

A METHOD OF DETERMINING THE MANUFACTURING BELT OF THE UNITED STATES

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A method for determining the general location of the main manufacturing belt of the United States has long been a problem of American geographers. Several methods of mapping this area have been devised and the results of each have shown similarities. Sten De Geer¹, a Swedish geographer, made one of the early studies. He delineated the American Manufacturing Belt on the basis of wage earners in manufacturing for all cities of 10,000 population or more. The use of spherical symbols to represent urban population was developed by De Geer and used in the compilation of his map.

Richard Hartshorne² mapped the manufacturing belt of North America in 1920 and 1930 using as a base the number of wage earners in manufacturing with certain modifications. He stated that in all populated areas there are some kinds of manufacturing to supply local needs and designated these as "ubiquitous" industries. Under this "ubiquitous" group are included such establishments as bread and bakery plants, newsprinting, local ice plants and repair shops. The number of establishments of this sort in some large cities is very great, even though the city is essentially non-industrial. A map showing these as manufacturing cities of great intensity is misleading, as the geographer is principally concerned with finding the areas where cities are predominantly industrial and not those having characteristics of commercialization or some other type. In compiling his map Hartshorne eliminated the non-industrial cities by taking a minimum ratio, 10 per cent of the total population employed as wage earners in manufacturing, as the proportion found in any city supplying essentially local needs, and not indicating an essentially manufacturing character to the city. This shows the excess number of workers over and above the number normal to non-industrial cities. His manufacturing belt was then represented by spheres which indicated the excess number of workers for each city. The excess or "surplus" workers were computed by subtracting from the total number of wage earners 10 per cent of the population of the city. Places with less than 500 "surplus" workers were omitted. Where suburbs, though politically independent, were known to be geographically continuous, they were included in the main center as were adjacent cities that form a continuous urban area. From these results he delineated a definite northeastern manufacturing belt.

Alfred Wright³ determined the manufacturing districts of the United States on the basis of value added to materials by manufacturing, for all cities over 10,000 population, and all manufacturing districts listed in the Census of Manufactures. He used the spherical method of representation and his results showed a similar pattern to those of De Geer and Hartshorne.

Clarence F. Jones⁴ represented the areal distribution of manufacturing in the United States by combining important criteria of manufacturing, such as wage earners by county units, power used by county units, and value added by county units. His method involved the use of three dot maps showing wage earners in manufacturing, power used in manufacturing, and value added by manufacturing. By superimposing these three maps, his results were definite

¹Sten De Geer, "American Manufacturing Belt," *Geografiska Annaler*, 1927, Arg. IX, Hoft 4, 233-250.

²Richard Hartshorne, "A New Map of the Manufacturing Belt of North America," *Economic Geography*, Vol. XII, 1936, 45-53.

³Alfred Wright, "Manufacturing Districts of the United States," *Economic Geography*, Vol. XIV, 1938, 195-200.

⁴C. F. Jones, "Areal Distribution of Manufacturing in the U.S.," *Economic Geography*, Vol. XIV, 1938, 217-22.

areas of manufacturing. On this map each county or industrial center with 4,000 horsepower or more, \$4,000,000 value added or more, and 4,000 wage earners or more was represented.

Since Hartshorne's method in representing the manufacturing belt of North America shows only cities of manufacturing specialization and eliminates cities that are essentially non-industrial, the writer chose to revise Hartshorne's map using Census of Manufacturers data for 1947 and to analyze the changes in the belt since 1930. However, after further study regarding his method of eliminating "ubiquitous" industries, the writer found that only an approximate percentage of ubiquity could be determined. Therefore a more reliable basis for computing a percentage that would show specialized manufacturing cities was used. This percentage, calculated at 8 per cent, was based on a ratio of total United States production workers² to total United States population³ for 1947. The map, then, indicates the excess number of workers over and above the number normal to cities of national average. In this way, it shows *intensity* of manufacturing, rather than *amount* of manufacturing, in an effort to delineate a definite belt.

The excess number of workers for each city, represented by the volume of the spheres used as symbols on the map, was determined by subtracting from the total number of production workers engaged in manufacturing establishments the national average, or 8 per cent of the population of the city.⁴ If the remainder was negative, or less than 1,000 workers, the city was omitted on the map. All cities of 10,000 population and over appearing in the 1947 Census of Manufactures were calculated. Every city was considered as a separate unit, even in cases where urban centers were contiguous, as, for example, Kansas City, Kansas and Missouri, and the twin cities Minneapolis-St. Paul.

These results, as shown on the map, delineate a main manufacturing belt very similar to the work of Hartshorne. The belt has, however, extended slightly to the west and a few additional outlying centers have appeared as a result of using this method.

The problem of drawing definite boundaries for the main belt is a major one, as manufacturing cities are not continuous as are agricultural areas. For example, the American Corn Belt, the Wheat Belt and the Cotton Belt are areas having a great concentration of the particular product throughout a certain area. These regions, then, can be fairly accurately circumscribed and denoted as a belt. But in manufacturing, there are several different highly concentrated districts with many small scattered centers lying between, or on the borders of them. The question is then, should these scattered centers be included in order that a main manufacturing belt can be delineated as is the Corn Belt and the Wheat Belt? In the analysis of the map, the answer to this question was positive, and the limits of the boundaries were drawn with this idea in mind.

The western boundary is probably the most difficult to outline, as many small centers appear on the map in that region. These cities are non-commercial centers located chiefly in northern Wisconsin and Iowa, and owe their importance to manufacturing chiefly as meat packing and milling centers. The one great exception in this district is the Minneapolis-St. Paul area, which

²Statistics obtained from *Census of Manufactures for 1947*.

³Population estimate for 1947 obtained from *Statistical Abstract of the United States, 1948*.

⁴Population estimates for 1947 by states were obtained from *Current Population Reports, Bureau of the Census, Series P-25, Number 4, October 12, 1947*. Populations of cities for 1947 were then calculated by using the same percentage increase or decrease as that of the state. This increase or decrease was added to the cities' 1940 populations giving population estimates for 1947 by cities.

is mainly a great commercial center, but, due to its large flour milling establishments, is shown on the map.

Starting at Green Bay, Wisconsin, the boundary extends southwest along the Rock River, including the Rock River cities, to the Mississippi River, taking in the cities of Moline and Rock Island, Illinois; