A SURVEY OF INDUSTRIAL LOCATION THEORY

As classical theory of location is the theoretical base of present investigation therefore, the present chapter is devoted to a survey of the various theories of location which have been formulated from time to time. An attempt has also been made to show the continuing relevance of classical theory of location in the backdrop of recent developments in spatial analysis.

A review of industrial complex analysis and Growth pole theory has also been undertaken in the present chapter. Both these approaches are based on inter-industry linkages and industrial interdependence.

Finally, this chapter presents a survey of the important work by A. Uday Sekhar on industrial concentration and industrial dispersal.

Theories of location deal with the organisation of economic and human activity in geographical space and attempt to pinpoint different factors that influence location decisions and the location pattern that emerges under different sets of conditions. The knowledge that these theories provide regarding factors most likely to affect entrepreneurial location
decisions, as well as of the conditions needed to arrive at a certain pattern of economic activity, is required to formulate schemes for the development of a region.

The development in the field of location theories till the early sixties can be placed under three main classes. The first category of theories which cover least cost location theories, analyse the location of individual firm under conditions of perfect competition. They explore the relative attractions of labour, raw material and market locations when the location of all other firms is given. The second class is of central place theory, which studies location at an industry level under conditions of imperfect competition and zero raw material costs. Interdependence models, the third class, also abstract from costs and assume imperfect competition, but because these models analyse only a few firms they are more concerned with individual decision making than the central place theory. Whereas least cost approach analyses location decisions when both market and materials are concentrated at points, central place theory and the interdependence models assume areal markets and a homogeneous pattern of raw materials. All the three groups of theories have been reviewed here.
2.1 Least Cost Theories of Location

The least-cost approach to location originated with Laundhart, Von Thünen and Alfred Weber. Later on Hoover also followed almost the same approach to analyse the location of industries. The least known work is that of Laundhart, who explained the location of industry as being determined by differences in cost and in demand at different locations. He considered cost differences as the most important factor in finding the optimum location and dealt with the simplest situation in which two alternative sources of raw material and one market were assumed to form the three corners of a triangle. Given this, the least cost site would be selected.

Von Thünen's theory is related mainly to agricultural sector. He attributed cost differences at alternative locations to land rent and transportation costs. Different crops would be produced at locations where these costs were minimised. He assumed (a) homogeneous land, (b) one consuming centre, (c) complete mobility of capital and (d) equal labour costs or if wages were different at different sites, the differential would appear as land rent, so that labour costs were unimportant in deciding location.

As is clear from above, Von Thünen did not pay much attention to the problem of industrial location. Alfred Weber
tried to provide a theory of location which is concerned in particular with industrial location. Weber's classification of industries into material oriented, market oriented and labour oriented has been one of the continuing mainstream of locational analysis.

2.1.1 Weber's Theory of Location

Weber wished to construct a pure theory of location, one which could be applied to all industries at all times. He therefore analysed only the general factors that influence the location of all industries, and these factors he divided into those influencing inter-regional location and those influencing intra-regional location (agglomerating factor).\(^1\) He found three elements which vary regionally, raw material costs, transport costs and labour costs - but for analysis, raw material cost fluctuations are included within transport costs.\(^2\) Weber's plan was to locate firms in order to minimise transport costs, but he introduced labour costs as a distortion of this pattern, and finally, he also included the effect of agglomeration economies.

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\(^2\) Ibid, pp. 25-34.
The basic organising principle of this theory is that industry locates to minimise costs.

Weber made three basic assumptions, to eliminate many of the complexities of the real world. First he assumed that location of raw materials is given, an assumption which seems quite accurate for minerals but less accurate for agricultural raw materials. His second assumption is that the location and size of consuming centres is given. Thirdly, he assumes that labour is immobile, wages are fixed and the supply of labour at each location is unlimited.

The first stage of Weber's model comprises a discussion of transport orientation. Industry is attracted to location where costs of transport are lowest, that is to locations where the number of ton miles of raw materials and finished products to be moved per ton of product is minimised. The locational triangle is used to find the least-transport cost location. Weber realises that other elements besides weight and distance affect transport costs and to allow for these he assigned 'ideal' weights to the goods to be moved rather than actual weights. For example, the fragile goods whose cost of transport is $1.00 per ton mile would be assigned an ideal weight four times as high as
that assigned to a bulky good which costs only $0.25 per ton mile to transport.

The materials which enter into the production process are classified in two ways. First, materials may be either ubiquitous or localised - some materials occur more or less everywhere but the distribution of others is more circumscribed. Secondly, Weber divides materials into those which lose weight in processing (gross materials) and those whose weight enters entirely into final product (pure materials).

Location is determined by the material index (MI) of the industry. This material index is defined as,

\[
MI = \frac{\text{Weight of localised materials}}{\text{Weight of finished product}}
\]

Weber concludes that industries displaying a high material index are attracted towards the sources of raw materials whereas those characterised by a material index of less than 1.0 locate at the place of consumption. Pure materials can never attract production to their deposits because they have no locational weight; a weight losing material may attract production to its

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Ibid, pp. 50-53.
deposit, but only if its weight is greater than the combined weight of all other materials and of the product.\textsuperscript{4}

From this analysis an important prediction can be made. The location chosen depends on material index, which in turn depends on weight loss of localised material in comparison with the weight of ubiquitous materials contained in the final product. It follows, that, although spatial variations in the structure of transport rates may modify locational choices, the general level of transport costs has no influence on the pattern of location of industry in a society.\textsuperscript{5} The increasing attraction of industry to markets is not to be explained in this model by the general lowering of transport costs.

The second stage of the model is the analysis of labour orientation. When examining spatial differences in labour cost, Weber does not consider differences which arise from organisational and technical efficiency, for these are not tied by location. He is interested only in those differences which are fixed. Furthermore, he neglects the fact that labour is in limited supply and that the location choice of the firm may influence wage levels, because he wishes to explore the effects of cost variations on location of industry.

\textsuperscript{4} Ibid, pp. 59-61.

