relevance. He asserts that small firms tend to move a longer distance more easily than large firms. Greenhut also contends that unorganised oligopoly, where firms compete freely in price, lends more readily to dispersal than organised oligopoly". (see Dr. Godbole, M.D., 1978: op.cit;pp.28-29). In the context of location factors, Chapman & Walker (1991; op.cit;pp.44-50) assert that awareness of cost structures is definitely relevant to plant location where their different elements are cheaper in some places than others. Further, even if a particular factor represents a significant proportion of total costs, it does not necessarily follow that it will have a noticeable impact on locational choice. What is important is how it varies spatially. Smith (1981, op. cit; p.150) makes a distinction between basic cost, the minimum which must be paid anywhere and locational cost, which varies from place to place. It is the latter which is crucial to the choice of location.
III D.2  Smith’s Model

In view of the foregoing, we find that Greenhut’s theory blends both the major location factors, namely, the demand and cost factors of location and acts as a bridge between the Weberian theory and Losch’s Approach. In real world situations, it can be said without any fear of contradiction that “both the costs and revenues of a manufacturing business will vary with location. The costs of assembling inputs and distributing outputs will depend on location relative to sources of supply and markets respectively. Location relative to the market may also influence the level of sales and therefore the revenue side in the firm’s balance sheet. It is not only purchasing and marketing activities which are influenced by location, but also the production process itself”. (Chapman & Walker, 1991: op.cit.; p.35)

Thus, the essence of, nay the dynamic context of, plant locations deserves to be understood, appreciated and perceived by the decision – makers in a wider context. The various schools of thought in the Normative Theory of Plant Location, though seemingly different, have the same common core, namely homo economicus. We agree with Chapman & Walker (op.cit.) when they observe that “central to the normative approach are certain assumptions regarding the characteristics of those responsible for selecting the best plant location. These are embraced within the concept of economic man. This notional decision-maker is distinguished by the single-minded pursuit of the goal of profit maximization and by the possession of complete knowledge of all relevant economic information, including the ability to predict the actions of competitors and future events. No individual can, in reality, possess such omniscient powers, and even if
all of the other simplifying assumptions of location theory were accepted, the optimal locations of these normative models would remain unattainable objectives. Greenhut (1963) was certainly aware of the problem, but retained the assumption of the economic man in his theoretical work. As noticed earlier, Losch (1954) was plagued with a similar dilemma. However, some of the economic researchers like Rawstron (1958) have sought to tone down the super-human attributes of economic man while at the same time keeping the cardinal normative requisite of pursuing an optimal location. Rawstron (1958) initially put his fingers on the existence of spatial margins to profitability which defined the boundaries of an area, focused upon the best location, within which profitable level of operations can be reached and kept. This idea was further developed by Smith (1966, 1981) who embodied it within both least cost and locational interdependence models of industrial location. The grand notion of a single best location at which maximum profits are attained was substituted by Smith’s Models in favour of a broader area of economic viability within which sufficient profit may be earned to permit successful and continuous operation. The concept underlying Smith’s approach has been elucidated with the help of Fig. III.7 which clearly explains two important notions – the space cost curve and the notion of spatial margins to profitability.
Both the notions are founded on the premise that, although a single optimal location may be identifiable, it is surrounded by other potentially profitable location sites. Fig. III.7 is a typical space-cost curve. It is a cross-section along the line PQ and the lowest point of the curve corresponds to the most profitable location at X. It is presumed that the product is sold at £170 regardless of the distance from the production site and this is indicated by the horizontal price (total revenue) line TR in the diagram. In the given circumstances, as shown in the diagram, Ma & Mb define the spatial margins to profitability. When delineated in three-dimensional terms, these margins enclose an area or zone of profitability. Beyond these margins, the total costs exceed the selling price of £170 and a loss will be made. The adaptation by Smith (1981) of Weber's ideas signifies a step closer to reality because it proclaims that the selection of the Least Cost Location is not essential for economic survival. The diagrammatic representation corresponds to a highly simple situation in which revenues
are presumed to be constant. The effect of changing various assumptions can be studied by incorporating the same within such diagrams (see Smith, 1981, pp. 157-221). However, some of the economic investigators like Taylor (1970)\textsuperscript{15} have expressed skepticism about the utility of Smith's models, as in practice, he felt that the identification of the boundaries of the area of profitability bristles with as many difficulties as the exercise of determination of the point of maximum profit location. The conceptual brilliance of Smith's models is, however, not in doubt. Nevertheless, in conclusion, we observe that Greenhut's model, despite its conceptual limitations centred on homo economicus, is an epitome of the Integrated or Profit Maximisation Approach; constitutes substantial improvement over the predecessor theories of the Normative School and together with Smith's model noticeably takes the Normative theories nearer to reality in Industrial Location.

III.E Behavioural School of Industrial Location

III.E.1 The Behavioural School of Industrial Location has its roots in the Rawstron's (1958) concept of spatial margins to profitability, and the work of Simon (1957)\textsuperscript{16} and that of March and Simon (1958). The concept of spatial margins to profitability as discussed in Para III.D.2 lent powerful recognition to the role of sub-optimal behavior in the choice of factory location. In the context of his research in Administration Theory, Simon discerned that whereas economic man is an optimiser, his real-world equivalent is a satisficer. Simon argues that since, in real life situations, decision-makers are not endowed with either the level of knowledge or the
powers of reason attributed to the economic man (*homo economicus*), they opt for courses of action or choices which, in their perception, are satisfactory. Simon (1957:op.cit) defined such behavior as *bounded rationality*. This is seemingly confirmed by our everyday experience as distinct from its relevance to more significant decisions such as the choice of location for an industrial plant. The fact of *sub-optimal behavior* in the choice of plant location also emerged from the study of response-patterns of industrialists to questionnaire surveys in the course of empirical studies pertaining to plant location decisions. The response-patterns of the decision-makers quite often emphasised the relevance of *personal considerations*, which figured prominently in Para III.D.1 during the course of discussions pertaining to Greenhut's Model (1956), over the more apparent and traditional location factors such as proximity to raw materials. These observations are reinforced with separate empirical studies by Katona and Morgan (1952); Greenhut & Colberg (1962); Lutterel (1962); Mueller & Morgan (1962); Mcmillan (1965); Cameroon & Clark (1966)\(^\text{17}\).

**III.E.2 Locational Preferences and the Behavioural School**

1) Locational preferences of the decision makers in Industrial Location are the bed-rock of the Behavioural school. The justification of these locational preferences are centred on decision-makers’ search for and evaluation of information (Fig. III.8). In this context, the Behavioural theory can be said to be more “realistic” than the cost-minimising theories claiming lineage from Weber, Losch & others focused on the concept of optimality as
embedded in the economic man. In economic literature, the cost-minimising theories are also known as Neo-classical theories as these are rooted in Neo-classical economics. (see Hayter, R. 1997: The Dynamics of Industrial Location, p. 79, Wiley, Chichester). The Behavioural Theory seeks to highlight that in the real world, decision-makers made choices based on limited information which may be characterised by varying degrees of uncertainty. Thus, the Behavioural Theory of Economic Behavior views the decision-makers as "satisficers" to indicate the real-life situation of decision-makers who are called upon to make a choice on the
basis of limited information and limited (bounded) rationality. "In Behavioural theory, satisficer firms are information processors; the environment of firms (or the wider economy) comprise information spaces or beds; and the key interactions between firms and environments are in the form of information flows..... Moreover, since in the real world, learning cannot be perfect, and, because decisions commit firms to the future which cannot be known precisely, Behavioural theory stresses how decision-makers cope with uncertainty". (see Hayter, R., op.cit;pp.137-138). The various stages in Locational Decision-making in terms of the Behavioural approach have been depicted in Fig. III.9. The movement for Behavioural understanding of industrial locational decision processes from the perspective of the individual firm was led by economic geographers like Pred (1967,1969), Townroe (1969, 1971) and Stafford (1969, 1972). They have asserted that, in real life, locational choice is part of a strategic or a long-term investment -

Conti...
decision that is complex, uncertain, inherently subjective and carried out by individuals or teams of decision-makers who lack the omniscient capabilities of economic man (Homo Economicus). Viewed in this perspective, factory location choices are a function of locational preferences, which shape, and, are, in turn, shaped by decision-making processes.

ii) There are two significant aspects of the behavioural rationale for detailed analysis of the processes of industrial locations. Firstly, Behaviouralists
point to evidence which suggests that for an increasing number of industrial activities, the spatial margins of profitability are extremely wide so that factories can potentially invest in a large number of viable locations. Such a view is founded on a decline in the centrality of transportation and communication costs, the large-scale investment in basic infrastructure and progressively increasing possibilities for locational adjustment. One New Zealand Study (Mc Dermott: 1973)\(^{18}\) showed that while some industries had few locational choices, others, such as leather and stationery could profitably locate anywhere in the country. Similarly in U.K., Taylor (1970)\(^{19}\) made similar comments regarding small firms in the iron foundry industry, while Taylor (1975)\(^{20}\) found, on the basis of isodapane analysis (relevant to cost minimization theories), that a fireworks factory could virtually locate anywhere in the Axial Belt and parts of Wales in the United Kingdom without incurring any penalty in relation to its existing location. Again, in the Iron and Steel Industry, spatial limits to economic survival are quite broad (Warren, 1970)\(^{21}\).

Thus, it is obvious, that an important rationale for the Behavioural approach towards factory location is rooted in the consideration that decision-makers have legitimate choices that are not economically pre-ordained and only crudely limited by economic constraints. Secondly, the Behaviouralists believe that irrespective of whether spatial margins to profitability are well-defined or not, analyses of locational decision making processes in accordance with the Behavioural approach can be useful to regional planning agencies seeking to attract industrial investment and to
firms seeking guidelines for their own decisions. (see Townroe, 1976; Stafford, 1979, Schemenner, 1982). The observations of these economic analysts of the Behavioural school find a resounding echo in the conclusions indicated by Chapman and Walker (1991, op. cit; pp. 20-21) as under:

"The rapid economic growth of the 1960's which resulted in an exceptional and probably unique volume of investment in new manufacturing establishments in Western Europe, North America and Japan provoked an increasing academic and policy interest in the practice of location decision-making. The abstract models of normative theory appeared to provide little useful guidance to, for example, governments wishing to influence the distribution of new manufacturing investment in accordance with their regional development objectives, and it seemed more relevant to focus on how decisions are actually made as opposed to how they should be made".

