Weber's Theory of Industrial Location

Course: Economic and Resource Geography (Paper-4)

(B.A. Geography, Part-11)

By

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**Alfred Weber** was the first person who propounded a comprehensive theory for the location of a manufacturing unit. He was a German economist who taught at the University of Prague (1904-1907) and the University of Heidelberg (1907-1933). In 1909, he published his “**Theory of the location of Industries**” incorporating several ideas partially formulated by Wilhelm Launhardt in the 1880’s.

**His theory was based upon several premises and postulates as follows;**

1. The unit of analysis as a single, isolated country that is homogeneous in term of climate, topography, race, technical skills of the population, and is under one political authority.

2. Some natural resources are ubiquitous (such as water, sand) whereas others occur only in fixed locals (like coal & iron ore)

3. Available workers are not “ubiquitous”, rather they are “fixed” in specific places.

4. Transportation cost in a function of “weight” and “distance”, increasing in direct proportion to length of shipment and weight of cargo.

Weber postulated that, given the controlled laboratory condition just described, manufacturing plants would be located in response to three forces – **relative transport cost, labor cost** and something he called “**agglomeration**”. 
Role of Transport Cost:-

Weber theorized that the transport cost would operate in distinctively different ways in different cases. Let us examine the situations given below.

Case A: **One market and One raw material**

If these are one market to demand the product and one source of raw material involved in the process, then these are three possible locations for the manufacturing plants

- If the raw material as ubiquitous, then the factory will be located at the market, since at this point- the lowest transport cost would prevail on both- material and product
- If the raw material is fixed and pure (e.g. Weight – loss is zero) then the factory can be located in either the market or at the source of materials
- If the raw material is fixed and gross (Weight is lost in the manufacturing process), then the industry would locate at the source of material.

Case B: **One market and Two raw material**

If there is only one market and the product is manufactured from two raw material (R, &R2), then manufacturing will tend to locate in one of the following several ways.

- If both R.&R2 are ubiquitous their manufacturing will be at the market
- If R1 &R2 is fixed elsewhere than at the market and if both are pure, then manufacturing will be at market.
In this case transport changes will have to be paid on only R2

- If both the raw materials are fixed and pure, the factory will be at the market. Both components would be sent directly to the consumption area for process since this would give the lowest-aggregate-transportation cost. Otherwise of the factory located at either the source of R, or the source of R2, additional transport changes would have to be paid on that leg of the journey on which the product moved to the market (M) (Fig. A)

- If both the raw material is fixed and gross, the solution is complex. To solve M Weber introduced his famous location Triangle (Fig. B)

Illustration: - Suppose that both R1 and R2 lose 50 percent of their weight in the manufacturing process, and that 200 tons of each is required in a year. If the factory were located at M the total transport cost for a year would be

- $200 \times 100 \text{ km}$

  $= 20,000 \text{ km on R, from SR, to M}$, plus

  $20,000 \text{ tons km on R2 from PSR2 to M}$

  $40,000 \text{ tons km. in all.}$

  If the factory were located at SR, the burden would be (a) $200 \text{ tons} \times 100 \text{ km} = 20,000 \text{ tons km}$

  $R2 \text{ from SR2 to SR, plus}$

- $200 \text{ tons} \times 100 \text{ km} = 20,000 \text{ tons km on the finished product from SR1, to M}$ also 40,000 tons km
However, if the factory were located at point – midway between SR1 and SR2, the transport cost would be as follows (a) 200 tons \( \times \) 50 km = 10,000 tons km on R, from SR, to x, plus (b) 10,000 tons km on R2 from SR,2 to x, plus (c) 200 tons \( \times \) 86.6km = 17320 tons km on finished product from x to m, or a total of 37,320 tons km. This is less than the burden facing an enterprise located at either M or SR1, or SR2.
If the two raw materials do not have the same Weight–loss ratio, and if different amounts are required, the factory would tend to locate nearer one of the raw material sources (higher weight–loss ratio or of greater amount required), so as to lessen the burden of transportation cost.

**Criticisms:**

Scholars have criticized Weber’s locational triangle concept on two major counts.

1. **Freight rates are not directly proportional to distance, and they are not ton for ton same on finished products as on raw materials.** But in spite of this criticism Weber’s locational triangle was surely a step forward in the advancement of location theory. He propounded the basic fact that transportation cost is theoretically the most fundamental element determining the location of a manufacturing plant.

**Role of labour cost:**

Weber recognized labor cost as an important factor which varies spatially and could influence the location of a factory. A locality of high transport cost might be able to offset the disadvantage through savings in wages. Then the location of factory depends upon how much it has to pay on transport cost and how much it has to pay on labor cost? For its solution, Weber introduced the concept of the isodapane. This is the line connecting the focus of points of equal total costs.
Example fig. C represents a very simple problem involving a single market-M and a single raw material source SR.

**Assumption:**

1. Transport costs are same per ton-km for raw materials and on finished products. The concentric circles around M portray transport charges from all points to M; those around SR portray transport charges from all points to SR. Both sets of circles are spaced to represent one unit of transport cost per ton km.

2. The raw material is focus and loses 50% of its weight which means that two tons material enter the factory for every ton of product it produces.

Now if the factory were located at X. The aggregate transport cost would consist of eight units on raw materials (two ton to the fourth concentric circle around SR), plus ten units a product, or 18 units in all. The heavy solid line seen in the figure is an isodapane connecting all points at which transport cost would total 18 units.

If the factory were located at SR, every ton of product shipped from SR to M, the amount would bear ten units of transport cost. If the factory were located at M, the amount would be 20 units of transport cost. Isodapanes reveal how much advantage the other place would have to be in order to offset its disadvantages in terms of transport costs, thereby attracting the industry to that location. As figure-C shows all points on the isodapane bear a transport cost burden of 18 units, a handicap of 8 units compared to SR. Accordingly all points on that line would have to possess an advantage of at least 8 units in order to
lure a factory in this enterprise. Weber’s contribution of isodapane provides a technique for the introduction of systematic introduction of a new variable (such as labor) into a theoretical scheme.

**Agglomeration: -** The advantages inherent in the factories locating near to each other. According to Weber there are some advantages which attract the industries in certain areas like banking, credit, communication facilities and insurance. Agglomeration may take place through increase in production or increase in plants making a cluster due to the demand of that produced. But some factors may discourage plant establishment i.e. deglomeration

**Criticisms:**

(1) Theory is over simplified.

(2) Theory only takes transport cost and labor cost as factors of location it does not take other factors like climate, historical factors, level of taxation, govt. support.

(3) Assumptions regarding fixed and immobile labor is not correct labor is highly mobile now days

(4) Webber has measured transport cost only on the basis of weight and distance although transport cost is also affecting the rate, policies of the transport agencies, the nature of commodities, the media of transport available and topographical character of region

(5) Webber’s theory is mainly formulated in terms of mathematical coefficients, rather than costs and prices.

In spite of all these drawbacks Webber’s theory stands out as the first systematic attempt for the location of the industry.
References:


2. C.J. Friedrich “Alfred Webber’s theory of the location of industries” ,Chicago, 1928, PP 226