

WEBER'S THEORY OF INDUSTRIAL LOCATION

Alfred Weber, a German economist was the first who gave scientific exposition to the theory of location and thus filled a theoretical gap created by classical economists. He propounded his famous industrial location theory in 1909 which was published in German language, book entitled '*Uber den standart der Industrien*'. The theory was translated into English language which was published as '**The Theory of the Location of Industries**' in 1929. Since then, the work on industrial location has been critically reviewed and highly commended. His theory, which is also known as '**Pure Theory**' and '**Least Cost Theory**' has analytical approach to the problem. The basis of his theory is the study of general factors which pull an industry towards different geographical regions. It is thus deductive in approach. In his theory he has taken into consideration factors that decide the actual setting up of an industry in a particular area.

Problems:

Weber was faced with many serious problems. He wanted to find out why did industry moved from one place to another and what factors determined the movement. According to Weber, factors affecting location of industries may be broadly classified into two groups or categories:

1. Regional factors or **Primary** causes of regional distribution of industry.
2. Agglomerative and degglomerative factors or **Secondary** causes responsible for redistribution of industry.

In so far as regional factors were concerned these, among other things, included cost of the ground, buildings, machines, material, power, fuel, labour, transportation charges and amount of interest that the capital would have earned.

1. Regional Factors:

After examining the cost structures of different industries, Weber concluded that the cost of production varies from region to region. Therefore, the industry in general is localized at a place or in a region where the cost of production was the minimum.

According to Weber there are two general regional factors which affect 'cost of production:

- (i) Transportation costs, and
- (ii) Labour costs.

In fact, these two are the basic factors influencing location of industries.

(i) Transportation Costs:

Transportation costs play an important part in the location of an industry. Transportation costs are influenced by the weight to be transported and the distance to be covered. Generally, industries will tend to localize at a place where material and fuel are not difficult to obtain. Weber has further given that the basic factors for location of an industry are the nature or type of material used and the nature of their transformation into products.

(ii) Labour Costs:

Labour costs also affect the location of industries. If transportation costs are favourable but labour costs unfavourable, the problem of location becomes difficult to have a readymade solution. Industries may have tendency to get located at the place where labour costs are low. But labour and transportation costs should be low for an ideal situation. Whether labour costs will have an upper hand in the location of an industry will be decided by labour cost index.

2. Agglomerative and Deggglomerative Factors:

Agglomerative factors make industries centralize at a particular place. Such factors may include banking and insurance facilities, external economies and the like. The tendency of centralization is influenced by the manufacturing index which indicates the proportion of manufacturing costs in the total of production. If the coefficient of manufacture is high industries will have a tendency to centralize, if it is low, tendency of decentralization may be visible.

Deggglomerative factors are those which decentralize the location of industries. Examples of such factors are local taxes cost of land, residence, labour costs and transportation costs. Such factors decentralization because the cost of production stands reduced due to decentralization of shift in location.

ASSUMPTIONS OF THE THEORY:

Weber mainly attempted to analyse different cost minimizing factors and processes and their impact on industrial location. Like in other deductive theories, Weber also offered certain assumptions before analysing the theory. His assumptions were as follows:

- (1) The area is typically uniform or isotropic in form of terrain or relief, climate, soils, economic system, technology and distribution of population.

- (2) Manufacturing involves a single product at a time and the product is supplied to a single market.
- (3) Raw materials are not evenly distributed in space but at a few known and fixed locations which are available at equal transportation cost throughout.
- (4) Markets are known as fixed at specific places.
- (5) The distribution of labour is fixed, as are wages at any specific location. Wages, however, can vary from one location to another. This means that labour was not mobile, and thus not affected by the location of industries; (of course, Weber knew this was not actually true in the real world).
- (6) Transport costs are uniform and tends to increase with increasing linear distance and weight of material transported. Transport routes are not fixed but connect origin and destination by the shortest distance.
- (7) Other assumptions include: (a) there is a perfect market competition, (b) each industry would incur identical production cost, and (c) there would be a uniform demand and uniform price for a product at all markets.

