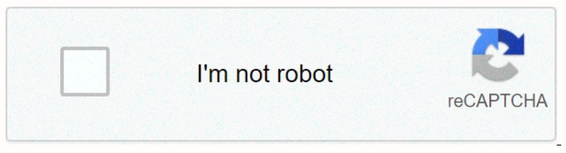

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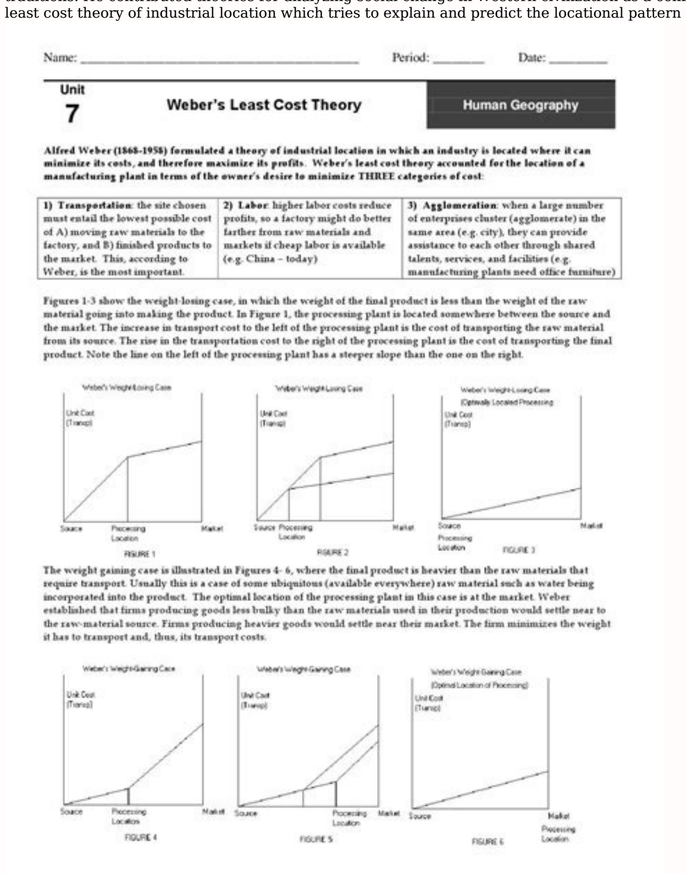
Alfred weber's least cost theory

Weber least cost theory. Alfred weber's least cost theory of industrial location.

German geographer and economist (1868–1958) For the Swiss politician, see Alfred Weber (Swiss politician). This article includes a list of general references, but it lacks sufficient corresponding inline citations. Please help to improve this article by introducing more precise citations. (December 2008) (Learn how and when to remove this template message) Alfred WeberGerman Economist, Sociologist, and TheoreticianBorn(1868-07-30)30 July 1868Erfurt, Province of Saxony, Kingdom of PrussiaDied2 May 1958(1958-05-02) (aged 89)Heidelberg, Baden-Württemberg, West GermanyKnown forWeber problemScientific careerNotable studentsCarl Joachim Friedrich Alfred Weber (German: ['veːbɐ]; 30 July 1868 – 2 May 1958) was a German economist, geographer, sociologist and theoretician of culture whose work was influential in the development of modern economic geography. Life Alfred Weber, younger brother of the well-known sociologist Max Weber, was born in Erfurt and raised in Charlottenburg. From 1907 to 1933, he was a professor at the University of Heidelberg. Weber started his career as a lawyer and worked as a sociologist and cultural philosopher.[1] Work Weber supported reintroducing theory and causal models to the field of economics, in addition to using historical analysis. In this field, his achievements involve work on early models of industrial location. He lived during the period when sociology became a separate field of science. Though his theory on 'Industrial Location' was strictly economic during his time it is widely studied in the field of geography now, mostly as a theoretical concept in the subdomain of economic geography.[1] Weber maintained a commitment to the "philosophy of history" traditions. He contributed theories for analyzing social change in Western civilization as a confluence of civilization (intellectual and technological), social processes (organizations) and culture (art, religion, and philosophy). Least cost theory Leaning heavily on work developed by the relatively unknown Wilhelm Launhardt, Alfred Weber formulated a least cost theory of industrial location which tries to explain and predict the locational pattern of industry at a macro scale.



