

CHAPTER I

EVOLUTION OF THEORY OF LOCATION

J.M.VON THUNEN (1826)

He was concerned with theoretical explanation of location of agricultural activities. The cost of transport and the rent of land are the main factors which explain according to Thunen, the location of agricultural activities and also of the manufacturing plant. In his model of concentric circles of economic activities with a city situated in the middle of coal and iron mines and agricultural activities spread in outlying regions on the assumption of homogenous land surface, the difference in the price of agricultural products in the city and the outlying region is equal to transport cost of agricultural production from the respective regions to the city. ¹

The major input variable in this model is transport cost, and the normative relationship assumed is the wish to maximise economic rent. Capital has no place in Thunens' theory and labour per se differing in skill and cost is insignificant as the differential is of the nature of land rent.

ALFRED WEBER:

★ Systematic study of industrial location as a discipline started only with the publication of Alfred Weber's book on the subject. According to W. Isard Weber's work is the 1st

attempt to construct a general theory of location of economic activity. The location triangle model of Weber has been a cornerstone of the classical theory, or, the least-transport-cost theory. The difference between von-Thunen and Weber's theories lies in the fact that von Thunen considered, "What type of production suits given location" and Weber considered, "most suitable location for a given branch of industry."

Unlike Von Thunen, Weber assumes uneven deposits of fuel and raw materials and several consuming centres, though his diagrams and discussions are mostly in terms of single market only. But he assumes several labour locations, with labour immobiles and in unlimited supply at a given wage rate. Underlying Weber's discussion is an implicit assumption of conditions of perfect competition. He divides the main factors influencing location into two broad categories i) General and Regional, 2) Agglomeration and deagglomeration. Weber realises material costs due to regional variations, but he treats them as a difference in their transport costs, weight losing and weight gaining etc. If the production requires use of more than one raw material, a place somewhere between the source and market may be the place of least-transport-cost. According to Weber, when Material Index is zero and location is market oriented. Labour cost is significant, because, it may exert a pull from the least transport cost location.

The decentralising tendencies of transport costs and labour costs are counteracted or intensified by agglomeration and degglomeration. He believed that industries with high value added can reduce expenses by agglomerating. This high value-added has two main constituents, the labour cost and cost of machinery. Generally when labour is the vital part of value-added, a real force of agglomeration exists.

Weber does not include factors, like interest, insurance, taxes in 'Pure theory of location' on the ground that they are institutional. Capital, climate, management are excluded from general theory on the ground that they do not influence location of all industries. According to Greenhut, "Weber's assumption of constant demand and his omission of institutional factors left gaps, which must be closed for a complete understanding of plant location in capitalistic economy."

TORD PALANDER:

A Swedish economist who developed Weber's analysis to subtle points in greater refined details in his book published in 1935. His approach, "1) he analyses given the price and location of materials and markets, where will production be located? 2) determination of the extent of markets, given the place of production, costs and transport rates. Palander develops a theory of spatial duopolistic competition in linear market in various combinations of costs of production and transport of firms and tries to determine the extent of market

commanded by each firm. Later on the assumption of a linear market could be relaxed to understand situations in three dimensions.

According to Palander a firm's profits are influenced by the extent of market the firm controls. Given the cost of production and profit per unit of output as well as the size of the market, the total profits become a function of the distance of the outer limit of market from the plant. The extent of market and consequently the profits are influenced by the locational decisions of competitors.

After explaining the market areas in spatial competition Palander turns his attention to the problem of choice of plant location. Here, he has developed Weber's analysis of transport orientation to considerable details. In his attempt to introduce market areas into the analysis of transport orientation, Palander demonstrates that different sections of the market will be served by different least-transport-cost points.

Palander has stressed in his discussion the importance of dynamic view of locations taking into account changes in factors influencing location through time.*

EDGAR HOOVER: 1937:

He separated costs factors as, transport and extraction costs. He assumes perfect competition between producers/ of sellers and perfect mobility of labour. As long as the cost

of extraction does not vary with output, that is in the absence of economies of scale, transport costs are the only determinant of location. When the delivered price, that is cost of production and cost of transportation rises steeply other producers step in, in the intermediate locations.

Hoover analysed the characteristics of freight costs. He stressed that the transport cost does not increase proportionately. With distance, rather the additions to such costs are less than proportional as the distance increases. He analysed the agglomerating and degglomerating forces more fully.

Hoover is more concerned with cost (than with demand) as others studied earlier.