III.E.3 Behavioural Matrix

i) It has already been brought out that the Behavioural School looks upon the firms as information processors. The Behavioural explanations of plant location depend a lot on how firms perceive, code and evaluate information and all the factors which influence cognitive and choice processes. The entire operating environment of the firm is an 'information bed' and the links between firms and the environment are formed as soon as information exchange takes place.
ii) The essential elements of the behavior school, namely, the concept of optimizer, the concept of satisficer and that of bounded rationality along with the concept of spatial margins to profitability were incorporated by Pred (1967, 1969) within his concept of the Behavioural matrix (see Fig. III.10). He applied the concept of behavioural matrix to a variety of decision-making situations including a new plant location. The matrix is a monitoring mechanism for the identification of the position of decision-makers relative to the normative concept of the economic man. The axes of the matrix measure the quantity of relevant information available to a decision-maker and his ability to use that information. It is obvious from Fig. III.10 that whereas decision-makers positioned in the top left corner of the matrix may be characterised as incompetent and ignorant in economic terms while those in the bottom right represent the opposite end of the spectrum of ability and knowledge. Pred's line of argument was that individuals in the latter position are more likely to make economically rational choices, but accepted that they could also derive benefit from chance factors not related to their own choices.
Fig. III.10 : The behavioural matrix and industrial location decisions (the number indicate the number of firms occupying specific positions in the matrix).

Source: Pred., 1967 (Adapted from Chapman and Walker; 1991 : 22)

O = Optimal location within each margin

• = plant locations
iii) Fig. III.11 connects this idea to the notion of spatial margins. It is hypothesised that there are three areas within which a hypothetical industrial activity may be profitably carried out. An optimal location is identified within each of these areas. The geographical position of a number of imaginary firms is linked to their Behavioural position within the matrix. Generally speaking, firms in the bottom right of the matrix have chosen locations near one of the optima, while most, but not all, of the
firms characterised by positions in the top left have selected unprofitable locations. (see Chapman & Walker; 1991: op. cit; pp. 22-23). In this context, the observations of Hayter, R. (1997; op.cit; pp. 142-3) are indeed highly relevant: -

"A continuum of behavior exists between these two polar situations. In addition, unexpected outcomes can occur. Thus, a firm with high ability and information can choose an unprofitable location (the 'bad luck' outcome) while a firm with low ability and information levels can choose a profitable location (the 'good luck' outcome). Firms may be able to adjust to unexpected circumstances. The reality of unexpected outcomes, however, reflects the fact that strategic decisions face uncertainty".

iii) Despite its conceptual brilliance, Pred's Behavioural matrix is still a stand-alone guide-post to students of industrial locations and industrial geography. No worth while effort has been made by researchers in industrial geography to operationalize the Behavioural matrix. It is indeed a travesty "that there has been little direct assessment of satisficing theory in studies of industrial location choice". (Hayter, R. 1997; op.cit; pp. 158-9) However, in the context of study of industrial locations, the Behavioural Matrix has successfully "emphasised that decisions are taken by individuals and organisations that diverge, to varying extents, from the theoretical norm of the economic man. Notions of probability and uncertainty are introduced, and the acknowledgement that survival is only
for a limited period outside the spatial margin is an implicit recognition of
the dynamic character of manufacturing distributions”. (Chapman &

III.E.4 Onwards to Regional Policy

Looking back, we find that a period of nearly five decades separate the birth of
Weber’s Least Cost School of Industrial Location and the emergence of
Behavioural School of Industrial Location. Both the schools of thought are inter-
linked to each other in an evolutionary sense, and, between themselves these
two span a number of approaches to the understanding and comprehension of
the complexities of Industrial Location decisions as highlighted in the preceding
discussions. It is significant that post-Weber, each theory or school of thought is
founded on the limitations of the predecessor theories. This sets the stage for the
discussion of the Regional Development Theory or Regional Policy in which we
see an harmonious inter-play of the several preceding theories/approaches to
Industrial Locations. As “induced industrialization” constitutes the essence of
Regional Development, the Growth Centre Approach based on the Perrouxian
Poles of Economic Growth and the creative role of social infrastructure coupled
with industrial infrastructure acquire added significance in this context.
Our principal concern in this study has been the relationship between the process of industrial development and inequalities of economic opportunity and development over space and time. Several observers of the scene have emphasised that the spatial imbalances, which are a noticeable feature of industrial development in the Capitalist West, are also evident in the centrally planned economies of the Socialist Bloc led by the erstwhile Soviet Union. (see Berensten, 1979; Fuchs and Denko, 1979; Zimon, 1979, Sillince. 1987, Koropecyj, 1972). Thus, spatial or regional disparities which spring forth from the process of industrialisation ought to be regarded as an inevitable feature of the industrial mode of production irrespective of the political system in which it operates. Clearly, the problem of regional disparities in economic and industrial development is of global dimensions. The planners and policy makers in diverse countries with different socio-economic systems are keen to evolve policies designed to bring about balanced regional economic development in their respective nation-states. However, the optimal policy-mix not only has to take into account the growth potential and resource endowments of each region and the light thrown on the subject of industrial location by the several theories enumerated earlier. In the context of induced industrialisation which efforts towards balanced regional economic / industrial development inevitably entail, the policy-mix must take into account the factors which motivate the entrepreneurs to locate their plants in the backward / depressed / relatively undeveloped / lagging regions. Simultaneously, the design of the policy-mix must also incorporate factors, which impart mobility to labour, supervisory and managerial personnel in favour of the backward regions. Additionally, the policy-
mix must also ensure that the proposed plant and the proposed location in the
backward region must adopt each other in a manner and to an extent that the
plant becomes an integral part of the economy of the region with appropriate
backward and forward linkages. The scenario, therefore, opens up a whole new
multi-disciplinary subject of study under the description of Regional Science or
Regional Economics or Regional Analysis. From this viewpoint, it is of utmost
contextual significance that the concept and connotations of the expression
'region' are fully explored.

III F.1. Concept of Region

i) When we think of a region, in the mental plane, the picture of a tract of
land or a piece of territory is conjured up. In the dictionary word "region" is
synonymous with country, State, Canton, Country, Province, City,
Conurbation, parish, township, borough, principality, realm, kingdom,
empire, dominion. space, district, area, ground, tract, territory etc: But. in
Regional Economics / Regional Science, we are concerned with an
economic region. For the purpose of Regional Analysis, a region/regions
must have homogeneity. But there is no consensus amongst the
economists about the factors, which define the homogeneity of a region.
Nevertheless, "a common procedure is to delimit the region by reference
to physical criteria, administrative boundaries or data availability" {see
Richardson Harry W. (ed); 1970, "Introduction in Regional Economics; A
Reader; Macmillan, London, p.12}. The distinguished Indian Researcher,
Menon K.S.V. (1979; op cit; pp1-5) has reported that "the concept of a
region as a method of classification has been evolved through two distinct phases, reflecting the economic advance from a simple agrarian economy to a complex industrial system. The first phase saw the "formal region" concerned with uniformity and defined on the basis of homogeneity. The second phase saw the development of the "functional region"—concerned with inter-dependence, the inter-relationship of the parts and defined on the basis of functional coherence". He goes on to enunciate that a "formal region" is a geographical unit, which is characterised, by homogeneity or uniformity in terms of chosen criteria. Initially, the criteria were primarily of a physical nature e.g. topography, vegetation or climate etc. linked with the celebrated concept of geographic determinism. This was followed by a changeover to the employment of social, economic & political criteria. By this yardstick, a natural region can be regarded as a "physical formal region". But, "economic formal regions" are primarily characterised by types of industry or agriculture though physical undertones are inevitably present. "Economic formal regions" were later defined by socio-economic criteria such as rate of economic growth, Income level, rate of unemployment etc. On the other hand, a functional region is a geographical unit, which manifests a fairly high degree of functional coherence, an inter-dependence of parts, identified on the basis of norms different from those of a formal region. Often referred to as a nodal or polarised region, it comprises heterogeneous units such as cities, towns and villages which enjoy functional inter-relationships. These inter-relationships are reflected in socio-economic criteria such as commuting trips to work centres or shopping trips connecting the shopping centre with
subsidiary centres. Again, Boudeville J.R. (1966, p.2), during the course of his review of the problems of Regional Economic Planning identified three different concepts of homogeneous, polarised, and planning regions. Homogeneous regions are close to natural regions of geographers. Polarised regions represent polarisation in terms of population density. Planning regions are defined as areas displaying some coherence or unity of economic decisions and have conceptual closeness to an administrative unit. Each of these regions can be studied from the viewpoint of microeconomics as well as macroeconomics. In a micro-study, the focus of study is the producer or consumer and his standpoint. By and large, in such a study, the entrepreneurial decisions regarding location, market research or optimisation of supplies are more relevant. In a macro-study, however, the focus shifts to the economic variables of the region as a whole and the study revolves round analysis of the structure and development of the geographical unit-city, town or a larger entity called the region. On this basis, Menon, K.S.V. (1979, op. cit, p.3) concludes that regions are a means to an end rather than ends in themselves. In fact, he goes a step further by holding forth that "a region should be defined according to the purpose of one's analysis".

ii) The concept of region, according to Dr. Sadhak H, (1986, op cit. pp. 17-18) has a "variety of uses from a tiny village as a nodal point of growth to a cluster of independent countries. But an economic region should be an integral component of economic development. In regional science, a region has been defined as an area in which all parts have, as far as
possible, similar economic structure and therefore similar problems and interests. This similar economic structure and similar economic problems call for uniformity in economic action in the form of regional planning. In the same vein, Klassen (1965) advocates that amongst other things, a planning region must be large enough to take investment decisions of an economic size, must be able to supply its own industry with the necessary labour, should have a homogeneous economic structure, contain at least one growth point and have a common approach to and awareness of its problems.

iii) In their detailed study by Brahma et al. (1975, pp 24-25), they dealt with the Delineation of a Region in the context of Regional Planning in Marathwada Region of Maharashtra and observed that "For Purposes of economic planning, a region may be delineated with reference to a number of relevant considerations. It can be an area with geo-physical homogeneity such as a river-valley. A common socio-economic history would be an added advantage since the structural changes to be introduced will have to be directed to the existing institutional set-up. It would also be convenient from the point of view of implementation of plan policies to so delineate the planning unit as to be more or less co-extensive with an administrative unit. No standard answers can be provided as regards the size of the planning unit; however consistent with the need for homogeneity or near-homogeneity with respect to potential advantage of planned development, the region should be broad-based and endowed with such element of diversity that integrated development of the
region deriving its major strength from local resources and local market can be planned".

iv) Dr. Gulati, R.K. (1999, p. 27) in his study on "Regional Disparities in Economic Development" has treated every state in India as a region on account of the practical consideration of data availability. Further, according to him, States were reorganised in 1956 "on the principle of linguistic and cultural homogeneity. Indian states are politico-administrative units and are considered economic planning regions. Most of the discussions in the National Development Council in the context of distribution of central assistance treats the concept of a region as state. The plan documents too treat a region in the same sense. In the interest of application of policy to the regional problem, it is obvious that the economic and political region must coincide .....states being an administrative and political units, the policies and priorities can be easily adhered to meet the requirement".

v) The National Committee on Development of Backward Areas (NCDBA) set up by the Planning commission, Government of India, in their Eleventh Report dated 30.11.1981 dealt with the "General Issues Relating to Backward Areas Development".