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Unit 7 — Weber's Least Cost Theory — Human Geography

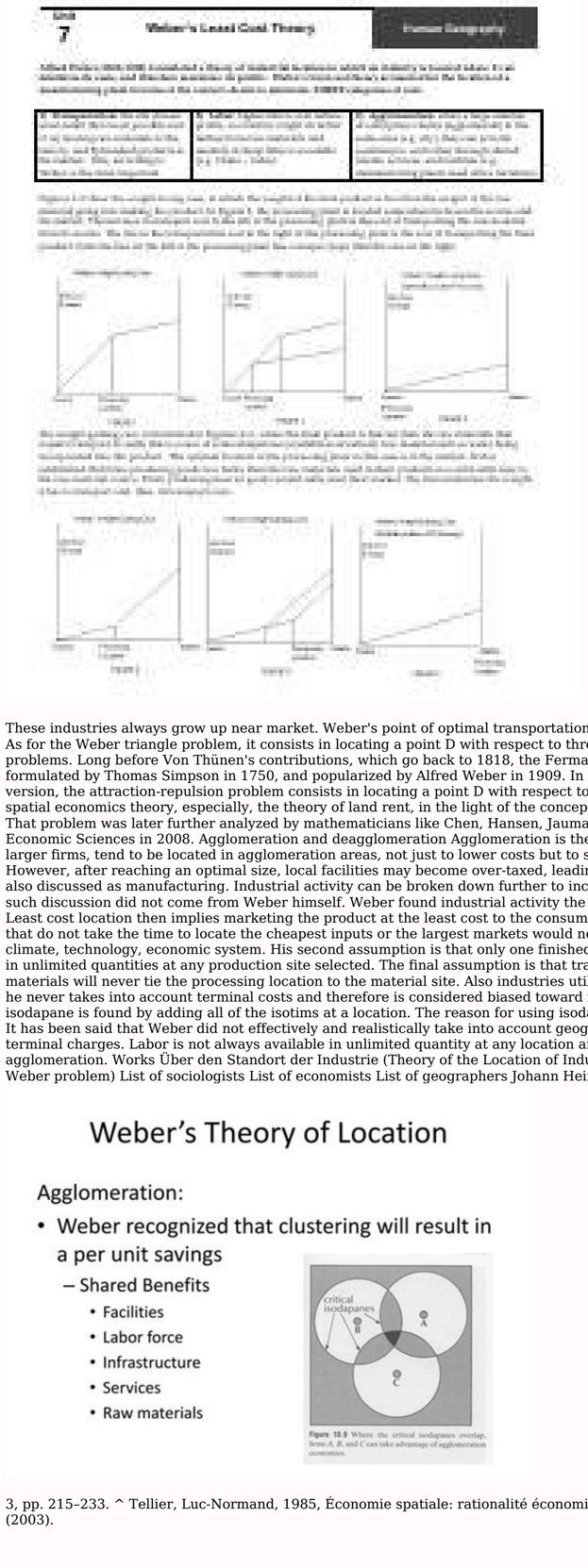
Alfred Weber (1868-1958) formulated a theory of industrial location in which an industry is located where it can minimize its costs, and therefore maximize its profits. Weber's least cost theory accounted for the location of a manufacturing plant in terms of the owner's desire to minimize THREE categories of cost:

1) Transportation: the site chosen must entail the lowest possible cost of A) moving raw materials to the factory, and B) finished products to the market. This, according to Weber, is the most important.	**2) Labor**: higher labor costs reduce profits, so a factory might do better farther from raw materials and markets if cheap labor is available (e.g. China – today)	**3) Agglomeration**: when a large number of enterprises cluster (agglomerate) in the same area (e.g. city), they can provide assistance to each other through shared talents, services, and facilities (e.g. manufacturing plants need office furniture)

Figures 1-3 show the weight-losing case, in which the weight of the final product is less than the weight of the raw material going into making the product. In Figure 1, the processing plant is located somewhere between the source and the market. The increase in transport cost to the left of the processing plant is the cost of transporting the raw material from its source. The rise in the transportation cost to the right of the processing plant is the cost of transporting the final product. Note the line on the left of the processing plant has a steeper slope than the one on the right.