\textsuperscript{5} Ibid, pp. 72-73.
Weber points out that industry must actually locate at a low wage location and not merely towards it if a labour cost saving is to be realised. An industry will choose a cheap labour site if the labour cost saving are greater than the increment in transport costs at this site above the minimum possible transport costs. If \( d_1 \) and \( d_2 \) are the number of ton-miles which must be moved per ton of product at the minimum transport cost location (1) and cheap labour location (2) respectively; if \( W_1 \) and \( W_2 \) are hourly wages at these locations; if \( h \) is the number of hours of labour required to produce a ton of product; and if \( c \) is the cost of transport per ton miles; then a firm locates at the cheap labour location if:

\[
W_1 h + d_1 c > W_2 h + d_2 c
\]

that is, if

\[
(W_1 - W_2)h > (d_2 - d_1)c
\]

The analytical solution is obtained by drawing isodopanes, or lines that can be drawn around least-transport-cost location joining places of equal additional transport cost. Among various isodopanes drawn around least transport cost location, one is such at which transfer costs exceed the minimum by an amount equal to the production cost economies at an alternative production point. This is the critical isodopane for that site.
If the alternative site is inside the critical isodopane the firm moves to that point; if the alternative lies outside the critical isodopane the economy in production cost is less than the additional transport cost incurred there.\textsuperscript{6}

Industries vary in the extent to which they are attracted to cheap labour sites. If an industry is characterised by high labour costs per ton of product, it is possible for that industry to effect large economies at a cheap labour location; and such industries are potentially attracted to labour locations. If an industry has a low material index, a small mass of material has to be moved per ton of product, and therefore the isodopane for this industry are widely spaced; there is a high probability that the industry will be attracted to points of low labour costs. These two ideas are combined in Weber's coefficient of labour, which measures the labour cost per ton of location weight (location weight equals material index plus unity). A high coefficient of labour implies a strong attraction to cheap labour locations.

In the third part of analysis Weber examines agglomeration economies. Weber defines an agglomerative factor as cheapening of production when that production is concentrated at one place.

\textsuperscript{6} Ibid, pp. 120-124.
Agglomerative factors include (i) economies of scale within a plant and (ii) economies from the association of several plants. Economies of association derive from the specialised division of labour between plants, better repair facilities, a specialised labour organisation, the development of market for the materials and product of an industry and the lowering of social overhead costs. The only deglomerative element is rent; which is related to the size of the city. Weber excludes from his definition of an agglomerative force the attraction of several plants to the same point in order to use cheap labour or raw material.

A plant locates in an agglomeration if the savings at this location offset the concomitant increase in transport cost. The agglomeration is located in order to minimise the sum of the additional costs incurred by all firm located there. If the agglomeration comprises, n firms and if the jth firm required \(d_2j\) ton miles at the agglomeration and \(d_1j\) ton miles at its minimum transport cost site, then the agglomeration is located in order to minimise

\[
c = \sum_{j=1}^{n} (d_2j - d_1j)
\]

The tendency to agglomerate is strengthened if firms in an agglomeration can use raw materials to replace their original
material choices. The extent of agglomeration depends on the economies available, the spacing of isodopanes (that is, on the material index of the industry and on transport rates) and on the density of industry (the average distance separating production units). Weber points out, though, that the force of agglomeration is unlikely to cause independent concentration to develop; since labour locations will almost always be points of accidental agglomeration. The firm's choice is between the economies of agglomeration available at agglomeration locations and the economies of labour plus accidental agglomeration economies available at labour locations. Only firms characterised by low labour orientation and extensive economies of agglomeration can be attracted to agglomeration locations which are independent of labour location.

2.1.2 A Critical Appraisal of Weber's Theory of Location

Since its publication Alfred Weber's theory of location has been subjected to penetrating review. Several criticisms have been made of the postulates which Weber employs to construct his theory. By far the most important of these criticisms is that Weber assumes that firms are in a perfectly competitive

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7 Ibid, pp. 135-153.
situation. From this condition follows his treatment of the location decision as search for a least cost site, for demand and price are then given. However, it can be readily shown that the assumption of perfect competition is incompatible with the postulate of spatial framework for society. There cannot be perfect competition over space, for distance presents firms with monopoly advantages in proximate areas. Locational specialisation is but one aspect of product differentiation which characterises monopolistic competition.\(^8\)

In reality, then firms seek maximum profit location not least cost locations. Further, not only must firms analyse the location of raw materials and cost of production but they must also investigate the location of other firms. The location policies of all firms are interdependent because of the element of monopolistic competition conferred on markets by space. Demand varies with price, and with location chosen. The greatest total demand will be realised with a different location of the plant at each factory price. It is then meaningless to find the point of lowest cost.\(^9\) Weber's assumption of space and of

\(^8\) M.L. Greenhut, Micro Economics and the Space Economy, Scott Foresman, Chicago, 1963, pp. 55-76.

perfect competition are inconsistent and permit only a partial analysis of location decisions.

Weber also assumes that scale of production of the plant has no effect on costs and that the firm uses the same input mix at all locations. These assumptions have been criticised by Hoover.10

Several other problems in Weberian analysis have been examined by location theorists. Weber suggests that the different costs of mining ores and fuels be brought within the scope of the theory by supposing that high cost mineral sources are further away from the production site than low cost sources. Hoover points out that this is no solution, since Weber had not yet found the production site; from what point should the high cost sources be considered more distant? Thus Weber's statement has no meaning.11 Hoover has also criticised Weber for assuming that freight rates are proportional to distance and quotes evidence to the contrary.

Weber's assumption of immobile, unlimited amounts of labour have also been criticised. Another serious deficiency of Weber's

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analysis is that he does not analyse the causes of labour cost differentials. Hoover classifies these causes as being due to (i) variation in cost of living (ii) labour immobilities. It may be profitable for the theory of location to use such a classification, for Hoover proposes that costs of living vary most in response to cheapness of food supplies. Therefore labour oriented industries seek location to which food can be sent cheaply.

Weber's treatment of agglomeration economies has also come under attack. Hoover argues that there are four main deficiencies in Weber's analysis.\footnote{Ibid, pp. 89-93.} Firstly, whereas Weber argued that agglomeration economies usually only reinforce the attraction of cheap labour locations, Hoover suggests that agglomeration is also likely at material sources, transshipment points and markets. Secondly, Weber incorporated in agglomeration economies three distinct forces: scale economies within the firm, localisation economies (for firms within a single industry) and urbanisation economies (for firms in all industries). Thirdly, Hoover argues, Weber's model contains no mechanism for measuring the effect on the extent of agglomeration of firms being able to replace material sources when they agglomerate.
Finally, Hoover quotes a criticism of Palander's. The Weber determines whether two firms will locate together by drawing critical isodopanes around their points of minimum transport costs. If these isodopanes intersect, the firms can gain economies by locating together anywhere within this zone of intersection. Palander points out that while such a move is advantageous to both firms together, it is not profitable for any one firm to move unless it is certain that its partner will behave in the same way. Weber's agglomeration procedure requires co-operation from two firm which are locating at the same time. Palander also argues that each firm desires that the agglomeration be located at that point within the zone of intersection of isodopanes which is nearest to its own point of minimum transport costs; that is, the agglomerating firms are in conflict about where to locate the agglomeration, and Weber has not solved this conflict problem.

