Title

Alfred Weber, Theory of the Location of Industries, 1909. *CSISS Classics*

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Alfred Weber: Theory of the Location of Industries, 1909
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Background

Alfred Weber (1868–1958), like his older brother Max Weber, started his academic career in Germany as an economist, then became a sociologist. While schooled at a time when European economics was emphasizing historical analysis, Weber was among those reintroducing theory and causal models to the field. He is best remembered, particularly in economics, regional science and operations research, for early models of industrial location (discussed below). When his work turned to sociology, however, Weber maintained a commitment to the "philosophy of history" traditions, developing 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). He also published empirical and historical analyses of the growth and geographical distribution of cities and capitalism.
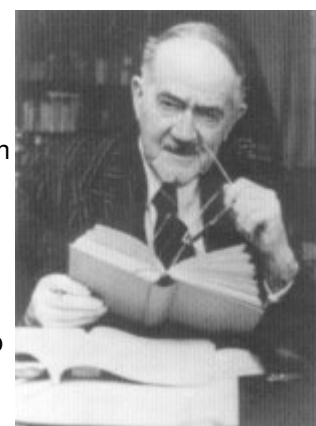
Weber remained in Nazi Germany during the war, but was a leader in intellectual resistance. After the war his writings and teaching was influential both in and out of academic circles in promoting a philosophical and political recovery for the German people.

Innovation

With the publication of *Über den Standort der Industrie* (Theory of the Location of Industries) in 1909, Alfred Weber put forth the first developed general theory of industrial location [references here are to the 1929 translation of the 1909 book by Carl Friedrich]. His model took into account several spatial factors for finding the optimal location and minimal cost for manufacturing plants. Weber also applied the model to service organizations such as investment firms, and more broadly to certain political and cultural systems. The problem of locating

industry was particularly relevant at the end of the 19th century, when the industrial revolution was well established, and development of rail transport, energy, telecommunications and urban growth provided more options for distributing firms and components of the manufacturing process.

In the 1909 book, Weber set forth his model as a systematic testing of hypotheses. He began with some assumptions of an ideal type of industry as a unit of analysis. The first five chapters tests the model under the assumption that production and distribution are indivisible and independent of other industries. He then rejects this hypothesis with attention to more real-world conditions in which locational factors may bring together or draw apart various aspects of industry, for example, the relation of raw materials to labor sources.

Changes in locational factors can lead to three areas of change in the industry: a spatial or vertical splitting of production and distribution, diversification within the plant of various processes, and division of labor between industries. Location may affect the costs of an industry in securing a location (e.g., cost of real estate) and obtaining raw and auxiliary materials. General regional factors may also effect the costs of manufacturing (e.g., labor costs) and transport costs in shipping to consumers.

The point for locating an industry that minimizes costs of transportation and labor requires analysis of three factors:

1. The point of optimal transportation based on the costs of distance to the "material index"—the ratio of weight to intermediate products (raw materials) to finished product. 2. The labor distortion, in which more favorable sources of lower cost labor may justify greater transport distances. 3. Agglomeration and deglommeration.

Agglomeration, or concentration of firms in a locale occurs when there is sufficient demand for support services for the company and labor force, including new investments in schools and hospitals. Also supporting companies, such as facilities that build and service machines and financial services, prefer closer contact with their customers. Deglommeration occurs when companies and services leave because of over concentration of industries or of the wrong types of industries, or shortages of labor, capital, affordable land, etc.

Weber also examined factors leading to the diversification of an industry in the horizontal relations between processes within the plant.

Formally distant processes may be brought together for technical reasons, such as chemical industry coupling new processes and raw material sources. A plant may also grow locally in economies of agglomeration when there is local cheap labor, or a labor pool that can adapt to fluctuations of markets for products in

the same industry. Auxiliary industries, such as those making packing material, may locate near their industry customers. Companies with specialized machines or services used only occasionally by larger firms tend to locate in agglomeration areas, not just to lower costs but as necessity for finding sufficient customers.

In the appendix to the 1909 book, Weber presented a mathematical summary of the model developed with the help of a mathematician colleague. It presented methods for calculating "locational triangles" in the placing of industry between raw materials and markets. An example in Figure 1, C1 and C2 are the source of raw materials and M is the market. If equal transport costs are assumed in all directions, the least-cost location, P, is derived from the "pull" from all three corners. Weber used a Varignon frame (Figure 2) to help physically calculate the points using weights to represent transport costs. Spatial economists and operations research tend to draw only upon Weber's mathematical model for locating industries. Weber, however, emphasized, and demonstrated at the end of several chapters, that these "pure" rules of location are insufficient unless tested by real-world local, sociological, and political conditions.

The issue of industry location is increasingly relevant to today's global markets and trans-national corporations. Focusing only on the mechanics of the Weberian model could justify greater transport distances for cheap labor and unexploited raw materials. When resources are exhausted or workers revolt, industries move to different countries. As a sociologist who resisted Fascist ideology, Alfred Weber might today have expanded his discussion of the potential negative social, cultural, and historical consequences of industrial location.

Fig. 1 locational triangle   Fig.2 Varignon frame (Weber 1929: 229)
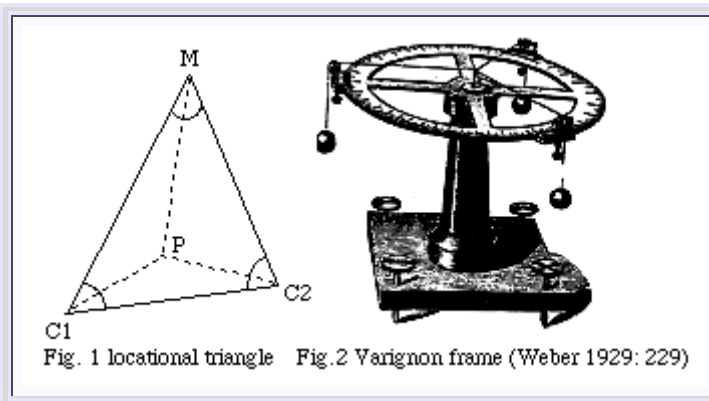
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Links Location of Industry
Alfred Weber and Subsequent Developments in Industrial Location Theory