For the purpose of evolving an approach for identification of backward areas, it felt the paramount need for specification of the appropriate geographical unit to facilitate physical demarcation and the subsequent
planned developmental effort. In this regard, it held forth the following predominant considerations:

a) The geographical unit should be small enough to ensure a certain homogeneity of condition so that a further differentiation of approach within the area is not necessary.

b) At the same time, the geographical unit should be large enough to be suitable for local planning.

c) The unit chosen must fit into the framework of development administration.

d) The geographical unit must be characterised by data availability of a high order with reference to indicators chosen for purposes of identification of backward areas. (see NCDBA, 1981, Eleventh Report, paras 4.8-4.9; p. 35)

vi) To sum up, in the Indian context, on the basis of the foregoing discussion, the following criteria emerge for consideration for defining a region for the purpose of analysis of Regional disparities and planned industrial development of Backward Regions:

1) The region must be a geographical unit.

2) The geographical unit must be endowed with homogeneity of language / culture / historicity / topography etc.

3) Reliable data pertaining to socio-economic indicators of the unit must be contemporaneously available in a standardised format.

4) The geographical unit should be such where the political and administrative authority converge at the base level in order to
ensure the implementation of the planned programme for industrial development.

In view of the foregoing, for the purpose of this study, we propose to adopt the states in India as regions for the purpose of studying inter-state disparities which is the standard practice in the Government of India for devolution of fiscal resources from the centre to the states. For the study of intra-state disparities, we propose to treat the district as a region as the district, being an administrative unit with assured availability of reliable data, has been adopted since inception, by the Central Government as the foundational entity for the identification of backward regions and the application of the Incentive schemes of the Central Government. In this context, we will like to highlight the fact that the Incentive Schemes of the State Governments look upon the Taluka / Block / Tehsil as the basic geographical unit for identification of degree of Industrial backwardness and the consequent level of availability of incentives to entrepreneurs as brought out in Chapter 1.D.6.5 and Table 1.2. The Taluka / Block / Tehsil, being part of a district, is much lower in administrative hierarchy than a district and such a practice is not in alignment with the approach of the Central Government in this regard. Thus, the centre-state dichotomy comes into sharp focus in this area, through conceptually, both the Taluka and the District can be taken as a region for the purpose of analysis as brought out in the preceding paras.
Ill F.2 Manufacturing and Regional Development Theory: Inter-relationships.

1) It is well-recognised that manufacturing and the Industrial mode of production, with its intrinsic tendency towards spatial unevenness or regional disparity, has a stellar role to play in Regional Development in the context of industrialisation of lagging / backward regions. It is an area of inter-disciplinary concern as it requires inputs from economists, geographers, physical planners, sociologists and researchers in the field of Industrial Geography. (see Hilhest, 1967; Norcliffe, G.B.; 1975; Beathe and Watts; 1983; Chapman & Walker, 1991). The industrialisation of Backward Regions is, in essence, a process of induced industrialisation with a duly calibrated pace of acceleration relative to the Industrially Advanced Regions. As already emphasised, the roots of the process lie in social equity and, distributive justice. All over the world, it is a socio-economic concern of the state in particular and the society in general. Such an induced industrialisation, as referred to above, is an attempt which seeks to understand, analyze and replicate the processes which brought about industrialisation, over a period of time, in the present day Industrially Advanced Regions. Thus, the analyst of today must be able to visualise the industrial landscape as it was at the time of the initial stirrings of the Industrial Revolution and the subsequent Evolution of Industrial Areas in a global context. Undeniably, the changes in the industrial landscape has been an ongoing process since the Eighteenth Century. Initially, it was Weber who, in 1909, noticed the economies of agglomeration in the context of plant location and the consequent spatial
inequalities, but, being a cost-minimiser of the Normative School, he characterised it as not a prominent type of orientation. However, interdisciplinary surge of interest in spatial inequalities continued unabated till it received focussed attention in the celebrated work of Myrdal G., who conceptualised the "Theory of circular and cumulative causation". It was propounded by him in 1957 in his published work "Economic Theory and Underdeveloped Regions". Myrdal's formulation was in direct conflict with the predominant view at the time that, in the long run, all regions, by the operation of free market forces, would approach towards an equal level of prosperity. Myrdal argued that, though in economic theory, market forces should prefer less-developed areas as their factor valuations are low, but in actual practice, Myrdal contended that the reverse was true and was positively more commonplace. Further, to make matters worse, the disparities widen over time as the process is cumulative. Once as soon as the development process is afoot, a variety of factors, forces and features have a vigorous propensity to intensify the further growth of a well established industrial area. (see Chapman & Walker; op.cit, 1991, p. 173) The differentials in regional growth are mainly attributable to "the resulting exchanges between the growing and lagging regions of a nation. Once the development process sets in, the growing regions will attract labour, capital and commodities from the lagging regions by offering higher wages and interest which will reinforce the further growth of the growing regions. In Myrdal's terminology it is called the "backwash effects". (see Dr. Sadhak H, op.cit, 1986:p.19). This is best illustrated by Fig. III.12 which vividly depicts the exchanges between the Core Region and the Peripheral
Region(s) leading to "Backwash Effects" in Myrdal's theory. In the pre-Myrdal scenario, the neo-classical theorists (of the Cost Minimising School) held forth that freely operating market forces, guided by Adam Smith's invisible hand and unhampered by State intervention, will ensure resolution of regional problems. (see Fig. III.13).

Fig III.12: Myrdal's "Backwash Effects" in Core-peripheral exchanges

Fig III.13: Towards long term Regional Equilibrium in Normative Industrial Location Theory (Neo-classical economic Landscape)

In this view of the matter, in the core regions, concentration of investment in the factories exerts pressure for labour supply which increases the demand for labour. With increase in the demand for labour, wage levels go up and up till the firms, as a consequence thereof, seek to locate plants in peripheral regions which are characterised by abundant labour supply at
lower wage levels. However, with the passage of time in the long run, so runs the argument of the neo-classical theorists, as more factories locate in peripheral regions, the demand for labour increases in peripheral regions which brings their wage levels under pressure. In addition, shift of labour from peripheral to core regions lessens pressures on wage levels in the peripheral regions and enhances pressures on wage levels in the core regions. Thus, in a neo-classical economic concept (to which the cost minimising theories of the Normative Location School belong), freely mobile capital and labour define tendencies towards equilibrium wage level and unemployment rates among regions. It is this rosy scenario which has been faulted with by Myrdal (1957) and later by Krebs (1982). According to them, it suffers from two unrealistic assumptions of equilibrium tendencies. Firstly, the mobility of workers, including unemployed workers, is invariably constrained by social and family commitments and a highly localised knowledge of opportunities. Migration to other regions is attended by huge monetary and social costs and entails uncertainties which are further compounded if migration leads to change of occupation involving new skills. Secondly, whereas flow of investments to core regions will continue unabated; this will ceaselessly mount pressure on wages and simultaneously reinforce agglomeration economies and the effects of inertia in the core regions. In a nutshell, the regional pattern of growth in the neo-classical mould may be "disequilibrating" (see Hayter, R. op.cit, 1997).
2) The other feature of Myrdal's model is that in the ultimate analysis, there will be "spread effects" which will transmit economic momentum and growth impulses from the growth areas (core regions) to the lagging regions in the neighbourhood, thereby stimulating a new cumulative causation process. This will, in successive waves, lead to a "self-sustained economic growth in the newly growing areas. But this spread effect of expansionary momentum will work only if the growing region has enough natural resources, food and semi-manufactures demanded by the growth area. Therefore in a (developing) country like India, we will generally find weak "spread effects" and strong "backwash effects". Myrdal's prescription is therefore strong intervention in the distribution of economic activity to induce stronger "spread effects" to remove regional disparities. (see Dr. Sadhak, H, 1986, op. cit; p. 20 and Chapman & Walker, 1991, op. cit, p.177) Myrdal's principle of circular and cumulative causation is best illustrated by reference to the flow chart in Fig. III.14.

Conti...
Fig. III.14: Myrdal's process of cumulative causation. Source: Keeble, 1967. (Adopted from Chapman & Walker, 1991; p. 174)
In Fig. III.14, four distinct cycles depicting the circular aspects of Myrdal's process can be identified. These are briefly outlined below:

i) On account of new wages, there will be incremental income in the hands of the local population and more local employment. This will exert significant influence on local opportunities in business and on the resources of the community. The consequent growth of opportunities in the local market promotes more service-oriented firms, shops etc., thus gives a boost to job creation in these sectors as well. This is known as a multiplier effect and enhances the income of the community for the provision of public infrastructure & community services. This is bound to increase the magnetism of the area to industrial entrepreneurs in the next phase. The optimism and the promise that oozes out of the process may be frustrated if the incremental income leaks out of the region — and, leakage takes place when the additional income is spent by the people outside the region or in buying products manufactured by industries outside the region thus denying the gain to local businesses. The multiplier process is known to realise its full potential in large cities as businesses must operate at thresholds which are profitable.

ii) Newly set up industry creates new jobs. These new jobs, over a period of time, strengthen the pool of trained / skilled labour who may be domiciled locally or brought in from non-local places. The community gains either way. As job turnover sets in, the numerical strength of available quality manpower increases. It can be
buttressed and sustained by the educational institutions and technical training institutes. In due course of time, it will crystallise as an important location factor for entrepreneurs in future.

iii) Development of allied ancillary industry is an expected outcome if a large company or a group of small companies in related activities are located in an area. These linkages can strengthen agglomeration tendencies depending on the type of industry.

iv) The network of ancillary industries leads to the development of external economies on account of the qualitative improvement in the general work environment. Accordingly, both localisation and urbanisation economies converge at that location.

v) Another cycle, not projected in Fig. III.14 is likely to surface after several successive periods. Relatively new inventions and innovations related to the principal industrial sector are bound to emerge. Depending on the mounting strength of the urbanisation economies, these may embrace other industries including new plant locations. (see Chapman & Walker, op.cit., 1991: p. 175).

3) The ceaseless growth and the strong survival instinct of large metropolitan areas attracted the notice of Pred, A.R. (1977: City Systems in Advanced Economies, pp. 173-82) in the context of Myrdal's formulation. The resilience of large metropolitan areas lies in their ability to adapt and adjust to changes in environment. Chapman & Walker (1991, op.cit., p. 179) assert that the strength of metropolitan areas "appears to be based on centrality within the information system of a country, bringing them early
news of both innovations and market opportunities". In the course of his incisive analysis, Pred (ibid) shows how modern day metropolises evolved from small trading centres and developed, over time, as strong manufacturing bases. Then onwards, they ascended the next step in the evolutionary ladder and acquired control over the crucial decision-making mechanism of the entire national economic landscape. The interlinkages and relationships encouraging growth in a mature and advanced national economic system comprised of a large metropolitan complex (M1) and other metropolitan complexes (M2..... Mn) have been illustrated in the flow chart shown in Fig. III.15.