But despite these criticisms D.M. Smith argues that "Weber's approach has much to commend it. As Weber said, his book was expected to be a beginning and not an end, and as a beginning to modern industrial location theory it has proved very valuable indeed. Most later writers have gained something

13 Ibid, p. 93.
from Weber, and a number of his concepts and analytical devices have been greatly extended - in particular, his isodopanes".\textsuperscript{14}

Appreciating the role of Weber's theory in empirical work he further says - "The value of Weber's theory as a framework for empirical inquiry must also not be overlooked ------. And in some other cases the Weber framework has been applied successfully to the explanation of real world pattern, ------. To have provided such a useful starting point for theory and also some kind of operational model for empirical investigation was no mean achievement".\textsuperscript{15}

\textbf{2.1.3 Hoover's Theory of Location}

Hoover also tried to propound a least cost theory of location, in which he tried to overcome some of the weaknesses of Weber's theory. Hoover starts with the assumption of perfect competition between producers or sellers at any one location. Secondly, he assumes perfect mobility of factors of production and takes transportation costs and production or extraction costs as the determinants of location. He considers extractive


\textsuperscript{15} \textit{Ibid}, p. 75.
industries first, with the location of deposits given, and attempts to find the area that each producing point will serve. The delivered price for any buyers will be the cost of extraction plus transport costs. He has represented this by a system of isotims, radiating from the point of production and joining places of equal delivered price. Buyers will obtain the commodity from the source that offers the lowest delivered price and the boundary between the market area of two producers will be a line joining the points at which delivered price is the same from both sources.

As long as the cost of extraction does not vary with output, transport costs are the only variable affecting price, but Hoover extends his analysis to include the influence of diminishing returns to scale. He follows Weber, fairly closely at first, pointing that in the absence of production cost differences the best location will be at the point of minimum transport costs, which may be at a material source, at the market or at an intermediate point. The least-transport-cost location is found by drawing isotims around given material and market points, from which lines of equal total transport cost (isodopanes) can be constructed.\(^{16}\) But Hoover goes further than

\(^{16}\) E.M. Hoover, op. cit., p. 43.
Weber by showing how different sections of the market will be served by different producing points.

He also differs with Weber's emphasis on least transport cost points within locational triangles. Even with the assumption of uniform transport costs, the possibility of a separate minimum point not at one corner of the triangle is much less than might be thought at first sight. It is far more likely than what Weber suggested that a material or the market will have a pull which will be greater than that of the other corners. The chance of a location not at one corner is even less likely, if the fact that transfer costs are actually less than proportional to distance is also considered. In addition, loading costs and other terminal changes operate against least-cost location inside the triangle. If a separate point away from material sources and market does occur, Hoover suggests that perhaps this is a sign that industry is not primarily transport-oriented at all and that possibly a low labour cost location enters into the picture. He claims that in practice the influence of transfer costs tends to locate production at markets, at sources of raw material, or at junction breakpoints in the transport network.
In considering, production costs, Hoover follows Weber's analysis of a cheap labour location very closely. He views it as a possible production point if the saving in labour cost compensates for increasing transfer charges. Inherent in this approach is the concept of plant producing for particular market areas; but with one area served by a cheap-labour location and the others by least-transport-cost points. Hoover considers economies of concentration as a part of production costs.

Praising Hoover's contribution in the field of location theory, Greenhut remarks that, Hoover's main contribution here lies not so much in theoretical originality but in a penetrating discussion of the influences of various location factors as well as containing a detailed consideration of transfer costs.  

But Hoover's contribution has its limitations too. Like Weber, he viewed transport orientation as something that could be analysed separately and did not integrate, other causal factors into his theory as fully as he might have done. Despite his references to market areas, he was much concerned with cost

than with the demand factor. Greenhut has also criticised Hoover for his failure to probe deeply into locational interdependence.

2.2 Central Place Theory

One of the major criticism of least-cost approach to location is its abstraction from demand. In this approach location is seen largely as a product of spatial cost differences, with variations from place to place in sales potential virtually being ignored. German economist August Lösch in 1940 produced the first general theory of location with demand as the major variable. Lösch was the first to describe general spatial relations in a set of simple equations and to present "a full general equilibrium system describing in abstract the interrelationship of all locations".18

Briefly, what he tries to do is to show what pattern of location will, in a simplified situation, fulfill certain conditions that define a state of equilibrium. His basic philosophy is that there is order and reason behind apparent chaos of the economic world.

Lösch rejects the least-cost perspective of Weber and his followers, as well as the alternative of seeking the location at

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18 A. Lösch, op. cit., p. 2.
which revenue is greatest. He points out "Weber's solution for the problem of location proves to be incorrect as soon as not only cost but also sales possibilities are considered. His fundamental error consists in seeking the place of lowest cost. This is as absurd as to consider the points of largest sales as the proper location. Every such one sided orientation is wrong. Only search for the place of greatest profit is right".¹⁹

Lösch's general theory is an attempt to show how, in given circumstances, all economic activity should be arranged in space. He assumes a broad homogeneous plain with an even distribution of raw materials and uniform transport rates in all directions. The population, engaged in agriculture, is evenly distributed, and all individuals have identical tastes, technical knowledge and economic opportunities. The settlement pattern is one of evenly distributed self-sufficient farmsteads. In considering industry, the question posed is: if farmers start producing a surplus of some commodity, what spatial economic pattern will eventually constitute a state of equilibrium? Lösch points out following five conditions which must be fulfilled by space economy to achieve equilibrium:

¹⁹ Ibid, pp.28-29.
(1) The location of every individual must be as advantageous as possible, in terms of profits for the producers and gains for the consumers.

(2) The production locations must be so numerous that the entire space is occupied (that is, there are no areas where the absence of a source of supply might attract a new firm).

(3) In activities open to everyone there are no abnormal profits, for they will be competed away by the entry of new firms.

(4) The areas of supply, production, and sales must be as small as possible, since only then can the number of enterprises that can survive reach its maximum.

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

These conditions must be fulfilled if spatial order of the economy is to have, as Lösch puts it, meaning and permanence.

Thereafter, Lösch demonstrates how equilibrium is reached. If a single farmer decides to produce a surplus of say, beer,
for sale, then his sales area will be circular, bounded by a locus of points at which delivered price becomes too high to sell any beer at all. But if one farmer can produce a surplus so can others, therefore, others enter into this trade. Competition gradually reduces the size of sales area until ultimately they become hexagonal in shape as all space is filled up. Of the geometrical forms that could occupy all space, the hexagon has the highest demand per unit of area and minimises the total distance from its centre to all points within the market area.