Description of the Theory

According to Weber, the optimum location of a firm is determined by transport cost, labour cost and advantages of agglomeration. To him, at first the point of least transport cost is determined and there after the effect of advantages of agglomeration is considered.

Role of Transportation Costs:

- 1. A one market (M), one raw material (R1) condition gives rise to THREE situations.**
 - (i) Raw Material Available Everywhere:** The best location in this situation is the market, as that will simply eliminate the transportation costs for the manufacturing unit.
 - (ii) Raw Material Fixed, And Pure:** The manufacturing unit, in this case, should be located either at the market or at the source.
 - (iii) Raw Material Fixed and Gross (i.e. It Loses Weight on Processing):** The best location will be at source.
- 2. One Market, two Raw Materials (R1, R2) condition gives rise to FOUR situations.**

- (i) **Both R1 and R2 are found everywhere:** here, the best location will be at the market, as in that case, lowest transportation costs would prevail.
- (ii) **R1 is fixed, R2 is found everywhere, both are pure:** the best location would be at the market, because then, transportation charges for R1 only will have to be paid.
- (iii) **Both R1 and R2 are fixed and pure:** the best location will be at the market, because in that case lowest aggregate transportation charges will prevail.
- (iv) **Both R1 and R2 are fixed and gross:** this is a complex situation, for which Weber introduced the “**locational triangle**”. Two raw materials-R1, and R2-and market (M) form the three nodes of this triangle. The transportation charges are a product of the cargo weight and the distance carried by transportation. Thus, a pull is being exerted on the location by each of these three nodes. It is seen that the weight-losing manufacturing processes like iron smelting tend to be located near the source of raw materials, while the weight-gaining ones like baking tend to be located near the market (Fig. 1).

Role of Labour Costs:

To determine the role of locational pattern of labour force on manufacturing location, Weber’s locational triangle is placed in concentric pattern of rising transportation costs outwards from the centre (Fig. 1). It is assumed that the labour force is dispersed outwards and the distance from the centre represents savings on account of labour costs decrease and a point (L) comes where the savings on labour cost overcome the handicap of rising transportation costs. This is a more profitable location than ‘F’ which is the lowest transportation cost location.

According to Weber, labour is concentrated at some definite places and different places have different labour cost. In order to save labour cost, the industrial plant may be relocated away from the point of the least transport cost. An industrialist considers the possible savings in labour cost being greater than any possible additional costs involved, he would be making a move from the point of least transport cost. Weber resolved this matter through using isodapane method.

isodapane is defined as a contour line drawn through all the points with equal total transport costs, with reference to the supply of each input at the point of industrial location, as well as the finished products. Isodapane joints those points where increased transport costs are balanced by labour movement cost savings.