Pred's treatise and the flow chart in Fig. III.15 convincingly establish that "the major centres were never just manufacturing cities but have tremendous importance in finance, trade, education and business services, the combination of which provides the wealth to supply a high level of cultural amenities, educational facilities, and attractive living conditions for those who can afford them. Frequently, especially in centralised countries such as France or Britain, the metropolitan city has massive political influence as well. Every kind of urbanisation economy has made these cities attractive to a succession of firms in new manufacturing business, where new entrepreneurs need support of the most diverse type. The extremely varied labour supply of a large city, as well as its rich and diversified market, add to its favourable location for business: (see Chapman & Walker, 1991, op. cit., p. 179) Again, the unique superiority "of metropolitan centres is the diversity of their
economies in both a sectoral and an organisational sense. Whilst specialization may offer important economic advantage to a region in the short term, the long term view suggests that diversification is necessary to ensure continuity of development as declining firms and sectors are replaced by more dynamic ones at earlier stages in their respective life cycles. (see Norcliffe, G.B. 1984: Industrial specialization versus industrial diversification).
Fig. III.15: The circular and cumulative feedback process for large metropolitan complexes in advanced economies.  Source: Pred. 1977
The preceding discussion centered on the profile of the present day mega-
metropolitan centres shows that their ceaseless growth is positively
attributable to an appropriate blend of Economic / Industrial infrastructure
and social infrastructure. *This blend was part of an evolutionary process
which witnessed their birth as a nascent Lilliputian trading centre and
facilitated their growth to the stature of a Bromdingnagian giant – sized
metropolis endowed with powerful social, economic and political antennae
and muscles. Their capacity to absorb and to adapt to changes in their
environment has also ensured their growth and survival so much so that
the sunset of one type of economic activity and the sunrise of another type
of economic activity takes place without any tremor whatsoever. It will
however be relevant here to highlight the vital role of innovation in the
development process which is best described by Friendman, J. (1972, A
general Theory of polarised development, p. 87) as under:

"The cumulative effect of successive innovations is to transform the
established structure of society by attracting creative or innovative
personalities into the enclaves of accelerated change; by
encouraging the formation of new values, attitudes and behaviour
traits consistent with the innovation; by formatting a social
environment favourable to innovative activity; and by bringing into
existence yet further innovation".
Thus, it is clear that the evolution of industries, whether geographically dispersed or concentrated, emergence of metropolitan centres, innovation, infrastructure (economic, financial and social), regional development and economic growth have strong and vibrant interrelationships. The significance of time, in the evolutionary context, should also not be lost on the Regional Scientist / Analyst engaged in the study of the development process of a region / nation.

III F.3 Special characteristics of a Regional Economy in the context of National Economy

In economic literature, all theories pertaining to economic development have evolved with the focus on the nation-state and the national economy. These do not per se apply mutatis mutandis to a regional economy as problems of economic growth in a regional setting are different from those which arise in a national setting. Primarily, a region is a completely open economy and has no defences against inflow / outflow of income / wealth across its borders to other regions of the nation-state. The inflow/outflow of the labour, capital and entrepreneurship and also that of commodities and services between regions of the nation-state have no legal barriers of the type which exist between one nation-state and another. The principal barrier to inter-regional flow is represented by distance which is a proxy for transport costs and psychic costs.

Secondarily, regional policy evolved for one specific region must, of necessity, consider all inter-regional effects prior to formulation and enunciation. In the ultimate analysis, regional growth plans must be dovetailed with the growth plan
for the nation as a whole. Thus, the degree of freedom of action or elbowroom is much less in the case of a region as compared to the nation-state of which the region is a part. However, the nation-state is not bound in any manner to take into account any extra-territorial consequences or fall-out of their policies and plans as inter-regional trade and international trade are governed by separate set of economic laws. Thirdly, the saving-investment ratio is of crucial importance to economic plans at the national level while the development of any specific region does not depend entirely or exclusively on internal or regional savings. The region / regions can have easy access to banking and other institutional channels to ensure saving – investment equilibrium in the region. The saving – investment equilibrium is also helped by the inducements to industrial entrepreneurs to invest in a region. The inducement to private investors can play its part unhindered because of the ease with which capital can flow across regional frontiers. (see Dr. Gupta, L.C., 1980: Dynamics of Regional Growth Process pp. 1-7).

III F.4 Growth Pole Theory and its variants in the context of Regional Growth and Planning

III F.4.1 Basic Concepts:

i) The Growth Pole Theory owes its origin to Pirroux, F. (1950) a French Economist. The Theory, as enunciated by Pirroux (ibid) is inductively derived on the basis of actual observations of the process of economic development. The Theory proclaims that the basic fact of spatial as well as, industrial development is that "development does not appear everywhere and all at once: it appears in points or development poles with
variable intensities; it spreads along diverse channels and has varying
terminal effects for the whole economy"). (see Hermansen T. (1973: p. 37)
Upon reflection, the seeds of the concept of Growth Pole Theory can be
traced back to the agglomeration factors of early Normative Location
Theories. The phrase 'Growth Poles' or 'Development Poles' (*poles de
croissance*) was chosen by Perroux (ibid) to draw attention to "a focus of
economic growth from which centrifugal forces emanate and to which
centripetal forces are attracted". (Perroux, 1950, p. 45). According to
Chapman & Walker (1991, op. cit., p. 230), Perroux did not look upon the
growth pole as a geographic location but rather a position in n-dimensional
*economic space*. It was a conscious attempt on the part of Perroux to
break away from the constraining geographical dimensions in the
expositions of Christaller and Losch in the context of the earlier German
work on Central Place Theory. It may be tautological to state that to
Perroux it was the economic space which mattered most and he looked
upon the economic space as a field of forces and the growth pole as a
vector or foci of economic forces. To set the record straight, Perroux did
acknowledge that growth poles would also exist in geographical space, but
did not develop the geographical dimension thereto. It was Boudeville,
J.R.C. (1966) who expanded Perroux’s theory to embrace the
geographical dimension in a comprehensive manner. Thus, to make things
more explicit, the expression *Growth Pole* may be taken to correspond
with the original concept of Perroux (ibid) without any specific geographical
dimension while the expression *Growth Centre* or *Growth Point* will
correspond to a spatial location. (see Menon, K.S.V., 1979: op. cit., p. 29).
The process of economic development was found to be essentially polarized by Perroux and he observed that it inescapably led to clusters of economic activity and growth. In Perroux’s original postulate, "a growth pole was a large and expanding firm or industry which could derive considerable economies of scale during the process of expansion and could influence the growth of a large number of other industries through its additional purchases of inputs and through its larger output which it could sell at a cheaper rate due to the economies of scale. Perroux and the French School of regional economics use the term pole and polarization in a way different from that used in English. Thus, while according to the meaning in English, there will normally be only two poles, in the French terminology, polarization implies a process by which several poles are created and enlarged". (see Dr. Godbole, M.D. 1978: op. cit. pp. 29-30).

This takes us to the exploration of the concepts of leading industry and polarisation and spread effects in the context of the Growth Pole Theory.

As defined by Perroux, the Growth poles are dominant and privileged points comprised of a group of leading industries (Industries Matrice) and propulsive firms which are dominated by the former. These industries or firms have identifiable attributes of rapid growth; relatively large size; high capital intensity; strong inter-industry linkages of the forward and the backward variety; high propensity to innovate and capacity to transmit growth impulses through the environment of the region in which they are located. When all these factors are taken into account in their totality, these generate according to Sadhak (1986, op. cit. p.24) a general climate of 'growth-mindedness in the region' thus shaking the region out of
industrial inertia. Chapman & Walker (1991, op.cit, p. 230) affirm that "Such (propulsive) firms or industries are characterised by rapid growth because they are involved in activities at an early stage in the product life cycle and by a tendency towards large scale, capital intensive production and organisational concentration. The propulsive industries or firms positively influence others which depend upon them for a high proportion of their inputs and / or outputs. This influence extends beyond direct and induced increases in production to include a change of 'atmosphere' which encourages further progress as economic and social changes set in motion (Myrdal's) sequence of circular and cumulative causation". Identical views have been expressed by Hansen, N.M. (1970: p. 140). As rapid growth is a characteristic feature of the leading industries (or propulsive firms), the rapid growth per se induces polarisation of other economic units into the Growth Pole thus conferring the benefits of agglomeration economies (internal & external economies of scale).

iii) The geographical polarisation will emerge as a concomitant of the induced economic polarisation just referred to with flow of resources to and concentration of economic activity at a limited number of centres within a region. The agglomeration economies will ensure their survival and prosperity long after the original raison detre of such locational choices ceases to exist. Allied to the concept of polarisation, is that of spread effects (of Myrdal's formulation). The phenomenon of spread effects will ensure that the dynamic propulsive qualities of the Growth Pole radiate outwards into the surrounding economic and geographic space. Such 'trickle down' or 'spread effects' have invested the Growth Pole theory with
special magnetism for the regional planner & brought popularity to the theory as a policy tool for regional growth and planning.

iv) In a later critique, Perroux, F (1961: L' economies de xxee Siecle. Paris: Presses Universities de France) observed that technological changes, over a period of time, create an inter-temporal sequence of sectoral foci or poles of economic growth. A survey of recent trends in economic history seemingly confirms that certain sectors of industry perform the lead role as 'propulsive engines of economic growth' in different regions and at different times. In this context, the Regional Analyst can recall that emergence of steam power, metallurgy, and textile technology along with all its innovations heralded the Industrial Revolution. Additional impetus in this regard is attributable to the emergence of the steel industry and the Railways in the mid-nineteenth century. The availability of electric power almost like a ubiquity further reinforced the industrial growth process coupled with advances in motor vehicle technology, synthetic materials and electronics. These were, in real life, the manifestations and concrete representations of Perrouxian poles of economic growth or sectoral foci. These sectors and their constituent firms demonstrated all the characteristics of leading industries and propulsive firms typified by their backward and forward linkages and capacity to register rapid growth and induce additional growth in allied sectors. "Such characteristics, according to Chapman and Walker (1991, op. cit, p. 146), are obviously desirable from a policy perspective and both national and regional development authorities seek to identify and to promote the prevailing and the next generation of high technology or sunrise industries". As highlighted earlier,
there is evidence of inter-temporal and inter-regional variations in the characterisation of an industry as a leading industry as typified by the fortunes of textile industry, rubber products, consumer durables etc. in a global perspective. (see Chenery, 1960, Rostow, 1960). In a historical setting, cotton textiles was the first 'early' leading industry to be set up followed by Rubber products in the 'middle' sector and consumer durables in the 'late' sector. This sequential order of leading industries ran its course initially in U.K. & U.S.A., and later, with the progress of industrialisation, through Italy, Sweden in 19th century and Brazil and S. Korea in twentieth century. (see Rostow, 1978, Beenstock, 1983).