As different goods are produced, a system of hexagons will arise for each industry, with the size of market area varying from industry to industry according to nature of the product. Lösch then superimposes all of the individual systems so that all have at least one production centre in common. At this centre, where every product is made, there will be a metropolis and at other places where two or more production points coincide there will be towns or cities. Lösch asserts that this arrangement has several advantages, the greatest number of locations coincide, the maximum number of purchases are made locally, and the sum of the minimum distances between production sites is minimised, so that shipment and transport lines are reduced.
Christaller also tried to develop a theory of central places under slightly different assumptions. But as Richardson points out "The Löschian system is a little less restrictive and more general than christaller's central place hierarchy model in two respects. First, large centres do not necessarily have to contain all the lower order industries. Second, the nesting factor or satellite ratio may be variable rather than a constant. As a result, the size distribution of urban centres in a region is more continuous than in christaller's rigid hierarchy".\[20\]

Although, Lösch criticised least-cost approach to location theory as being one sided, for neglecting demand but in order to overcome this weakness, he goes to the other extreme. The most serious limitation of his theory is his failure to consider spatial cost variations, which were eliminated in his assumption of a uniform plain with evenly distributed materials and population.

Neither natural resources nor demand are evenly distributed over space. Even if they were, to start with, interdependence would lead to unevenness in location of demand.

Lösch has also been criticised on the ground that his ideal system of location could be brought about only by state direction, in other words it is irrelevant to a competitive capitalist economy. Holland criticises Lösch for his "procrustean assumptions" and views his substitution of theoretical form for reality as "regional metaphysics".\textsuperscript{21}

The other problem of this theory is that it does not provide a theory of development, because it only tries to explain a pattern of centres and not how these patterns came into existence nor how they will change.

2.3 Interdependence Theories of Location

The locational-interdependence approach arose out of the theoretical examination of how equilibrium would be achieved under conditions of imperfect competition. Lösch attempted to find the best pattern of location from the point of view of society, the interdependence models show how optimum behaviour by firms may result in socially non optimal behaviour. The simplest model illustrating aspects of the problems of locational interdependence and agglomeration is the famous

linear market duopoly model developed by Hotelling. He assumes two producers A and B who sell a homogeneous product along a linear market (the standard example is of two ice-cream sellers on a beach) at prices $P_A$ and $P_B$. Consumers are evenly distributed, demand is inelastic and each consumer buys one unit of output in each time period. Production costs are zero (a special case of the constant marginal costs with changes in output or location) and each producer could supply the total market if allowed. Transport cost is assumed to be constant and equals $c$ per unit of output per unit of distance. The producers are free to locate anywhere and can relocate at zero cost. The linear market is of length $d$. Each producer will be guaranteed the sheltered market outside (a for A, b for B) but the market between them will be shared, with A supplying $x$ while B supplies $y$, so that market area boundary is defined where delivered prices are equal,

$$P_A + cx = P_B + cy.$$

Thus,

$$d = a + b + x + y.$$

The problem is then to find out profit maximising locations for A and B. If A first chooses a location (regardless of where it

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is) B’s profit-maximising location will be determined by the function

$$\text{Max } \pi_B = \frac{c}{2} \left( d + \frac{b-a}{3} \right)^2$$

This is maximised when $b$ is as large as possible and this implies that B should locate adjacent to A on the side nearest to the centre. However, unless A first choose a central location, this does not result in equilibrium. Since A's profit is given by

$$\pi_A = \frac{c}{2} \left( d + \frac{a-b}{3} \right)^2$$

It pays A to maximise $a$, and to do this he 'leapfrogs' over B and locates immediately next to him, but on his other side. This reduces profit for B and he is then induced to jump over A. This leapfrog game continues until both are located at the centre of the market. This is a locational equilibrium because neither can increase profits by relocating. Also, $p_A = p_B$ to protect each producer's sheltered market. Thus profit maximisation induces agglomeration. Market forces result in a pattern that is socially wasteful because transport costs are at a maximum whereas the minimum transport cost locations (a social optimum) would require the firms to locate in dispersed fashion at each quartile.
Although Hotelling's analysis is elegant and correct within its assumption, these assumptions are so restrictive that the model offers little insight into real-world locations. There are many objections to the model. An oft criticised condition is that a unit quantity is consumed per unit of time at each point on the line. This implies that demand is absolutely inelastic or as Lerner and Singer point out consumers have infinite incomes.\footnote{A.P. Lerner, and H.W. Singer, "Some notes on duopoly and spatial competition", Journal of Political Economy, 45, 1937, pp. 145-186.}

A further criticism of Hotelling's theory is made by Lösch. It is highly unlikely that a duopolist would imagine that his pricing and location policies would have no effect on the policies of his competitor.\footnote{A. Lösch, op. cit., pp. 72-75.} Lerner and Singer also point out that Hotelling's conclusion that sellers locate at the centre of the market cannot apply to more than two sellers, for if (say) three sellers locate at the centre, the middle one can then make no sales.

2.4 Maximum Profit Location

Melvin Greenhut was the first, to make a major attempt to integrate the least cost and locational interdependence
theories. Through his two books Plant Location in Theory and in Practice (1956) and Micro economics and the space Economy (1963) and many other papers, he tried to look at the effect of space on conventional economic theory.

Greenhut considers transportation as a major determinant of plant location and points out that it should be distinguished from other factors, not confused with them. An entrepreneur will tend to economise on transportation if freight costs comprise a large part of total cost, but this will be possible only if transfer costs vary significantly, at different locations. Material orientation is considered as a product of transport costs and it is pointed out that it occurs in two special cases: where the materials are perishable and where transport cost on material is much greater than on the finished product. Otherwise, the transport factor may be expected to favour a location near the market. Processing costs can be expected to influence location where transport costs or demand factor do not require material or market orientation.

Greenhut gives special attention to the demand factor, as well as to the effect on location of the interdependence of firms. He points out that if the demand curve is infinitely elastic then all production would take place at the point of
consumption, since any rise in price with freight costs would eliminate demand. As a general rule, the more elastic the demand for a firm's product, the more dispersed production will be. But the tendency to disperse also depends on freight rates (high transport costs to the consumer will make for dispersal) and the characteristics of marginal costs. Also, the larger the number of firms, the greater the force for dispersal, since small firms seeking a relatively small market area will move to a distant point of the market more readily than a large firm, which may want a location with access to a major part of the market. Greenhut makes an important distinction between organised and an unorganised market situation. Unorganised oligopoly, where firms compete freely in price, leads more readily to dispersal than organised oligopoly, in which a basing point system or similar practices encourage undue localisation.