DEMAND APPROACH TO LOCATION:

Christaller introduced in 1933, the 'central-place-theory'. August Losch refined the theory in 1940. He wrote, "the location and production of most goods lie closer together" "and" the production of most goods is rather evenly distributed in respect of their sales." According to Losch the right approach to location is to find the place of maximum profits, where total revenue exceeds total cost by the greatest amount. The approach is deductive. They assume, existence of space exploiting activities, transportation costs and economies of scale. Their assumptions are, "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 of each product and vi) completely rational behaviour of all producers and consumers. They disregarded existence of external economies and inplant linkages. They assumed a hexagonal market area surrounding the production site, ^{is} which would be optimal from the point of view of the individual plant. The difference between the two models arises from their different ways of treating the combination of market areas." ¹ 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 derives the organisation from below.... the two models apply to different types of goods, Losch model to transportable commodities and Christallers to immobile services.".

Hermansen has emphasised one basic weakness of the Christaller model. It does not allow for specialisation among places or division of labour other than that represented by the supplying higher order centres of goods to lower ones. Thus, all centres are service centres. The applicability of this model is, therefore, limited to the service sector.

In the Losch model, the following conditions have to be satisfied 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) Non firm makes any abnormal profits to induce entry of new firms.
- iv) The area of supply, production & sales must be as small as possible.
- v) At the boundaries of market areas, consumers are indifferent as to which of the two neighbouring producing locations they get their supply from.

Losch superimposes all 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 will be towns or cities.

The Losch theory has been criticised on many points. Many of its assumptions have been questioned. Losch neglects spatial costs variations. In his model, demand is the sole determinant of the location of producers. Transport cost has the effect of only limiting the size of the market areas.

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 explain how the centres flourish, stagnate or how the growth impulses are transmitted through space. Also, "Loch model does not have any ^{sp}aggregative features. It is strictly speaking more a model of spatial specialization, location and

trade of individual goods than a model of overall spatial, organisation. Both these theories seem to hold good more for a diverse industrial economy where in activities of various kinds may not be spread so uniformly as visualised by Christaller and Losch.

But as pointed out by Bos (1963) "these theories were the first-global theories of location, attempting a simultaneous co-herent explanation of the spatial pattern of human settlement, including the location of production and consumption in spatial structures with different locations, size and functional structure. Although both these theories are partly positive.... and partly normative--- they have contributed considerably to the understanding of spatial interrelation and to the evolving view of cities and systems within systems of cities.).

SARGENT FLORENCE'S THEORY:

S.Florence was critical about Webers geographical aspect of location. He observed that the relation of an industry to an area is not so important as the relation of the industry to the distribution of the occupied population as a whole. The popular meaning of localisation i.e. relation between industry and geographical area has not been accepted by S. Florence. To establish a relationship between the population distribution and the distribution of the industry, he takes the occupational distribution of the population.



The locational trends reflect the relative attractiveness of different regions, as also the propensity of each industry for dispersal or decentralisation.

LOCATION QUOTIENT:

"The Location Quotient" can be computed by two different methods".

- i) by dividing (a) the percentage share of the region in the total workers employed in the industry by (b) the percentage share of the region in the total working population.
- ii) by dividing (a) the percentage share of the industry in the total workers employed in the region by (b) the percentage share of the industry in the total working population.

Both the methods yield the same result. The difference between the two methods can, however, be explained by the following formula,

$$\frac{A}{C} \times \frac{B}{D} = \frac{\overset{A}{B}}{B} \times \frac{C}{D}$$

Where A represents the share of the region in the total workers employed in the industry, B represents the total workers employed in the industry, (represents the share of the region in the total working population, and D represents the total working population.

If an industry is evenly scattered over the whole country, its location quotient will be close to unity for each region, whereas if the industry is localized in any particular region, the location quotient will be more than

unity for that region, and zero or so for others.

CO-EFFICIENT OF LOCALIZATION:

"When workers are divided up region by region as percentages of the total in all regions, the co-efficient is the sum (divided by 100) of the plus deviations of the regional percentages of workers in the particular industry from the corresponding regional percentages of workers in all industry. This will yield a co-efficient varying from 0 to 1. Complete co-eincidence region by region of the particular industry with all industry will yield a co-efficient of 0, while extreme differentiation will yield a figure approaching unity. In between the two, will fall industries, whose co-efficient of localization may show wide variations.

The co-efficient of localization indicates the propensity of each industry for localization. Those industries which show low co-efficient of localisation have high propensity for dispersal, for they can thrive in widely different environments. The examples of such industries are mineral waters, bread and flour, building, tailoring, sho^emaking, brick-making, grain-milling, etc. On the contrary, those industries which show high co-efficient of localization are either extractive industries such as coal-mining or slate quarrying, which must necessarily be located near their deposits, or, industries which use considerable proportions of weight-losing materials, such as iron and steel, tin-

plating, copper-manufacturing and other metal industries.

Such industries are generally raw material controlled rather than market controlled. Industries lying between the two extremes, such as cotton, jute, paper, cement, match, Oil-refining, and general engineering have usually a wide choice of location. It is in these industries that the relative pull of different factors, namely, transport, labour and agglomeration, exercises an important influence, and the question of selection becomes difficult.