Thus, a specific industry may be a leading industry in one region (or country) in a given time-period, yet at the same time, it may be in its sunset phase in another region or has vanished altogether therefrom. It can therefore be inferred that no leading industry may be in that role for ever in a given region because of the dynamic character of the underlying inter-relationships between innovation, technical change, spatial evolution of industries and economic growth. In view of the preceding considerations, no leading industry in any region of the world, in the context of the Growth Pole Theory, can take its principal role or status for granted.

III.F.4.2.(a) Concept of Industrial Complex & Regional Growth

The promotion of Industrial complexes for regional development purposes is closely allied to the concept of Growth Poles or Development Poles. Dr. Gupta, L.C. (1980, op. cit, p. 22) opines that "the geographic
agglomeration of the industrial complex is the result, basically, of complementarities and external economies. Factors other than natural resources also seem to play an important part in the formation of growth nodes or industrial complexes. In this context, the formulation of Hermansen T (1973, op. cit, pp. 26-27) is quite enlightening. He observes that "an industrial complex may be defined in a very wide sense – as an ensemble of technically and economically inter-connected industrial units usually located on a given territory. Such a complex is normally a planned one, based on physical infrastructure and developed around one major industry which forms the core or the focal point of the complex. The core often appears to be a heavy industry. The concept of industrial complexes is basically functional". We find a striking resemblance of views in the critique of Goyacheva, A (1981, p. 79) who made a specific study of Industrial complexes in India. He observes pithily that an industrial complex is a "chain of a functionally inter-connected industries". The production technique employed ensures the presence of all links in the chain of inter-connecting industries. The inter-connection of industries is noticeably characterised by the condition of optimality which ensures that all the industries in the complex can operate optimally in conjunction in the complex as compared to when these operate over a wide area. As the industries in the complex are functionally inter-connected, there is noteworthy similitude between flow of raw materials and delivery of goods amongst the industries comprised in the complex. Dr. Sadhak, H. (1986, op. cit, p. 26) believes that through the propulsive industry of the Perrouxian mould "is not an absolute necessity for functioning of an
industrial complex, economies of agglomeration and concentration is a must. Such an industrial complex is generally planned and has a well-developed industrial infrastructure. There will be key industries to generate the forces of dynamic growth in the industrial complex". However, Chapman & Walker (1991, op. cit, pp. 231-2) are credited with a diametrically opposite view about the centrality of a leading industry or a set of propulsive firms in an industrial complex. In their view it is essential that "these complexes should be focused upon sectors with the characteristics of Perroux's propulsive firms or industries, including rapid rates of growth in employment as well as extensive backward and forward linkages to serve as the channels for transmission of growth. The Petrochemical industry met these requirements during the 1960's when it was used as an instrument of regional development policy in several different countries". The Petrochemical industry established itself as a major industry in the U.S.A. in 1940's, in Western Europe, in 1950's, in Japan in early 1960's & Rest of the world in mid-sixties. The Governments of several developing countries like Brazil, Mexico, Taiwan, and Saudi Arabia have directly encouraged the creation of national Petrochemical industries complex and the growth of the industry acquired a special momentum of its own due to oil price shock of 1973 & 1979.

ii) Initial stimulus for the entrepreneurial interest in the petrochemical industrial complex was provided by the writings of Isard et al (1959) who, on the basis of comparative cost analysis, made out a convincing case for the location of a fully integrated oil-based industrial complex on the Caribbean island of Puerto Rico. The active involvement of the
Government of Puerto Rico during the 1960's was founded on the well-informed presumption that the high capital intensity of the project will generate large scale labour intensive projects downstream, namely, plastics fabrication and synthetic textiles as had happened in other lands/regions. But, the entire project folded up by mid-1970's on account of the spectacular failures at the downstream end. The collapse of the basic operations was partly due to circumstances peculiar to Puerto Rico (see Chapman, 1982). Similarly, as noted earlier, in Chapter II, the regional policy failed to achieve the expected results in Italian Mezzogiorno and as Rodgers (1979, pp. 125-126) records that "there was virtually no spin-off or multiplier effect such as small or medium - sized establishments that were linked to the basic industries". These illustrations merely serve to highlight that the mere existence of technical linkages does not on its own lead to allied investment in related manufacturing industries. The availability of technical linkages is a necessary but not a sufficient condition for the emergence and operation of multiplier effect of the propulsive industries. Chapman & Walker (ibid), in this context, have opined that "industrial linkages are maintained over considerable distances in economies with efficient transportation systems. Furthermore, the location requirements of upstream and downstream operations in a processing chain may be very different. In the case of petro-chemicals, the basic activities are drawn to their sources of raw material (natural gas supplies and oil refineries), but the plastics and textile industries which depend upon petrochemical products tend to be associated with market locations and sources of cheap labour respectively. The fact that these
activities are usually carried out by different companies from those responsible for oil refining and basic petrochemical production also makes it more difficult to encourage their concentration within a single complex. However, Puerto Rican experience should not blind us to the fact that petrochemical industry has been a major industry since 1940's both in an inter-temporal and inter-regional perspective and this places it in a unique category as a major industry. As regards Italian Mezzogiorno, the investigations made by Holland (1971) indicate that "much greater levels of State Control over the location and structure of firms is necessary to ensure that the multiplier effect of propulsive industries is retained at the regional scale".

iii) Nearer home, in India, the scenario in this regard has been none too rosy. The NCDBA (1981, op. cit, para 6.5, p. 62), while appreciating the fact that in the case of public sector units, much of the investment had flowed to backward areas, the committee noted "that the multiplier effect from these large projects in backward areas have been very limited mainly because government directives on anciliarisation do not seem to have been pursued with any degree of vigour". The following observation in India's Draft Five Year Plan (1978-83 p. 111) also succinctly describes the situation:

"Our experience with large industrial projects in backward areas showed that their spread effects are low and the surrounding areas continue to remain poor and undeveloped. In fact such development by creating a dualistic-economic structure may pose more problems than it solves. These arguments are applicable not
merely to large public sector projects but also to modern private sector industry”.

Taking an objective view, we are inclined to highlight the fact that the setting up and successful operation of large industrial projects involving huge Central outlays and locating them in backward regions in 1950’s were in themselves real life stories of success representing triumph of both political will and egalitarian ideology despite heavy odds like resource constraints, lack of technical know-how, lack of trained man-power etc: Further, these large industrial projects, which were noticed by us during the course of this study in Chapter I (para I.D.6.3), had to be set up in public sector as no private entrepreneur had the will or the financial muscle to invest in such projects involving large outlays and long gestation periods. With deep emotional fervour, Jawaharlal Nehru, the first Prime Minister, described these projects as “temples of humanity”. Yet, the almost uniform failure of these projects to integrate themselves with the economy of their respective host regions and their poor spread effects is indeed noticeable and well documented. In this context, a representative of the Ministry of Industry, Government of India, during his testimony before the Estimates Committee of Parliament (1974, p. 32) admitted to lack of success on this front and stated as under:

“It is a fact that despite large central investment, the industrial development of some of the states had not taken place. It appears to be a fact that the type of industries which have been taken up in the central sector have necessarily been of the kind which did not
have the forward and backward linkages, like steel or coal or some of the heavy fertilizer (projects) etc."

In this milieu, Dr. Godbole, M.D. (1978, op. cit, p. 31) wonders aloud that it is possible that "some of the backward areas in which these major projects were located would have remained backward or would even have deteriorated in the absence of these projects". He goes on to add that "the original expectations of the projects leading to speedy development of these areas have not come true. Some of the large projects have remained islands in the midst of large backward areas. This has partly been due to inadequate advance planning for such industrial complexes, lack of minimum infrastructure, non-availability of skilled manpower etc. If these requirements are fulfilled and proper types of propulsive industries chosen, the industrial complex may prove to be an important tool for greater regional balance in industrial and economic growth". During 1969-70, a study on Regional Development Planning in India was sponsored by U.N. Research Institute for Social Development. Misra et al (1974, p. 192) who carried out the study made the following observations:

"In resource – rich, well populated, but socially and economically backward regions, the growth pole policy has not been a success. There are several examples of this in India. Vishakhapatnam port, with a shipyard at the core, and Rourkela and Bhilai, with modern steel plants as cores, were planned in economically and socially backward regions, in the hope that they would form nuclei around which regional development could be triggered off. The impact of these projects on the regional economy has, however, not been
spectacular and the so-called "leading industry" has in each case failed to generate development impulses in the hinterland. Just ten kilometers away from these projects, people lead the same traditional lives as they always have.

Similarly, a research study on Jamshedpur carried out by Datta-Maya (1977, p. 27) contains the following observations about the surrounding area 10-20 years after the city’s birth:

"Beyond four miles of the works, life had little changed except for cutting the forests and supplying fuel to the town".

In this context, it deserves to be recalled that the steel complex of Jamshedpur was implanted 95 years ago in 1908 in a most backward tribal region of India’s most backward state (see Schwartzberg, 1969: pp. 110-116). The steel complex and the New Township of Jamshedpur started attracting the attention of new small scale and medium scale industrial promoters from 1919 onwards and this phase went on till 1929. (see Datta Maya 1977, op. cit, pp. 18-21 cited by Dr. Gupta, L.C., 1980, op. cit, p. 39) Thus, there was a long time lag between the commencement of the Jamshedpur steel city complex and the development of complementarities and the evolution of external economies at Jamshedpur. This is despite the fact that the steel complex, being in private sector, was free to take requisite entrepreneurial initiatives of the right variety unencumbered by the shackles of an interventionist State.

iv) The foregoing discussion pertaining to industrial complexes, both on an inter-temporal and inter-regional basis, indicates that the last word has not yet been said yet in this regard. In India, we are still in the learning curve
phase. But, this much is clear that a lot depends on the choice of the large or leading industry or the nucleus plant, its potential for anciliarisation; the degree of functional interconnections between the large industry etc. and the ancillary units; the potential for forward and backward linkages with local industry and as well as the agricultural hinterland of the host region; and, the comprehensive planning for amenities along with the creation of appropriate social infrastructure at the site of plant location. In short, instead of 'stand alone, industrial complexes', we should plan for industrial townships in the identified backward regions with the larger goal of distributive justice, harmonious Industrial dispersal and confluence of primary, secondary and tertiary activities in the chosen backward regions.

III.F.4.2.(b) Concept of Growth centres and Regional Policy

i) In the opening para of this chapter, we have examined the conceptual difference between a Growth Pole and a Growth Centre and it was elucidated therein that a Growth Centre or a growth point is a growth pole with a geographical dimension or a spatial location. The expressions Growth pole and Development pole are used interchangeably in the literature pertaining to Regional Economics. Internationally, the development pole theory (Growth Pole Theory) has of late attracted considerable notice as it is believed that the theory can be effectively operationalised in diverse economic and socio-political systems. Its uniqueness lies in ensuring focused attention on industrial growth in certain high potential areas or industries and this aspect has considerable relevance in developing economies with their well-known constraints.
regarding availability of capital, trained man-power, technical know-how, administrative and managerial skills and the like (see Dr. Godbole, M.D. 1978: op. cit, p. 30). Thus, in terms, Growth Centre Concept aims at minimisation of the cost of regional development in a given time frame. Sadhak, H.K. (1986, op. cit, p. 25) seeks to highlight this aspect with his following significant observations:

"Growth centre theory stresses the importance of concentration of resources to certain key locations rather than dispersing the same to all the other regions. The places having potentiality of secondary and tertiary sectors are chosen as growth centres for concentrated developmental efforts and generation of growth impulse in those centres which will be transmitted to neighbouring regions. Usually the towns of reasonable size of population with minimum necessary infrastructure having small degree of industrialisation are selected as growth centres"....