Greenhut also considers the effect of 'cost reducing' and 'revenue increasing' factors, apart from transportation, processing costs and demand factor. Cost-reducing factors refer to gains that arise essentially from agglomeration or deglomeration; for example, the external economies that a firm may derive from a location in a city familiar with firm's type of business. Revenue-increasing factors cover similar considerations that affect sales. Also distinguished are
personal cost reducing and personal revenue increasing factors, which refer to advantages gained from personal contacts between individuals. Greenhut also mentions the purely personal consideration that may influence the precise choice of location, providing the entrepreneur with 'psychic income'.

Thus according to Greenhut's theory of location, following are the causal factors of location:

1. Cost factors of location (transportation, labour and processing costs),
2. Demand factors of location (locational interdependence of firms or attempts to monopolise certain market segments),
3. Cost reducing factors,
4. Revenue increasing factors,
5. Personal cost reducing factors,
6. Personal revenue increasing factors,
7. Purely personal considerations.

He has suggested these causal factors by a priori reasoning and has supported them further by the findings of empirical research.

Greenhut's model is deceptively simple; actually the variables are simultaneously interdependent. The inclusion of
"psychic income", a purely subjective consideration, introduces various complexities into the model.

2.5 Recent Development in Theories of Industrial Location

The past few decades have seen a sustained assault on classical location theory, along with various attempts to broaden the perspective of spatial economic analysis. In this section the two most important recent approaches to location theory have been discussed. They are (i) Behavioural approach to location and (ii) Structural approach to location theory.

2.5.1 Behavioural Approach to Location Theory

The behavioural approach to decision making within enterprises on issues relating not only to location but also to pricing, product development, marketing and production processes came into existence in 1960's. There were a number of reasons behind this development. First, there was growing dissatisfaction with the idealised assumptions which underpinned much of the classical approach to locational analysis. As Wood pointed out the restrictive assumptions about the entrepreneurial desire to minimise transport cost, had produced a set of theories which were of little help in confronting real issues facing urban and regional planners.25

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Secondly, empirical studies of entrepreneurial decision making were stressing how little information formed the basis of many locational choices and how imperfect such information often was, thus undermining the fundamental assumption of economic rationality as a basis of classical location theory. Thirdly, the increasing concentration of manufacturing into larger and larger concerns mean that large companies were often in a position to control local price of labour, inputs or land, in a manner which ensured that they did not have to make locational choices on the basis of selecting a site, which minimised such costs. They were large enough to select a location on other criteria and distort local cost surfaces. Fourthly, evidence was appearing to show that profit and cost surfaces were so gently sloping that there was ample scope for business to choose locations on non pecuniary criteria including environmental preferences and not to be too disadvantaged by the resultant shortfall in profits. Lastly, the growth of management science as an academic discipline was opening up a new body of literature on the nature of decision-making within corporate structure, of which locational choice was just one element and a rather minor one.

Behavioural theories of location drew attention to two respects in which underlying assumptions of neoclassical theory
were not reflected in reality. Firstly, decision-makers did not have perfect information upon which to base their locational choice, nor, even in the largest enterprises, did they have the perfect ability to use their information. Pred developed the behavioural matrix in a probabilistic sense to show that the better the information and greater the ability to use it, the more likely it was that the location chosen would lie at, or close to, the point which maximised profit. With less information and less ability, there was less probability that the location chosen would be optimal. Within this probabilistic model, however, there was always a chance that any enterprise, however ill informed, would make the optimal choice.\(^{26}\)

The second respect in which behavioural Theories went beyond neoclassical assumptions was to show that it was perfectly possible for enterprises to make a conscious choice of location well away from optimal one, in the full knowledge that profits were not being maximised. There are two reasons for this type of choice. First, the locational choice might be regarded as a utility maximising choice in which profit is only one element. The entrepreneur might therefore choose a location in

which social or environmental attributes outweighed, to a certain extent, profit. Secondly, as Simon and others pointed out entrepreneurs may have business objective other than profit maximisation. Cyert and March pointed out the possibility of multiple business goals in organisations with large number of individuals. These business goals might include growth, security, the minimisation of risk, entrepreneurial satisfaction or merely self preservation. Thus it is obvious that while responding to some of the limitations of normative theory the behavioural approach itself opened up new lines of enquiry.

2.5.2 Structural Approach to Location

As a response to the behavioural approach to theories of industrial location, in later half of 1970's structuralist or radical theories emerged which stress that enterprises are a part of the wider structure of society in which the interplay of capital and labour is based upon power coalitions whose interests are usually in conflict. Much of the industrial geography is concerned with production in the capitalist mode in which capital and labour combine to generate wages for labour and profit for capital. But growth in one is likely ceteris paribus to be achieved at the expense of the other. The major elements in the structuralist approach have been the role of
very large enterprises in using their economic and political power to achieve authority, over their workforce, the role of organised labour in responding to this control and the overall pattern of change in the world economy. One of the prominent protagonist of this school, Massey, argued that an alternative, radical approach to neoclassical industrial location theory was required. What was distinctive about this approach, she argued, was firstly that it applied no abstract model of the firm or enterprise. Secondly, the spatial dimension was introduced only as last step in the causal sequence; spatial changes are viewed only as an effect of the response to non spatial changes in Macro-economy. Thirdly, by dealing with particular product markets the macro economic effects are held constant thus permitting an analysis of different responses by different types of economy. Thus the structuralist approach has tried to incorporate social and political factors on the choice of location.

2.6 Relevance of Classical Theory of Location

A body of theory may be recognised as defective if it fails to elucidate the reality that it claims to represent. This may

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be the case if the theory is logically flawed, if it assumes away some of the critical variables or if postulated relationship or outcomes predicted are shown to be false. The conduct of enquiry in any field involves the critical scrutiny of existing theory and its refinements and reformulation or replacement by an alternative perspective.

As has been explained in the earlier section, in past few decades a scathing attack has been launched against classical theory of location and many attempts have been made to broaden the perspective of locational analysis. But as Smith points out "-------- new perspectives are seldom a dramatic break from the past, more often they comprise incremental developments rooted in what has gone before and, in some respects are captive of past approaches or intellectual traditions".  