The weight gaining case is illustrated in Figures 4- 6, where the final product is heavier than the raw materials that require transport. Usually this is a case of some ubiquitous (available everywhere) raw material such as water being incorporated into the product. The optimal location of the processing plant in this case is at the market. Weber established that firms producing goods less bulky than the raw materials used in their production would settle near to the raw-material source. Firms producing heavier goods would settle near their market. The firm minimizes the weight it has to transport and, thus, its transport costs.

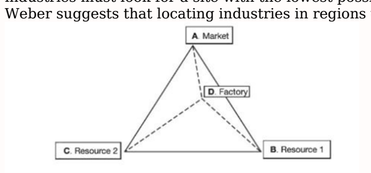
It emphasizes that firms seek a site with minimum costs for transport and labor. The point for locating an industry that minimizes costs of transportation and labor requires analysis of three factors: Material index The point of optimal transportation is based on the costs of distance to the "material index (MI)" – the ratio of weights of the intermediate products (raw materials or RM) to finished product or FP. a) RM is more than FP; MI>1[1] b) RM is equal to FP; MI=1[1] c) RM is less than FP; MI<1[1] In one scenario (a), the weight of the final product is less than the weight of the raw material going into making the product—the weight losing industry. For example, in the copper industry, it would be very expensive to haul raw materials to the market and process them there, so the processing occurs near the raw materials. (Besides mining, other primary activities (or extractive industries) are considered material oriented: timber mills, furniture manufacture, most agricultural activities, etc.. Often located in rural areas, these businesses may employ most of the local population. As they leave, the local area loses its economic base.) In other cases, the final product is equally as heavy as the raw materials that require transport (i.e. the Material Index is equal to 1). Usually this is a case of some ubiquitous raw material, such as water, being incorporated into the product. This is called the weight-gaining industry. This type of industry might build up near a market or near a raw material source, and as a result might be called a foot-loose industry. Cotton industry is a prominent example of weight-gaining raw material. In a third set of industries, including the heavy chemical industry, the weight of raw materials is less than the weight of the finished product.