He further elaborates that

"this growth centre concept is akin to Lloyd Rodwin's "concept of concentrated decentralisation". This theory propounds the view that "urban industrial growth will be diffused to the backward regions of a developing country through concentration of infrastructure and productive investment in selected points or sub-regions. Therefore one of the basic conditions of the growth centre concept is that the growth points, centres and poles should be developed simultaneously to form a balanced centre of hierarchy. The growth centre is considered to be a powerful tool of development of
backward regions and an easy instrument at the hands of the Government to remove the disparity between developed and backward regions”.

In a similar vein, in this context, Chapman & Walker (1991, op. cit, pp. 232-233) strongly advocate the view that the "Growth-centre policies, which seek to provide an efficient organisation of public infrastructure, are yet another approach to regional development. They have generally been more successful than policies focused upon investment in regional industrial complexes”.

They have however chosen to caution that "growth-centre policies are not without problems. The benefits tend to be focused upon the chosen centre and its immediate hinterland. Moseley (1974) suggests that there is little evidence of spread effects around growth centres and that the multiplier mechanism tends to reinforce their dominance by attracting labour and capital from their surrounding regions, a process which inevitably creates political tensions. This is not necessarily a bad thing, however it can be argued that concentration upon the best location is essential to maximise total regional income”. The essential merit of Growth Pole Theory / Growth Centre Theory in the context of regional planning has now been universally recognised as a policy tool as it seeks to maximise regional income and regional growth at minimal costs in a given time-span. Sadhak (1986, op. cit, p. 23) is indeed euphoric about the Growth Centre approach “due to its emphasis on the concentrated development in limited centres due to limitation of disposable resources at the hands of public authority.
Since Regional Policy heavily depends on the incentives and subsidy, resources can be diverted to a limited space at a time and optimal allocation of resources can be done by creating growth points/growth centres..... In fact this doctrine has become most fashionable tool in the hands of planners and policy-makers in under-developed countries". Reinforcing the preceding strands of thought, Menon, K.S.V. (1979; op. cit, pp. 34-36) observes as under:

"The value of the growth pole theory as a policy tool in regional planning has been realised for some time. The theory is particularly convincing as a policy tool for several reasons:

a) Owing to various agglomeration economies, it tends to be a very efficient way of generating development.

b) The concentration of investment in specific growth points costs less in terms of public expenditure than wholesale grants to large areas.

c) The spread effects out of the growth will help to solve the problem of depressed regions".

In his incisive analysis, Menon (ibid) has sought to distinguish between the end use of a Growth pole policy vis-a-vis a growth centre policy. The principal difference between the two, according to Menon (ibid) is that "the (Growth) pole policy necessitates the development of a selected industrial focus comprising propulsive firms from leading industries, the intention being to foster localisation economies. On the other hand, the (Growth) centre policy does not involve the selection of related industries, but rather
entails the concentration of investment in the provision in a chosen location of those facilities which will create urbanised economies that are attractive to industry. As industry must be localised, a growth pole policy will inevitably result in a growth centre and the resultant urbanisation economies. However, this may not necessarily be true in reverse, for, a growth centre policy may not lead to the development of a growth pole of linked industries”.

III.F.4.3 Growth Centres Policy in India & NCDBA Report

A) On 30.11.1978, the Planning Commission, Government of India set up the National Committee on the Development of Backward Areas (NCDBA). The committee was set up primarily to review the working of various policies and programmes in regard to the development of Backward Areas since the Fourth Five Year Plan (1969-74). The NCDBA was assigned the task of setting out a suitable strategy or strategies for the development of backward areas in the context of priorities and objectives set out in the draft 1978-83 plan. The committee was headed by Shri B. Sivaraman, then Member, Planning Commission. In their Report on Industrial Dispersal dated 25.10.1980, they strongly recommended the adoption of Growth centres policy for development of industrially backward regions. During the course of their report, they made the following observations:

a) A certain degree of concentration is inevitable in the location of industrial activity. The tendency of industrial units to congregate at certain centres arises on account of several reasons. Firstly, industry needs infrastructural facilities which are not evenly
distributed and are often concentrated at some nodes. Secondly, there are linkages between industries with the output of one being the input of the other. In many cases, the incidence of transport costs is such that such linked industries tend to be located near one another. Thirdly, there are certain advantages of agglomeration which could arise because the presence of a large number of units at one centre stimulates the growth of repair and maintenance services and trading network or because the larger the number of units the greater the pool of floating labour making it easier to cope with absenteeism. (para 6.1)

b) Left to itself, industry goes to urban areas because of the availability of infrastructure and ready demand for products. From this a process of agglomeration starts and more industries migrate to the same areas. Public policy cannot ignore these advantages of agglomerations and any attempt to distribute large and medium industry, at any rate, throughout the country in small lots is bound to fail. Hence the aim of policy must be to develop viable industrial growth centres in backward regions. (para 6.2)

c) The creation of viable growth centres in backward area requires that the forces of agglomeration which attract industries have to be created in these areas. The validity of the growth centre concept arises mainly from the fact that the industry needs infrastructure and support facilities, that there are economies of scale in providing these facilities and hence that some degree of congregation of industrial units at one point is desirable. The advantages of a
growth centre approach are particularly strong in the development of small and medium industries. Very large centres generate such massive demands for infrastructure that in fact they require captive facilities. At the other extreme village and cottage industries are highly dispersed and the possibility of congregating at one centre is limited. (para 6.3)

d) The natural tendency of industries to congregate together at certain location implies that there is an intimate link between industrialisation and urbanisation .... The Intimate link between industrialisation and urbanisation has to be reflected in policy design. One consequence of this link is that industrial promotion has to be based to a large extent on the growth centre approach. Another implication is that planning for industrialisation and urbanisation have to go together. In fact, a programme to disperse industries to new centres, the programme to develop medium sized town and the objective of controlling metropolitan congestion are complementary to each other. (para 6.9)

e) The industrial dispersal policy for medium and large industries has to be such that the policy leads to location of industries at points away from the present agglomerations so that the dispersal process can start outwards from the existing agglomerations. The policy has also to be such that due weightage is given to locations in the states which are industrially backward. The preference of the entrepreneurs for location with minimum facilities shows that the location has to be in a fairly large urban centre and industries must
be allowed to congregate in a location. What is wanted, therefore is a growth centre approach and not an area development approach. With a growth centre approach, there is a definite concentration of effort on selected centres whereas with an area development approach the effort is necessarily more wide spread. The policy should encourage the location of industry in suitable growth centres with due weightage for such growth centres which are industrially backward. (para 7.6)

f) The key principle underlying the policy package has to be that of concentration of effort for the rapid development of the selected centres. The provision of infrastructure, the promotional efforts of the State Governments, and of the Central Government must be directed strongly at the selected centres to avoid diffusion of effort. (para 7.17)

g) A certain level of infrastructure development is a pre-condition for economic and industrial development in any area. As far as industrialisation is concerned, the major items are power supply, access to regional and national transport networks, telecommunications, industrial estates, housing and urban infrastructure. In general, investment in these lines tends to follow rather than lead it, an approach which to some extent is unavoidable in a situation of overall shortage. However, such an approach may tend to discriminate against the new centres. In these areas, investments in infrastructure may have to precede demand since the base level of infrastructure is so low that, in the
absence of such an approach, industry may not be prepared to shift to these areas at all. The problems faced vary for different types of infrastructure. (para 7.20)

h) As regards central incentives and subsidies e.g. Central Investment Subsidy, Concessional Finance, Income Tax Concession etc. the NCDBA has recommended their continuance with the proviso that it is applicable only to areas which are not near existing industrial centres in order to bring the Central Incentives & Subsidies in alignment with the policy of industrial dispersal. They have further recommended that the geographical coverage of Central Investment subsidy scheme and concessional finance must converge. Similarly, they have recommended the continuance of State Government incentives with the proviso that both sets of incentives must be in alignment with the policy of industrial dispersal to backward regions. Even the location of the Growth Centres proposed by them must be in consonance with the objectives of the policy of industrial dispersal. (paras 7.9 – 7.17 and paras 7.31 to 7.39)

B) A look at the preceding paras will indicate that the central principle underlying the strategy evolved by NCDBA is that incentives for industrial dispersal should be given in a manner which persuades industries to move away a sufficient distance from existing centres into remoter areas. Simultaneously, the committee was convinced that the new centres which have to be developed away from existing centres must be of sufficient size so as to attract economies of
Hence, the committee has combined the dispersal approach with a growth centre approach. The salient features of the specific recommendations of the NCDBA for operationalizing the strategy are given below:

a) The cut-off criterion for the selection of centres for the development of medium and large industry would be that they should have a population of at least 50,000 and that they should be situated at a minimum distance from an existing industrial centre. For this purpose, "existing industrial centres" should be all town / urban agglomerations with an employment in non-household manufacturing of over 10,000. The minimum distance should be

150 kms for centres with an employment of 150,000;
100 kms. for centres with an employment of 50,000 to 150,000;
75 kms. for centres with an employment of 25,000 to 50,000;
and, 50 kms. for centres with an employment of 10,000 to 25,000.

b) 100 such centres should be selected out of all eligible towns for development in the Sixth Plan.

c) Each growth centre should be managed by an industrial development authority which would have the charter to develop and provide the necessary infrastructural support as well as to mobilise funds from institutions like IDBI, HUDCO etc.

d) For institutions like IDBI, HUDCO etc: to play an effective role, it would be desirable that appropriate financial support to these institutions is assured during the plan period.

e) State Governments should undertake to provide the requisite infrastructural facilities at the selected locations and to orient their own
promotional efforts in the same direction. Urban development programmes may be used in these centres on a priority basis.

f) The schemes of central capital subsidy, concessional finance and income tax concessions may continue for all small industries located outside the cut-off areas specified by NCDBA whether located in a growth centre or not. The infrastructural support recommended by the committee for each growth centre will not be available for industries which may come up outside such growth centres.