The past two decades have seen the ascendancy of the so-called behavioural school in locational analysis, with its emphasis on the elucidation of real-world decision making. Rejecting the unduly deterministic framework derived from economic theory, the behaviouralists have sought guidance in such fields as organisation theory and psychology. But a convincing general theory capable of incorporating the variety of human

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motivations and actions found in practice has eluded even its most ardent pursuers. Therefore as Harvey pointed out "It is a golden rule of science that you do not throw away one theory, however inadequate it may be, until we have a better one to replace it".²⁹

Further, pointing out the inadequacy of behavioural theories of location Townroe comments "It is clear that the strength of the behavioural view lies in the insights provided rather than as a basis for prediction, or for evaluation, either of the locational behaviour of a firm or a group of firms or of policy instruments".³⁰

One major line of criticism has been the inability of Weberian analysis to accommodate external (or internal) economies associated with inter-industry linkages. As Wood has stated "that traditional location theory regards as awkward exceptions the complex agglomeration that are supposed to be based upon the principles of external economies of scale and close functional linkage".³¹ He goes on to state there is little to be gained from taking Weber as a theoretical starting point.

³⁰ P.M. Townroe, "Approaches to the Study of Industrial Location", Massey and Morrison, 1975, p. 34.
But refuting this charge Smith points out that difficulties raised by agglomeration and linkages are essentially problems of measurement. If this could be overcome it might be possible to deal with these variables operationally within existing models derived from classical location theory. Smith further argues that "The most profitable line of inquiry at present would appear to be in the empirical investigation of inter-industry relations and the nature and functioning of existing industrial agglomerations, in an attempt to understand just how linkages operate to create locational advantages. Such research is an essential prerequisite to the effective use of planned industrial complexes as an instrument of regional development policy ------. This work can be achieved without any fundamental change in theoretical framework as long as the full potential and flexibility of extended Weber model is appreciated".\(^{32}\)

Since the present empirical investigation is an attempt in this direction only, in the light of above mentioned comment of Smith, taking Weber's theory as base for this work seems to be quite justified.

Another point of criticism about classical theory is that transportation and labour costs are much less important to the modern multiplant corporation than they were when Weber wrote. But Dicken, a notable contributor of the development of organisation perspective, has himself made the most vigorous rehabilitation of traditional location theory with these words "I believe that it is possible to argue that least cost location theory still has some relevance in helping us to understand the spatial organisation of activities not at the scale normally assumed, but rather at a greatly enlarged organisational and geographical scale. In other words, I would argue that such theory is relevant in precisely, those circumstances of corporate organisational structure which are held to have rendered it impotent". 33

Thus we find that although new perspectives are being developed in locational analysis, attempts are also being made to resurrect the old ideas. Thus it is pertinent to end with the words of Dicken that perhaps it is time for Weber to be lifted back into the bath. 34

34 Ibid, p. 143.
2.7 **Industrial Complex Analysis**

External economies of agglomeration and inter-industry linkages are increasingly important determinants of plant location in advanced industrial nations. They are tending to strengthen the advantage of a location in an existing industrial or metropolitan area for industries with complex input-output relations with other activities, thus reducing plant mobility to some extent. External economies are also among the most important factors affecting industrial location in underdeveloped countries. In other words, the understanding of external economies is an important ingredient in the solution of problems of industrial development planning strategy.

This leads to the question of the adequacy of existing location theory to accommodate the economies arising from agglomeration and inter-industry linkages. There is little doubt that most effective strategy for planned industrial development is to create growth points (or system of such points) based on a carefully selected groups of inter-related activities and large enough to benefit from external economies of agglomeration. What is needed is some conceptual framework for the design of such a strategy. A favoured approach in recent years has been based on the concept of an industrial
An industrial complex may be defined as "a set of activities occurring at a given location and belonging to a group (subsystem) of activities which are subject to important production, marketing, or other interrelations. 35 Industrial complex analysis is a compromise between theoretical perfection and practical necessity. Inter-regional input-output analysis offers the most obvious framework for organising data on inter-industry linkages, but it is unable to handle economies of scale, economies of agglomeration, and areal variations in production costs arising from different input prices and combinations. The comparative-cost approach, based on classical location theory, can overcome these difficulties to a large extent, but misses the details of inter-industry relationship, revealed in an input-output table. Industrial complex analysis, as developed by W. Isard, T. Vietorisz and E.W. Schooler; is an attempt to provide a hybrid technique that retains the more important inter-industry relations while not losing the strength of the comparative-cost approach. Its objective is to identify the kind of industrial complex that would be most suitable for a given development programme or region. Input-output analysis is used to identify inter-industry linkages and the

appropriate structure for possible industrial complexes, while comparative cost analysis evaluates the relative merits of different industries and different locations.

The concept of industrial complex as developed by Isard et al is based on modern Weberian framework. In such a framework they have tried to look at locational interdependence via an interactivity matrix form, with adjustments for non-linearities and economies of scale within each activity. By doing so, they have attacked several forms of locational inter-dependence, where one activity constitutes the market for the product of another activity, where the scale of operation of one activity affects factor proportions and costs in another, etc. They have used typical comparative cost approach here. Differences among regions in transport, labour, power and fuel costs, etc., and in production costs arising from scale of operation have been evaluated. From such evaluation any one of a number of possible efficient location patterns can emerge. They point out, it may be observed, that for one configuration of markets, all the activities might best be included in one giant complex concentrated at a single location, for another configuration of markets, the activities might best be geographically split into three parts, giving rise to several types of smaller
complexes at three locations, and for yet another configuration of markets, a still greater number of smaller complexes might be indicated. In short, many diverse patterns are possible, depending on the geographic spread of markets as well as on other major factors such as the geographic spread of base raw material sources.

However, according to Isard et.al, industrial complex analysis, just as industry location analysis must attack spatial juxtaposition economies; and in attacking these economies, industrial complex analysis may permit more meaningful industrial projects or greater understanding of industrial location patterns. If economies of spatial juxtaposition of industries are known to be of major significance in full complexes, and roughly of the same magnitude from location to location, comparative analysis may safely proceed with an evaluation of only objective locational factors of transport cost differentials and production cost differentials affecting the full complex at each potential location. If spatial integration economies are modest, they must be calculated in order to compare full complexes with split location patterns of smaller complexes. They also point out that because of the intangible nature of many spatial juxtaposition advantages, they are not subject to accurate
calculation. Thus, any comparative conclusions in which these subjective factors enter must accordingly be interpreted with caution.

In developing the conceptual framework and procedures, Isard et.al have drawn empirical materials almost exclusively from a study of hydrocarbon complexes for the region of Puerto Rico. But according to them, the industrial complex approach has relevance and can yield valid empirical materials for many regions of the world. Generalising further, the industrial complex approach can be applied to a wide variety of inter-related groups of activities. Whatever the group considered, the specific procedures and structure of study will tend to vary from complex to complex as well as from region to region.