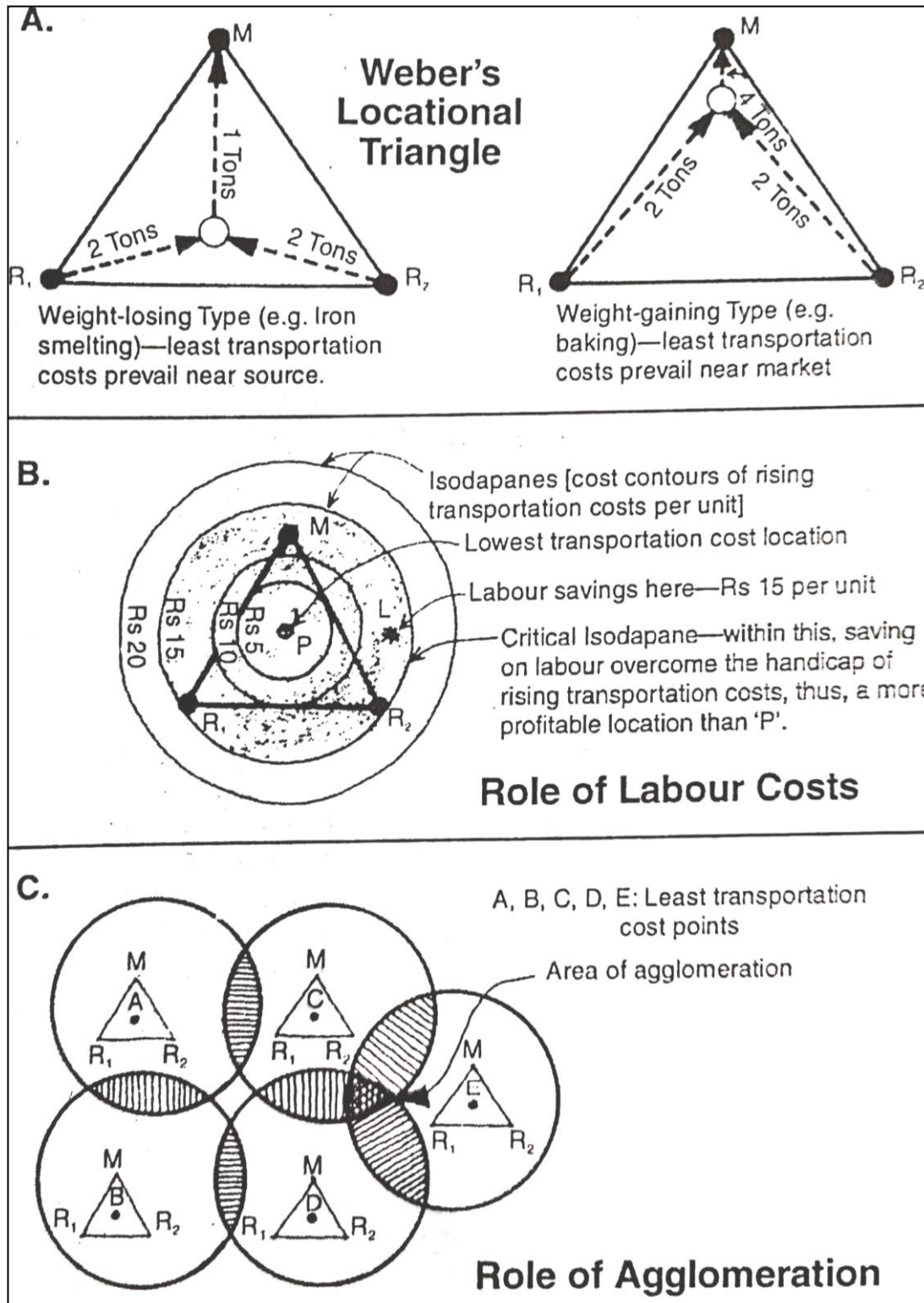


Fig. 1: Weber's Theory of Industrial Location

Role of Agglomeration:

The coming together or agglomeration of industries offers cuts in production costs if two or more industries operate in the same location (Fig. 1). Weber visualized agglomeration economies as an important secondary factor. Agglomeration of industries occurs when several industrial enterprises with different industrial plants would mutually concur to locate and operate at a clustered spatial point closely. Agglomeration economies denotes the savings of the individual plants that result when they operate at the same location. This saving is the result of common use of such activities as financial services, public utilities, auxiliary industries etc. As more and more enterprises cluster, linkage increase and there is an increased flow of goods between plants specialized labour and savings because of purchasing of materials in bulk and facilities of large-scale marketing of finished products. Thus, agglomeration economies can be obtained when a firm produces items in mass or when many firms cluster together in the same location. Agglomeration economies exert significantly on the location of industrial plants. Weber visualized agglomeration economies as a strong deviational force on the location of minimum transport cost in the same way as is exerted by cheap and skilled labour locations.