C) As indicated in the preceding para, the NCDBA strongly recommended an optimal mix of dispersal approach and growth centre approach for industrialisation of backward regions and removal of disparities between the backward and developed regions of India. After a long lapse of eight years, the Government of India, accepted in principle, the recommendations of the NCDBA about the development and setting up of Growth centres in India. A press note was issued by the Department of Industrial Development, Ministry of Industry, Government of India in June, 1988 and the same is shown as Appendix XVI. The details of the scheme were finalised in December, 1988 and communicated by the Central Government to Government of all States / U.T.'s accordingly and the contents of the communication are reproduced in Appendix XVII. The prominent features of the Growth Centre Scheme as approved by the Government of India are given below:

i) For the promotion of Industrialisation of backward areas in an effective manner, the focus would hence forth be on the development of growth centres that would act as the magnet for attracting industries to backward
areas. Such growth centres would be endowed with infrastructural facilities on par with the best available in the country, particularly in respect of power, water, telecommunications and banking.

ii) To start with 100 such growth centres will be set up in a span of about five years at an estimated cost of Rs. 25-30 crores per Growth Centre. Thus, an investment of the order of Rs. 2500-3000 crores is planned over a period of five years in backward areas with the ultimate objective of developing one growth centre in each of the 430-odd districts in the country. Most of the backward areas will be covered by the scheme in 10 to 15 years after the setting up of the first lot of 100 growth centres.

iii) The development of growth centres is in addition to the existing backward areas scheme and is not by way of substitution thereof.

iv) All existing fiscal and financial incentives will continue in centrally declared backward areas and the same will also be available to the industrial units set up in the growth centres.

v) In the first phase in 1988, 61 growth centres were taken up for allocation amongst various states and U.T.'s as shown in Table III.2. The number of growth centres has since risen to 71 and their overall distribution pattern is as shown in Table III.3.

vi) Growth centres shall not be located within 50 kms. from the boundary of the 7 cities of Calcutta, Bombay, Delhi, Madras, Bangalore, Ahmedabad & Hyderabad with a population above 25 lakhs; 30 Kms.
**Table III.2 : Allocation of Growth Centres to States / U.T.'s**

(1990-91 to 1994-95)

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>State/U.T.</th>
<th>Total No. of Growth Centres allocated in the initial year 1990-91</th>
<th>Total No. of Growth Centres allocated till 1994-95</th>
<th>Increase w.r.t. initial year</th>
<th>Total Expenditure incurred Rs. (lakhs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Andhra Pradesh</td>
<td>4</td>
<td>4</td>
<td>0</td>
<td>707</td>
</tr>
<tr>
<td>2.</td>
<td>Assam</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>Nil</td>
</tr>
<tr>
<td>3.</td>
<td>Bihar</td>
<td>5</td>
<td>6</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>4.</td>
<td>Gujarat</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>3365</td>
</tr>
<tr>
<td>5.</td>
<td>Haryana</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>1138</td>
</tr>
<tr>
<td>6.</td>
<td>Himachal Pradesh</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>Nil</td>
</tr>
<tr>
<td>7.</td>
<td>Jammu &amp; Kashmir</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>201</td>
</tr>
<tr>
<td>8.</td>
<td>Karnataka</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>1642</td>
</tr>
<tr>
<td>9.</td>
<td>Kerala</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>726</td>
</tr>
<tr>
<td>10.</td>
<td>Madhya Pradesh</td>
<td>5</td>
<td>6</td>
<td>1</td>
<td>5282</td>
</tr>
<tr>
<td>11.</td>
<td>Maharashtra</td>
<td>4</td>
<td>5</td>
<td>1</td>
<td>774</td>
</tr>
<tr>
<td>12.</td>
<td>Orissa</td>
<td>3</td>
<td>4</td>
<td>1</td>
<td>Nil</td>
</tr>
<tr>
<td>13.</td>
<td>Punjab</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>2260</td>
</tr>
<tr>
<td>14.</td>
<td>Rajasthan</td>
<td>4</td>
<td>5</td>
<td>1</td>
<td>745</td>
</tr>
<tr>
<td>15.</td>
<td>Tamil Nadu</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>1884</td>
</tr>
<tr>
<td>16.</td>
<td>Uttar Pradesh</td>
<td>6</td>
<td>8</td>
<td>2</td>
<td>2187</td>
</tr>
<tr>
<td>17.</td>
<td>West Bengal</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>Nil</td>
</tr>
<tr>
<td>18.</td>
<td>Arunachal Pradesh</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>Nil</td>
</tr>
<tr>
<td>19.</td>
<td>Goa</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>312</td>
</tr>
<tr>
<td>20.</td>
<td>Manipur</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>Nil</td>
</tr>
<tr>
<td>21.</td>
<td>Maghalaya</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>Nil</td>
</tr>
<tr>
<td>22.</td>
<td>Mizoram</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>Nil</td>
</tr>
<tr>
<td>23.</td>
<td>Nagaland</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>Nil</td>
</tr>
<tr>
<td>24.</td>
<td>Pondicherry</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>Nil</td>
</tr>
<tr>
<td>25.</td>
<td>Tripura</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>Nil</td>
</tr>
<tr>
<td>26.</td>
<td>Sikkim</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>Nil</td>
</tr>
</tbody>
</table>

Grand Total: 61, 71, 10, 212.27 Crores

Note: Project Reports in the cases of 30 Growth centres are still awaited / under approval.

Source: Ministry of Industry (Govt. of India) Department of Industrial Development, Annual Reports (1990-91 to 1995-96).
Table III.3: Per Capita Value Added in Factory Sector in major States in the Initial Year (1990-91) of commencement of Growth Centre Schemes

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>State/U.T.</th>
<th>Per capita Value Added</th>
<th>No. of Growth Centres Allocated</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Andhra Pradesh</td>
<td>448.28</td>
<td>4</td>
</tr>
<tr>
<td>2.</td>
<td>Assam</td>
<td>327.30</td>
<td>2</td>
</tr>
<tr>
<td>3.</td>
<td>Bihar</td>
<td>300.82</td>
<td>5</td>
</tr>
<tr>
<td>4.</td>
<td>Gujarat</td>
<td>1081.65</td>
<td>2</td>
</tr>
<tr>
<td>5.</td>
<td>Haryana</td>
<td>993.81</td>
<td>2</td>
</tr>
<tr>
<td>6.</td>
<td>Himachal Pradesh</td>
<td>730.13</td>
<td>1</td>
</tr>
<tr>
<td>7.</td>
<td>Jammu &amp; Kashmir</td>
<td>98.80</td>
<td>2</td>
</tr>
<tr>
<td>8.</td>
<td>Karnataka</td>
<td>615.68</td>
<td>3</td>
</tr>
<tr>
<td>9.</td>
<td>Kerala</td>
<td>419.98</td>
<td>2</td>
</tr>
<tr>
<td>10.</td>
<td>Madhya Pradesh</td>
<td>646.31</td>
<td>5</td>
</tr>
<tr>
<td>11.</td>
<td>Maharashtra</td>
<td>1520.64</td>
<td>4</td>
</tr>
<tr>
<td>12.</td>
<td>Orissa</td>
<td>364.09</td>
<td>3</td>
</tr>
<tr>
<td>13.</td>
<td>Punjab</td>
<td>915.73</td>
<td>2</td>
</tr>
<tr>
<td>14.</td>
<td>Rajasthan</td>
<td>353.50</td>
<td>4</td>
</tr>
<tr>
<td>15.</td>
<td>Tamil Nadu</td>
<td>1037.05</td>
<td>3</td>
</tr>
<tr>
<td>16.</td>
<td>Uttar Pradesh</td>
<td>332.45</td>
<td>6</td>
</tr>
<tr>
<td>17.</td>
<td>West Bengal</td>
<td>469.82</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td><strong>Grand Total for 17 States</strong></td>
<td><strong>53</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>All India Rs.</td>
<td>608.70</td>
<td>61</td>
</tr>
</tbody>
</table>

Source: Govt. of India, Annual Survey of Industries, Factory Sector, (1990-91)

Note: Taking the value added per capita in 1990-91 as a criterion, the States which lie above the national average are Gujarat, Haryana, Himachal Pradesh, Karnataka, Maharashtra, Punjab & Tamilnadu. If these states are considered more developed, the distribution of eligible centres works out as follows:

**Industrially Developed states** .................. 17

**Industrially Backward states** .................. 36

This gives a ratio of 1:2.11 between the Developed and Backward major states in the allocation of Growth Centres. It is in close proximity to the ratio of 30:70 or 1:2.33 recommended by NCDBA (1980, para 7.15, p. 36).
from the boundary of the 2 cities of Pune and Kanpur with a population of above 15 Lakhs and below 25 Lakhs; and 15 Kms. from the boundary of 12 cities (with a population range of 7.5 Lakhs & 15 Lakhs), namely, Nagpur, Jaipur, Lucknow, Coimbatore, Patna, Surat, Madurai, Indore, Varansai, Jabalpur, Agra & Vadodra (These population ranges are on the basis of 1981 census).

vii) The Growth centres must have access to the following infrastructural facilities:

- Proximity to Railheads, National or State Highways.
- Proximity to adequate and dependable source of water supply.
- Proximity to adequate and dependable source of power.
- Access to telecom facilities.
- Availability of reasonable educational and health facilities.
- Availability of sufficient land for development of housing facilities and for promotion of tertiary activities.

viii) The Growth Centre should be selected on the consideration that its sphere of influence would cover a radius of about 20-25 kms; and the Growth Centre should not be located in an ecologically sensitive area:

ix) Each Growth Centre shall acquire 400 to 800 hectares of land for infrastructure development and for allocation mainly to small and medium sized units. Apart from the cost of land and its development, the other items that will be eligible for financing under this scheme will be construction of access roads; provision of water supply; Effluent disposal system; upgradation of existing schools, colleges, I.T.I.'s, hospitals,
dispensaries etc; upgradation of housing stock; provision of telecom facilities; distribution network for power within the Growth Centre.

30% to 40% of the funds for each Growth Centre shall be furnished by the Central Government and the balance will be contributed by the State Government, Financial Institutions and market borrowings.

III F.4.3.1 Growth Centres Policy in India: Pace of Implementation
The implementation of the scheme commenced in the year 1990-91. It was projected that 100 growth centres will be set up in the next 5 years and an expenditure of 25-30 crores for each Growth centre was anticipated and thus an expenditure of Rs. 3000 crores for 100 Growth Centres over a period of five years was anticipated. As shown in Tables III.2 and III.3, a total of 212.27 crores of expenditure has been incurred in connection with identification, project reports, cost of works etc. for 71 growth centres over a period of 5 years from 1990-91. It amounts to an average annual expenditure of 42.454 crores against the projected annual average expenditure of Rs. 600 crores. At the present pace, given zero inflation rate, it will take a total of 70 years in all to set up 100 fully functional Growth Centres in the country. Project report in the case of 30 growth centres are still awaited or under approval. Thus, the first phase of setting up 100 Growth Centres will be completed only by the year 2060. By the Government’s own standards, the pace of implementation is excruciatingly slow specially when the significance of time factor in the context of Regional Development is well known. In this setting, Brahma et al (1975; op cit, p. 23) draw pointed attention to this aspect of Regional Development. In their view,
"It is equally pertinent to realize the fact that if the objective of national planning is to lift the per capita income of the poorest region to a specified level of adequacy within a specified period, howsoever long or short, even the money cost of attaining this objective is higher, the more unequal is the distribution of economic activity in between the various regions of the economy. In other words, the total investment effort needed for eradication of absolute poverty will be higher if inter-regional disparities in per capita income are larger, and lower if the inter-regional disparities in per capita income are smaller".