CO-EFFICIENT OF LINKAGES:

The co-efficient of linkage signifies the extent to which two industries tend to be located in the same region (owing to related technical processes or mutual interdependence for some common factor). The co-efficient of linkage can be worked out by the following formula. When workers in various industries are divided up region by region as percentages of their total, it is the sum (divided by 100 and subtracted from unity) of the plus deviations of the regional percentages of workers in the particular industry from the corresponding regional percentages of workers in the particular industry from the corresponding regional percentages of workers in the other industry. This will yield a co-efficient of linkage varying from 0 to 1. Complete coincidence of the two industries region by region will give a co-efficient of linkage of 1, extreme differentiation.

A High co-efficient of linkage invariably signifies that the two industries are either mutually interdependent on some common geographical factor or vertically related as consecutive processes. The examples of such industries are cotton spinning, cotton-weaving, textile finishing and packing, textile machinery, certain dye stuff industries etc. All these industries have a certain advantage in juxtaposition, and are in fact spot-localized. It is, therefore, natural that the industries having a high co-efficient of linkage tend to move in the same direction, and their locational trends usually manifest considerable degree of uniformity and similarity.²

i) uneven distribution of productive resources

ii) lack of cheap transport facility.

"Recent trends in localization suggest a wider dispersal of productive activity. The propensity of each industry for dispersal & according to the nature and character of raw materials the character of technical processes involved, the availability of other productive factors, & its adaptability to environmental changes. Generally speaking, the industries using 'pure' 'or' ubiquitous' materials in the manufacturing processes, and having a 'material index' not greater than unity, possess greater degree of propensity for dispersal' than industries using highly 'localized' and 'weight-losing' materials in the manufacturing processes, and having a material index } than unity. The development of alternative

sources of power, like hydro-electricity, discovery of new substitutes, the changes in the technical process, the cheapening of the transportational system, the preference for the policy of balanced regional development, the greater mobility of labour, capital and other productive factors—all are tending to bring about a wider dispersal of productive activity.

Industries could be divided into 3 broad categories;

- 1) Industries showing no dispersion
- 2) those showing dispersion, but no decline in original locations.
- 3) those showing dispersion, accompanied by decline in original locations.

1st category- Iron & Steel, show high co-efficient of localization.

2nd category- Sugar and paper, manifest a tendency for dispersal. This dispersal is unaccompanied by any decline in the importance of original locations, the original locations continue to possess decisive natural and economic advantages and that these locations were not unscientific or irrational.

3rd category- Cotton and Cement industries. Which manifest an unmistakable tendency for dispersion accompanied by decline in the importance of original locations. The shift reflects that environmental changes have created better opportunities for others. These industries use 'Pure' materials which impart whole or considerable part of the weight

to the finished product, or they could be started without any difficulty wherever other productive factors are available. They are "market-localized". It is these industries which offer the greatest prospects for dispersal and decentralisation" In any scheme of regional planning such industries have imp. role to play.

They are useful for framing a realistic policy of locational planning, based on broader economic, ~~s~~^ocial and strategic considerations."

Industries with low coefficient of localization have high propensity for dispersal, for they can thrive in widely different environmental condicions e.g. mineral water, bread & flour, building, tailoring, shoemaking.

- i) Prevalence of small size units in low co-efficient industries.
- 2) Prevalence of medium size units in medium co-efficient industries.
- 3) Prevalence of large size units in Large co-efficient industries.

Inspite of some criticisms, which are not mentioned, it can be said that the indices provided by S. Florence are of immense help for an analysis of existing state of valuable guide in finding out the trends of development. The co-efficient of localisation helps the Government in deciding upon the types of industries that are amenable to dispersion under a schemē of regionalism.*

PERROUX (1955):

He developed the theory from observation of actual process of economic development. Development takes place not everywhere, but at certain points only, that too, in different intensity. The process of economic development is polarised, A growth pole may be a large and expanding firm or industry enjoying increasing economies of scale with expansion and having backward and forward linkages. Perroux was influenced by schumpeters theories of role of innovations and large scale firm. Rodell has added a refinement to the concept of growth pole. A growth pole according to him is a single firm (an) industry. If development is caused by several firms or industries of different kinds, then it becomes a growth centre.

The growth pole is a cluster of human activities, functionally linked with other larger and smaller clusters, sending socio-economic impulses to clusters lower in hierarchy and receiving similar impulses from centres higher in hierarchy. Growth poles are the centres having localised mix of economic, social institutional and psychological facilities interrelated with each other to create internal and external economies and extending their influences to surrounding areas in proportion to the size of the localized facilities.