These industries always grow up near market. Weber's point of optimal transportation is a generalization of the Fermat point problem. In its simplest form, the Fermat problem consists in locating a point D with respect to three points A, B, and C in such a way that the sum of the distances between D and each of the three other points is minimized. As for the Weber triangle problem, it consists in locating a point D with respect to three points A, B, and C in such a way that the sum of the transportation costs between D and each of the three other points is minimized. In 1971, Luc-Normand Tellier[2] found the first direct (non iterative) numerical solution of the Fermat and Weber triangle problems. Long before Von Thünen's contributions, which go back to 1818, the Fermat point problem can be seen as the very beginning of space economy. It was formulated by the famous French mathematician Pierre de Fermat before 1640. As for the Weber triangle problem, which is a generalization of the Fermat triangle problem, it was first formulated by Thomas Simpson in 1750, and popularized by Alfred Weber in 1909. In 1985, in a book entitled Économie spatiale: rationalité économique de l'espace habité, Tellier[3] formulated an all-new problem called the "attraction-repulsion problem", which constitutes a generalization of both the Fermat and Weber problems. In its simplest version, the attraction-repulsion problem consists in locating a point D with respect to three points A1, A2 and R in such a way that the attractive forces exerted by points A1 and A2, and the repulsive force exerted by point R cancel each other out. In the same book, Tellier solved that problem for the first time in the triangle case, and he reinterpreted spatial economics theory, especially, the theory of land rent, in the light of the concepts of attractive and repulsive forces stemming from the attraction-repulsion problem.
That problem was later further analyzed by mathematicians like Chen, Hansen, Jaumard and Tuy (1992),[4] and Jalal and Krarup (2003).[5] The attraction-repulsion problem is seen by Ottaviano and Thisse (2005)[6] as a prelude to the New Economic Geography that developed in the 1990s, and earned Paul Krugman a Nobel Memorial Prize in Economic Sciences in 2008. Agglomeration and deagglomeration Agglomeration is the phenomenon of spatial clustering, or a concentration of firms in a relatively small area. The clustering and linkages allow individual firms to enjoy both internal and external economies. Auxiliary industries, specialized machines or services used only occasionally by larger firms, tend to be located in agglomeration areas, not just to lower costs but to serve the bigger populations. Deglomeration occurs when companies and services leave because of the diseconomies of industries' excessive concentration. Firms who can achieve economies by increasing their scale of industrial activities benefit from agglomeration. However, after reaching an optimal size, local facilities may become over-taxed, leading to an offset of initial advantages and increase in prime cost. Then the force of agglomeration may eventually be replaced by other forces which promote deglomeration. Globalization Similarly, industrial activity is considered a secondary economic activity, and is also discussed as manufacturing. Industrial activity can be broken down further to include the following activities: processing, the creation of intermediate parts, final assembly. Today with multinational corporations, the three activities listed above may occur outside MDCs. Weber's theory can explain some of the causes for current movement, yet such discussion did not come from Weber himself. Weber found industrial activity the least expensive to produce.
Least cost location then implies marketing the product at the least cost to the consumer, much like retailers attempt to obtain large market shares today. Economically, it is explained as one way to make a profit; creating the cheapest product for the consumer market leads to greater volume of sales and hence, greater profits. Therefore, companies that do not take the time to locate the cheapest inputs or the largest markets would not succeed, since their product costs more to produce and costs the consumer more. His theory has five assumptions. His first assumption is known as the isotropic plain assumption. This means the model is operative in a single country with a uniform topography, climate, technology, economic system. His second assumption is that only one finished product is considered at a time, and the product is shipped to a single market. The third assumption is raw materials are fixed at certain locations, and the market is also a known fixed location. The fourth assumption is labor is fixed geographically but is available in unlimited quantities at any production site selected. The final assumption is that transport costs are a direct function of weight of the item and the distance shipped. In use with his theory he created the locational triangle. His triangle is used with one market and two sources of material. This illustrated that manufacturing that utilizes pure materials will never tie the processing location to the material site. Also industries utilizing high weight loss materials will tend to be pulled toward the material source as opposed to the market. Furthermore, many industries will select an intermediate location between market and material. The last generalization is considered to be wrong because he never takes into account terminal costs and therefore is considered biased toward intermediate locations. To further explore the location of firms Weber also created two concepts. The first is of an isotim, which is a line of equal transport cost for any product or material. The second is the isodapane which is a line of total transport costs. The isodapane is found by adding all of the isotims at a location. The reason for using isodapanes is to systematically introduce the labor component into Weber's locational theory. Weber has received much criticism.
It has been said that Weber did not effectively and realistically take into account geographic variation in market demand, which is considered a locational factor of paramount influence. Also his treatment of transport did not recognize that these costs are not proportional to distance and weight, and that intermediate locations necessitate added terminal charges. Labor is not always available in unlimited quantity at any location and is usually quite mobile through migration. Plus most manufacturing plants obtain a large number of material inputs and produce a wide range of products for many diverse markets, so his theory doesn't easily apply. Furthermore, he underestimated the effect of agglomeration. Works Über den Standort der Industrie (Theory of the Location of Industries) 1909 Ideen zur Staats - und Kultursoziologie (1927) Kulturgeschichte als Kultursoziologie (1935) Farewell to European History or the Conquest of Nihilism (1947) Einführung in die Soziologie (1955) See also Geometric median (also known as the Fermat–Weber problem) List of sociologists List of economists List of geographers Johann Heinrich von Thünen References ^ a b c d e "Alfred Weber's Theory of Industrial Location". Mapping Around. Retrieved 2022-10-13. ^ Tellier, Luc-Normand, 1972, "The Weber Problem: Solution and Interpretation", Geographical Analysis, vol. 4, no.

3, pp. 215–233. ^ Tellier, Luc-Normand, 1985, Économie spatiale: rationalité économique de l'espace habité, Chicoutimi, Gaëtan Morin éditeur, 280 pages. ^ Chen, Pey-Chun, Hansen, Pierre, Jaumard, Brigitte, and Hoang Tuy, 1992, "Weber's Problem with Attraction and Repulsion," Journal of Regional Science 32, 467–486. ^ Jalal, G., & Krarup, J. (2003).