In conclusion, it may be stated that for many problems concerning resource use, industrial location and regional development, industrial complex analysis is a useful technique. It can identify and evaluate profitable situations and activity combinations which cannot be accurately assessed either by simple individual industry comparative cost studies or by strictly linear inter-industry techniques.

However, Isard has himself pointed out some limitations of the Industrial Complex Analysis. He points out "yet there are limits to the use of the industrial complex approach in
understanding and projecting an inter-regional system of industrial locations. Obviously, it should not be employed where the production and marketing inter-relations among activities of a reference group are relatively insignificant. Further, its effectiveness may be severely restricted in situations in which some of the activity inter-relations result in economies of spatial juxtaposition which are largely non-quantifiable. More important, it fails to penetrate as deeply into a specific industry as an individual comparative cost study does".36

One of the major limitations of industrial complex analysis is with respect to the ability of the input-output model to predict the propulsive impact, on regional development in a situation of structural change. There is a danger of the planned complex being merely a self-contained subsystem unless special efforts are made to promote complementary industry. According to Holland, the propulsive impact of the complex may be limited, if it is an isolated venture rather than part of "a comprehensive and balanced development package".37 In other words, the industrial complex must itself be an integral component in a broader spatial planning strategy.

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36 Ibid., p. 411.
2.8 The Growth Pole Theory

The concept of growth poles was originally introduced and put into systematic use by French regional economist Francois Perroux in his classical article of 1955. The concept of growth poles suggested in that paper is closely related to his particular notion of abstract economic space as a field of forces, consisting of centres, poles or foci 'from which centrifugal forces emanate and to which centripetal forces are attracted. Each centre being a centre of attraction and repulsion, has its proper field, which is set in the field of other centres.' From the outset, it is important to note that Perroux was originally concerned with economic growth, and primarily with firms and industries and their inter-relations, and not with the geographical pattern of economic activity, or the geographical implications of economic growth and intra/inter-industrial shifts. To Perroux, geographical space appears to be only one and a rather 'banal' type of space. He maintains that it is possible to distinguish 'as many economic spaces as there are constituent structures of abstract relations that define each object of economic science'. It is among the centres of this field of forces

that Perroux identifies his growth poles in which economic growth occurs and is spread throughout the rest of the economy. Thus, Perroux's concept of a growth pole is a highly abstract one. It was introduced as a tool to explore the process by which economic activities, i.e., firms and industries appear, grow, and, as a rule, stagnate and sometimes disappear. Hence, the process of economic growth is conceived of as essentially unbalanced involving a succession of dynamic poles through time.

In his theory of growth poles, he attempted to explain how modern process of economic growth deviated from the stationary conception of equilibrium growth. In doing this, he based his argument heavily on Schumpeter's theories of the role of innovations and large scale firms. According to Perroux, entrepreneurial innovations are the prime causal factors, behind economic progress. He argues, like Schumpeter, that most innovating activities take place in the large economic units, which are able to dominate their environment in the sense of exercising irreversible, and partially reversible influence on other economic units by reason of their dimension, negotiating strength and by the nature of their operations.
The close relationship between scale of operation, dominance and impulses to innovate become the most important features of Perroux's theory and lead to the concepts of dynamic propulsive firm and leading propulsive industry. The characteristics of a dynamic propulsive firm are that it is relatively large, has a high ability to innovate, belongs to a relatively fast growing sector, and the quantity and intensity of its interrelations with other sectors of the economy are important enough for the induced effects to be transmitted to them. The features of a leading propulsive industry are similar. They appear to be relatively new ones, operating at a technically advanced level in markets with high income elasticities of the products. Moreover, such industries exert a considerable influence on their environment through inter-industry linkages. Such linkages can be of two types - forward linkage and backward linkage. In the case of a backward linkage an industry encourages investment in the earlier stages of production by expanding its demand for inputs (which are the outputs of industries in the earlier stages of production). In the case of forward linkage, an industry encourages investment in the subsequent stages of production either by transmitting innovation or effects of innovations forward. One possibility is that as a result of innovations,
costs of production in the industry decline. This could lead to a fall in the price of its output. If this happens, the demand for this industry's output by those industries which use its output as input, will increase. In addition to this possibility, there are many other ways in which innovations or effects of innovations can be transmitted forward.

Thus, inter-industry linkages and theory of industrial interdependence play a major role in the growth pole theory. As a matter of fact, this theory together with the Schumpeterian theory of development can be said to constitute the two cornerstones upon which Perroux bases his theory.

Perroux's conception of space was essentially an abstract one. Boudeville gave it a regional character and a specific geographic content. Consequently, it was with Boudeville that the growth pole theory received a specific geographic and regional importance. He defined a regional growth pole as a "set of expanding industries located in an urban area and inducing further development of economic activity throughout its zone of influence." The place where these 'expanding' or 'propulsive' or 'dominant' industries are located in the region becomes the pole of the region and agglomeration tendencies are promoted. Such tendencies arise because of

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external economies and result in polarisation of economic activities around that pole. The external economies that become available in the area constituting the growth pole of a region are basically of the following three types:

1. Economies internal to the firm: These are the lower average costs of production resulting from an increased rate of output. These are the economies which any single firm by its own organisation and effort can enjoy.

2. Economies external to the firm but internal to the industry: These are associated with localisation of industry. On account of close locational proximity of linked firms, as industry expands at a particular location, cost per unit of output to a firm declines.

3. Economies external to the industry but internal to the urban area: These can be termed urbanisation economies. They include development of urban labour markets, access to a larger market, and provision of a wider range of services.

Due to the emphasis placed by the growth pole theory on various policy oriented concepts, this theory has widely been accepted by contemporary governments in many parts of world as a tool of economic and even social transformation at the regional scale. However, these governments and other proponents of the growth pole notion have not entirely solved
the problem of just how to use this concept as a tool of economic and social policies for promoting basic changes in the distribution of population and economic activities.

The effective use of the growth pole as a policy instrument is inhibited by the fact that it is, as Hansen stated "characterised as an ambiguous concept composed of loosely related vague sub-concepts." According to Lasuen, growth Pole theory "is badly in need of a thorough semantic reworking; the concepts and the language which characterise it need more precise definition and more consistent usage". Growth Pole Theory suffers from two other deficiencies that adversely affect the utility of this theory as a policy instrument. One deficiency is related to the lack of knowledge concerning the process of growth within poles over time. The second deficiency is connected with the paucity of information about the nature and significances of the spatial components of inter-industry linkages that exist between various kinds of industries found within growth poles.