In Indian condition the application of growth pole did not produce any result "In the course of their application

to the Indian situation the only alteration is the idea of a hierarchy of diluted poles in the form of growth points and growth centres. Such a concept has not aided diffusion of impulses from the core to the periphery but has become an instrument of drain of peripheral resources to the cores. Metropolitan centres like Bombay, Calcutta, Madras and Delhi are growth poles. But these metropolitan areas control almost the whole economy of the nation. They are islands devoid of functional links with surrounding regions. The links that exist are exploitative in nature and are thoroughly disadvantageous to the rural areas. The spill-over effect is confined to a narrow zone they act against the process of decentraliz| concentration leading to 'dual economy'. By Dual economy we mean, that a few urban centres or urbanised areas manifest all characteristics of "developed areas" while major part of the country remains primitive.

In India there is no North vs South problem, there are rather pockets of plenty", 'islands of prosperity' ¹ or centreperiphery problem.

A NEW APPROACH - CLUSTER APPROACH² - for development of rural areas.. The Basic idea is to treat the numendus small villages of the country as a community of a smaller number of clusters of contiguous village. Such clusters can be converted[†] into an instrument of fundamental change by proboting intra clusler interactions, community feelings,

simultaneously dissipating the growing upward linkages and providing more viable units area of development in our blighted rural sector, Village clusters are a strategy to strengthen lateral links and to dissipate growing vertical links in the settlement systems.

Thus the suction mechanism operating in the Indian economy at macrolevel through the flow of resources from the resource rich areas to the metropolitan economy will be avoided. When 'Percolation effect' is not seen, the cluster approach by which inter-village interaction, integration is strengthened and a threshold for planning is prepared on be tried.

DEFINITION & MEASUREMENT OF DISPERSAL:

The term 'dispersal' implies that an industry exhibits any of the following tendencies:

- a) The locations hitherto holding a relatively non-significant position have gained so much in magnitude as to attain a relatively significant position in the industry over a given period of time.
- b) The locations hitherto enjoying a relatively significant position in the industry in the beginning of given period of time show a decline or do not gain proportionally in the total increase of magnitude of the industry over the period.
- c) The locations not having the industry at the commencement of the period enjoy a relatively significant position in the industry at the end of the period &

d) the relative gains in 'magnitude' of the locations holding a relatively non-significant position in the beginning of the period combined with the share of the new location are more than the gains of locations that enjoyed a relatively significant position in the beginning of the period."

2) MEMORIA :

According to him, the dispersal of industries has been considered as the most effective weapon for combating regional imbalances. Dispersal is commonly thought of as relocation of industries. It should be considered in a wider context & should also include i) decentralisation of new industries & of 2) population centres within the country. Dispersal also implies that urban concentrations should generally be below some size which is a particularly attractive target of attack & that not two such centres should be close enough to form one target from the point of view of arrival attack.

3) HOOVER:

According to Hoover, the policies of dispersal can operate on at least 3 distinct area levels:-

1) NATIONAL SELF SUFFICIENCY: Which makes a national economy less-dependant on international trade. Nations try to be self-sufficient in matters of food, iron & steel production, armament and defence products, so that in times of emergency a country may be able to sustain itself.

2) REGIONAL SELF-SUFFICIENCY: Or balanced regional development which reduces the degree of economic specialisation of the separate region of a country. Every region tries to be as self-sufficient as possible.

3) COMMUNITY DIVERSIFICATION: Which reduces the degree of economic specialisation of individual towns or villages. Even the smallest area tries to be self-sufficient & to have a little economic relationship with other towns or villages as practicable.

OBJECTIVES OF DISPERSAL:

According to Prof. Hoover, dispersal & decentralisation aim at the following objectives:

1) It aims at a more even development of the local resources of the country as a whole. Under this type of industrial dispersion the industries would be varied & balanced locally in order to secure a varied & balanced life in different regions of the country.

2) It involves an optimum industrial development based on broader economic, social & strategical consideration. It establishes an equilibrium between the people & the heritage of the region." The aim of regional development should be to secure maximum efficiency in the utilization of available resources rather than the adjustment of rival claims of different areas to achieve their own aims & ambitions.

- 3) It seeks the objective of conservation of limited & exhaustible resources for the benefit of prosperity. Full development of forest or mineral zones, stock raising zones & cereal & raw produce & agricultural zones require the establishment of varied types of industries to utilize the diverse resources of these zones by treating them all as parts of a single unified broad region.
- 4) The regional development leads to an equitable distribution of employment opportunities. Such development is based on the truth that prosperity & pyerty are invisible. If industrial development in the country is to proceed rapidly & in a balanced manner, increasingly greater attention will have to be paid to the development of those states & regions which have so far remained backward.
- 5) It helps in the avoidance of migration of labour, prevention of the occurrence of depressed areas & equalisation of the percapita income in different parts of the country.
- 6) Decentralisation is the most useful passive measure for guarding against disastrous destruction of industrial clusters and population from launching a heavy aerial attack.