CRITICISM:

Weber's industrial location theory explains some basic influences on the location of industries, but it has been criticised mainly because of its assumptions and changed circumstances related with technology, transport system etc. Some important criticisms of Weber's theory are given below:

1. Unrealistic Assumptions:

According to critics of this theory, Weber has unrealistically oversimplified the theory of industrial location. Many assumptions in the theory are unrealistic. According to them Weber has taken only two elements for determining the cost of transportation namely weight and distance. He has not given due to place to the type of transport, quality of goods to be transported, topography, character of region etc.

2. Labour Centres Notion Defective:

Weber's ideas about labour centres have also not been accepted. He has started with the presumption that there are fixed labour centres with unlimited supplies of labour in each of them. Obviously both these assumptions are not correct. There cannot be fixed labour centres, because each industry creates new labour centres. Similarly, there can never be

unlimited supplies of labour in any centre.

3. Ideas about Fixed Points of Consumption:

It is argued that Weber's this idea does not work well with the market conditions in a competitive structure. Consumers are always scattered all over the country and thus consumer centres always shift with a shift in industrial population. There can therefore be no fixed point of consumption.

4. Vague Generalisations:

Weber, while expounding his theory of industrial location, has introduced, it is believed, certain vague generalisations. He has given no due place to non-economic factors of industrial location, which play a big role in this regard. Who can deny that there are certain historical and social forces which go a long way while deciding industrial location of an industry, but he has completely ignored them, which has made his theory very unrealistic.

5. Defective Method of Analysis:

Weber has tried to classify material into ubiquitous and fixed material. Again, the division is arbitrary. According to Robinson who does not know that in actual practice materials are drawn from many alternative fixed points.

6. Overburdened with Technical Considerations:

Theory is heavily overburdened with technical considerations. It has not laid due stress on costs and prices and has over stressed technical coefficients. The most important criticism about Weber's analysis is that it is lamentably removed from all considerations of costs and prices and it is formulated mainly in terms of technical coefficients.

Utility of the Theory:

No doubt theory suffers from some serious defects, yet it cannot be denied that it has its own value, importance and significance. It is primarily because the alternatives given are neither comprehensive nor complete. So far it is the only theory which is capable of universal application.

Every change of industrial location involves a change in the combination of means of production. But this theory obviously does not provide any guidelines for locating new industries.

Technical Terms

In the analysis of his industrial location theory, Weber has introduced and defined certain technical terms. He classified materials in terms of weight and availability and their relative significance in processing of products. The terms are as follows:

- (1) Ubiquities or Ubiquitous Materials:** The raw materials used in manufacturing industries which are available constantly everywhere and are not localised. Such materials do not influence the selection of location of the industry concerned.
- (2) Localized Materials:** Such raw materials which are found only in some well-known geographical areas. Examples include coal, petroleum, gold, bauxite etc.
- (3) Pure Materials:** Such raw materials which do not lose, or nominal lose their weight in processing. Raw cotton in spinning or cotton yams in weaving are given as examples.
- (4) Gross Materials:** That materials which lose weight in processing. Such materials differ in the proportion of loss depending on the characteristics. For example, iron ore, tin are, bauxite ore, sugarcane, sugar beet etc. lose their weight very much in processing.
- (5) Location Weight:** The total weight that is involved in movement of raw materials and produced materials per unit of products. It is the combined weight of raw materials and manufactured goods.
- (6) Material Index:** It is a measure of materials used in manufacturing industry which is calculated by the total weight of localized materials used per product divided by the weight of the product. Manufacturing industries in majority have an index greater than 1.0 and are called '**weight losing**'. Thus, material index is used to indicate whether the least cost location is oriented towards the source of raw material or market centre. If the material index comes to be less than 1.0, it favours market site plant location; if it is more than 1.0 it moves to the raw material site location, and if a plant uses only pure material as raw material, it has an index of 1.0 and may be located anywhere.
- (7) Isodapane:** A line joining the places (points) having same transport cost per unit manufactured good is termed as isodapane by Weber.