"Geometrical solution to the Fermat problem with arbitrary weights". Annals of Operations Research, 123, 67{104. ^ Ottaviano, Gianmarco and Jacques-François Thisse, 2005, "New Economic Geography: what about the N?", Environment and Planning A 37, 1707–1725. External links Biography at CSSS On Alfred Weber's Theory of Industrial Location Alfred Weber and Subsequent Developments in Industrial Location Theory Weber' Theory of the location of industries – English translation Newspaper clippings about Alfred Weber in the 20th Century Press Archives of the ZBW Alfred Weber's Theory of Industrial Location Retrieved from " The least cost theory by Alfred Weber takes a look at industrial location. It suggests that by choosing the correct location for an industry, its costs can be minimized. That allows the industry the opportunity to better maximize its profits. The least cost theory looks at the three common categories of cost that typically have the largest influence on profits. 1. Transportation. Weber suggests that industries must look for a site with the lowest possible costs for moving raw materials and then their finished products to market. 2. Labor. When labor costs are high, profits are naturally reduced.
Weber suggests that locating industries in regions where cheaper labor is available is the best way to maximize profits within this category. 3. Agglomeration.



Weber also suggests that industries should locate in clusters to maximize the assistance they can receive from one another. That reduces additional costs that various industries face and allows for the cross-promotion of products and ideas. Every industry faces different challenges in these areas. Domestic companies face different challenges compared to international companies. Yet, at the same time, the theory suggests that a similar method of evaluation can help industries establish locations that minimize costs and maximize profits. Why Many Industries Fail to Maximize Products One of the key issues that is addressed in the least cost theory by Weber is the idea of weight gain. Certain industries are referred to as being “weight-gaining” or “bulk-gaining” industries because of the product they produce. After receiving raw materials at their location, they produce a product for the marketplace that is larger than the raw materials they received. For the modern industry, there may be multiple weight-gaining issues that must be addressed for a single product that goes to market. Take a bottle of Dr Pepper as an example. It was first introduced in the late 19th century as being “liquid sunshine,” but in reality, the formulation is a combination of raw ingredients that come together to create a liquid beverage. That liquid cannot be served to the general public after it has been created. It must be placed in containers that make the liquid accessible to others so it can be consumed. That means cans, bottles, and pressurized containers. The plastics and metals add weight to the product that is shipped to the market. If a Dr Pepper bottler is creating their own cans and bottles, they will also experience bulk-gaining because raw aluminum is different than an aluminum can. In the least cost theory, the added weight that comes from the extra bulk translates to a higher cost for getting it to the market. Industries that deal with this issue must place their industry closer to the final market phase because that will maximize their profits better than being closer to the raw materials. The opposite, however, can also be true.
Some products are lighter once they have been created for the market. Because the raw materials are heavier, the industry must locate itself closer to the source of the ingredients so it can maximize profits. What Happens When Multiple Source Materials Are Required?
In Weber’s least cost theory, the goal is to examine the cost of every ingredient in the processing chain, from sourcing raw goods to placing a finished product onto a store shelf. When there are a variety of materials that are needed for production, Weber suggests that the production point should be moved closer to the heaviest raw material to balance out the industry’s transportation costs. Agglomeration is an exception to this rule. When like-minded industries come together, it may be possible for the heaviest raw materials or heaviest finished products to have the lowest overall cost. That occurs because an industry can pay a portion of the transportation costs since other industries are involved in the same process. For example: let’s say Dr Pepper and Miller Brewing have production facilities next to each other. Both need to purchase raw aluminum for their cans. By buying in bulk together, they can save $0.20 per pound on their order. They split the difference, which reduces their anticipated cost by $0.10 per pound. The other exception to this rule is when energy supply is a major factor in the production chain. In the past, mills were often placed along rivers because the spinning wheel was required to make everything work. Energy-specific industries may benefit the most by being located as close to their primary energy source as possible instead of their raw materials source or their marketplace. The Alfred Weber least cost theory suggests that by reducing costs on the most expensive budget line-item, it becomes possible to maximize profits over time. That is why it is such an effective strategy to use.