With the help of an arithmetical example, they have sought to illustrate the foregoing assertion. For this purpose, they adopted a single indicator of economic development, namely, per capita income. And, they made the following assumptions:

i) equal and stationary population equal to 20 lakhs in each region

ii) total initial GNP of Rs. 100 crores distributed over 10 such regions.

In this scenario, they have presented the relevant calculations in a tabular format as shown in Table III.4.
Table III.4: Annual Geometric rate of Growth required for raising per capita income of poorest region to a given level of adequacy.

<table>
<thead>
<tr>
<th>Share of the poorest region (%)</th>
<th>Current per capita Income in the poorest region (Rs.)</th>
<th>Level of Adequacy (Rs.)</th>
<th>Availabilities needed to lift per capita income of the poorest region to the level of adequacy</th>
<th>Annual Geometric rate of growth in GNP needed to achieve the objective in 25 yrs. (percent)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5</td>
<td>200</td>
<td>4000</td>
<td>2000</td>
</tr>
<tr>
<td>2</td>
<td>10</td>
<td>200</td>
<td>2000</td>
<td>1000</td>
</tr>
<tr>
<td>5</td>
<td>25</td>
<td>200</td>
<td>800</td>
<td>400</td>
</tr>
<tr>
<td>10</td>
<td>50</td>
<td>200</td>
<td>400</td>
<td>200</td>
</tr>
</tbody>
</table>

The above Table III.4 indicates the effort in terms of growth in the GNP necessary to bring the per capita income in the poorest region to a specified level of adequacy at Rs. 200 at different shares of the poorest region in the GNP. The last column shows the requisite annual geometric rate of growth in GNP if the objective is to be attained within a period of twenty-five years. The Table confirms the conclusions arrived at by Brahma et al (ibid) and indicates that the delay in the setting up of the Growth centres can prove highly costly in terms of the investment effort required as well as slow pace of industrialization of backward regions with all its attendant consequences.
III. F.5 Relevance of Social Infrastructure in Area Growth & Regional Policy

i) The motivational role of social infrastructure in Plant location, consequently industrialisation and regional planning, did not receive the kind of weightage it deserved in India. The school of thought led by Dr. Gupta, L.C. (1980; op. cit, p. 93) advocates the view that "the relative attractiveness of an area from the viewpoint of social amenities plays as important a role as economic factors in the development of the area. The provision of adequate social amenities in the form of housing, medical, educational, recreational and other facilities can make an area attractive for industrial location relative to other areas". It deserves "to be explicitly recognised that social amenities are vital factors in the competition of areas for new industries and that it is not sufficient to rely on financial incentives to bring areas to the threshold of spontaneous economic growth. The social infrastructure has to be up to the level appropriate for the industries and employee group to be situated in the area". [see Dr. Gupta, L.C. (1980: op. cit, p. 27)].

ii) Even, the documents pertaining to the Five Year Plans, in so far as these relate to "Development of Backward Areas" are dominated almost exclusively by a discussion of financial incentives for location of industrial projects in backward areas and show no awareness whatsoever of the need for better amenities planning as a part of the strategy for attracting industrial entrepreneurs and investments to such areas. And, the Financial Institutions also exclusively rely on a set of financial incentives and / or identification of appropriate industries; preparation of project profiles; conduct of techno-economic surveys etc. to the
utter neglect of social infrastructure. An OECD report, authored by Klassen, L.H. (1968, p. 15), emphasises the valuable contribution of social infrastructure in the location choices of industrial entrepreneurs and it affirmatively points out that an industrialist seeking a site for his plant will "not only evaluate the area in terms of purely economic factors, but also from the point of view of its endowment of such general amenities as good housing, education, shopping and entertainment facilities. The area competes with others..... as much on these terms as in purely economic characteristics". The National Council of Applied Economic Research (NCAER) in their study report on Industrial Programmes for Fourth Plan for Bihar (1967: Chap. 3-5, New Delhi) have strongly stressed that "improved amenities and social infrastructures have a positive effect on economic growth". In the same vein, Dr. Gupta, L.C. (1980: op. cit, p. 25) argues that "higher expenditure on some of the social infrastructure items, such as the health and the personal well-being and the knowledge and skills of human resources is an economically profitable investment for a nation and an area". In this context, in the international setting, the positive example of South Korea comes to the fore. Economic Development of South Korea, a state created in 1945, has been marked by a high degree of State intervention. Chapman and Walker (1991 : op. cit, pp 211-215) have hailed South Korea as a successful case of a Newly Industrialised Country (NIC). They have made the following observations:

"The broad policy framework has been set within the context of a series of five year economic development plans, starting in 1962. These plans not only set growth targets, but also established investment priorities for the successive planning periods. These priorities changed through time as
attention was focused on different manufacturing sectors. Nevertheless, heavy public investment in infrastructure, broadly defined to include utilities, transport facilities, education and housing, was a common element of all plans from the first beginning in 1962 to the fifth ending in 1986. Indeed, the proportion of total investment directed to these purposes was between 58 and 68 percent throughout the 25 year duration of the first five plans.

In the Korean case, stress on improving the quality of education was also noticed by Enos and Park (1988) in their study on Korea. Entities like Samsung and Hyundai are global corporations of Korean origin and they have actually succeeded in "reversing the traditional flow of investment between the developed and the developing world" by setting up their own production bases in countries such as U.S.A. and Canada (see Chapman & Walker, 1991: op. cit, p. 215)

iii) The Korean case is of relevance to India on account of the common factor of planned economic development. Korean industrialisation is founded on economic infrastructure and social infrastructure. However, the Growth centres policy for industrialisation of backward regions as now adopted by India does, to some extent, address the concerns pertaining to social infrastructure as set out in para III. F. 4 of this study. Thus, in a sense, in 1988, the social infrastructure as an input to industrialisation won due recognition in the context of a regional policy for India\textsuperscript{22}. 
### END NOTES TO CHAPTER III

<table>
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<tr>
<th>S. No.</th>
<th>Notes</th>
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22. Relevance of infrastructure in the context of industrial growth has been repeatedly emphasized in Chapters I, II & III.

a) In the context of industrial infrastructure, I.T. Act, 1961 is the only Central statute which has defined the expression "infrastructural facility" and that also in an all-inclusive connotation. It has been defined in S.80 IA to include:

i) A road, bridge, airport, port, inland waterways and inland ports, rail system or any other similar public facility.

ii) A highway project including housing or other activities being an integral part of the highway project;

iii) A water supply project, irrigation project, sanitation and sewerage system.

b) The NCDBA (ibid, 1980) in its report has emphasized that a certain level of infrastructural development is a pre-condition for economic and industrial development in any area. They have further stressed that as far as industrialization is concerned, the major items are power supply, access to regional and national transport networks, telecommunications, industrial estates, housing and urban infrastructure. With great foresight they have strongly recommended that in developing/backward regions, investments in infrastructure
may have to precede demand since the base level of infrastructure is so low, that, in the absence of such an approach, industry may not be prepared to shift to these areas at all. The problem faced may vary for different types of infrastructure (NCDBA Report, 1980, para 7.20).

c) While agreeing with recommendations of the NCDBA (ibid), the Govt. of India, in the context of Growth Centre policy, went a step further by incorporating reasonable educational and health facilities and sufficient land for promotion of tertiary activities within the compass of the term ‘industrial and social infrastructure’ (Govt. of India Press note, 1988 shown at Appendix XVI and XVII).

d) Social amenities in the form of housing, medical, educational, recreational and other facilities come within the purview of social infrastructure which is known to play a vital role in the competition of areas for new industries. It is known to have a positive effect on economic growth (OECD Report authored by Klassen, L.H., 1968, p.15 and NCAER Report, 1967 ibid).

e) The term ‘financial infrastructure’ includes availability of easy bank credit, widespread banking network, concessional finance and tax incentives etc. The Wanchoo Committee, set up by the Govt. of India in 1968, was charged with the task of recommending fiscal and financial incentives for starting industries in backward areas. While making their recommendations they drew upon the experience of highly industrialized countries of Western Europe, viz. BELGIUM, ITALY, DENMARK, WEST GERMANY, SWEDEN, NORWAY etc. According to the Committee, all these countries have given very liberal facilities and on a very large scale for the purpose of attracting industries to depressed areas. These facilities included loans, grants, tax incentives, site improvements and subsidies for building construction. In the context of tax incentives, they have cited the positive international experience of countries like BELGIUM, CANADA, FEDERAL REPUBLIC OF GERMANY, FRANCE, IRELAND, PUERTO RICO etc. They therefore observed that in India “we have also to offer positive incentives to attract entrepreneurs in large numbers to backward areas” in addition to provision of basic economic and social overheads (para 10, Chapter II).

f) In their Research Paper titled “Infrastructure and the Wealth of nations”, Ed Nosal and Peter Rupert (March, 2002, Research Department, Federal Reserve Bank of Cleveland, U.S.A.; ISSN 0428-1276) studied the relationship between infrastructure and economic growth across 123 countries including India. They have made the following observations:

i) Economies cannot grow without a sound infrastructure

ii) A developed infrastructure allows competition to flourish and resources to flow to their highest valued use. It enables investment and accumulation of capital, both material and human, which lead to greater productivity and wealth.
iii) Commonly, when people speak of a Nation’s infrastructure, they mean its roads, bridges, dams, rail lines, telecommunication networks, power generating facilities and so on. Infrastructure encompasses not only these tangible forms of capital but also some less tangible resources that are just as essential in promoting growth and prosperity. Such resources include things like property rights (and a legal system to help enforce them), a standard system of accounts, stable money and a secure financial system.

iv) The tangible capital provides the ability to move the goods, capital, labour, ideas and information to their highest valued use.

v) The intangible capital in the form of a sound legal system and stable financial system invests the decisions of the entrepreneurs with reliability, accuracy, enforceability and security. A secure, stable financial system includes not only secure financial institutions and markets, but also the stable purchasing power of money.

vi) Economic freedom of the citizens plays a major role in determining both the level and growth rate of many economic variables as well as other measures of well being, Economic freedom of exchange in capital and financial markets, international exchange, freedom to trade with foreigners, security of property rights and viability of contracts; freedom to use alternative currencies; protection of money as a store of value and medium of exchange i.e. sound monetary policy and price stability. Revenue and expenditure of Government; and structure of the economy and the use of markets; and freedom to make investment choices.

vii) There is a recognizable link between sound economic infrastructure, stable money and economic growth and prosperity.

[URL: www.cle.frb.org/research]