Growth pole theory also explains very little about where in the region growth poles should be established. Nor does it provide, a coherent explanation for various kinds of growth

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poles found in specific locations over the surface of the earth. Growth pole theorists have also made the mistake of using linear static tools, specially the input-output model, to apply a theory based on dynamic, non-linearities and cumulative change. According to Richardson "other problems, for which no conclusive answers have been produced by the growth pole theorists include: how to determine the threshold population size for a pole; how to distinguish between a 'natural' and a 'planned' pole, and whether both count; how to choose the most effective policy instruments for pole promotion; and how to identify and develop the mechanisms needed for diffusion into the hinterland"42

Despite these problems, the growth pole theory is a useful concept for spatial analysis. The growth-pole approach is attractive to policy-makers because it presents opportunities for integrating industrial policy, physical planning and inter-regional and intra-regional economic planning.

2.9: A Review of the Study of Industrial Concentration and State intervention to reduce spatial concentration

Like other developing countries, India had been experiencing since her independence, a high and perhaps

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42 H.W. Richardson, op.cit., p.166.
increasing concentration of population and economic activities at selected locations such as Bombay and Calcutta and severe disparity in welfare among different regions within the country. In response, the Government of India adopted a series of measures to promote a more decentralised and spatially "balanced" development. Most of the measures are directed at influencing the location of manufacturing industries as they are viewed as the prime determinant of spatial development. This kind of policy has been followed by State and local governments also. However, these policies are not without unintended side effects.

The purpose of A. Uday Sekhar's study has been first to identify the intended objectives of Industrial location policies which have been pursued in India in order to assess to the extent possible their effectiveness in achieving the objectives. Then, he has tried to evaluate their possible unintended as well as intended effects. 43

But before starting a study of locational policies, the manufacturing sector of India has been reviewed with emphasis on identifying its spatial pattern of distribution. According to this study one of the striking characteristics of Indian Industrial Development has been its uneven geographical

A. Uday Sekhar, Industrial Location Policy: The Indian Experience - World Bank Staff Working Papers Number 620. 75
spread. In order to identify the relative degree of industrialisation of different states, he has computed the share of value added in the factory manufacturing sector in NDP for each state. Comparing the ratios for 1976, it is observed that Maharashtra, West Bengal, Gujarat and Tamil Nadu were the industrial leaders, in the sense that they had an above average manufacturing value added | NDP (VAM/NDP) ratio.

As per this study in 1961, also, these states (along with Delhi) were relatively more industrialised (with the exception of Tamil Nadu). However, during 1961-71, the manufacturing sectors of the other states have been growing at a faster pace relative to NDP.

The next part of the Uday Sekhar's study presents a review of the industrial location policies pursued by the government. According to him, policies influencing interstate distribution of industry comprise (1) Industrial licensing, (2) Location of Public Sector Plants (3) distribution and pricing policies for intermediate industrial inputs and (4) State Government incentives. Since 1951, the central Government has been authorised to license a new industrial establishment or a substantial expansion. This instrument has been used to achieve a "balanced" regional development.
According to Uday Sekhar, location decisions of public sector plants are also important policy instrument, because many basic and capital goods are produced by the Public Sector in India. It has been observed that less developed states of Madhya Pradesh and Bihar received large shares of investment, followed by Orissa and West Bengal. Now he points out that since location decisions were made on the basis of technical and economic consideration as well as regional balance, it is impossible to isolate the degree of regional consideration which went into location decisions, but an empirical analysis shows that the per capita cumulative investment in this sector has been consistently negatively related to State per capita income and undoubtedly it contributed to balancing the distribution of industry among states.

With regard to the distribution of such basic commodities as cement, steel and coal, "freight" pooling" is exercised by the central government, so that firms in every location may equally benefit from the provision of these goods.

State Governments provide a host of incentives aimed at attracting industries to their own states. They include financial assistance for investment, the provision of infrastructure and industrial estates, concessions in power and water tariffs and concessions in taxes.
According to Uday Sekhar, policies influencing intra-regional distribution of industries include (1) those for encouraging village and cottage industries as well as modern small scale enterprises, (2) Industrial estate programs, (3) Rural industries Project programme, (4) metropolitan planning and (5) incentives to promote industrial development in backward districts. Generally these programmes are designed to promote the development of rural and backward areas by encouraging industries in those areas or by encouraging traditional or small enterprises which are more equally distributed over space.

The study under review analyses changes in the spatial pattern of industrial location during 1960-75. The study has observed that as far as inter-state distribution of industry is concerned, various indices indicate that the concentration of industry subsided from the 1960s to the 1970s. For example, converging trends among States were observable from 1961 to 1975 in the share of the manufacturing sector in the state product and in the value added per employee in the manufacturing sector. According to this investigation, the industrial value added and employment became more equally distributed among states from 1960 to 1975 as measured by the Theil's Inequality and the Hirschman-Herfindhal Indices. He
points out that since the trends in industrial location are results of both market forces and government policy, it is not possible to conclude that industrial location policies have successfully narrowed disparities among states. However, there are good reasons for speculating that some of the policies were instrumental in narrowing the disparities.

Next, the intra-regional distribution of industry has been examined. By comparing the degree of concentration of industrial employment in 1961, and 1971, by grouping cities by size, one main conclusion has been obtained. For India as a whole, the employment in the household industry lost the degree of concentration. Substantially from 1961 to 1971, due to a reduction of concentration (relative to population) in the smaller classes of towns. However, the non-household industry maintained its level of concentration during the period. This means that the industrial policy apparently had not resulted in any substantial shift of industry away from large cities to smaller towns.

Finally, Uday Sekhar's study presents an overall assessment of industrial location policy. According to this study from the viewpoint of efficiency, the best set of measures to correct inefficient locational distribution of industries operate via readjustments in infrastructural
investment and the prices charged for their utilisation. Direct industrial location policies such as licensing and input rationing are poor substitutes. The study suggests that even if the best solutions are not workable, it would be advisable to operate through incentives and disincentives rather than through controls, because the latter were crude devices and may lead to extremely large efficiency loss in the national economy without being detected.

The study also concludes, that one serious limitation of locational control is that, contrary to expectations, controls cannot induce industrialists to invest in non-viable areas. Therefore, if licensing is utilised actively for locational purposes, the result will be a decrease in investment in the restricted areas without a compensating increase in other areas. This involves not only a loss in efficiency, but also a defeat of the objective of industrialising non-restricted areas. Uday Sekhar, on the basis of this investigation has suggested a thorough overhauling in the approach towards locational concentration of Industry.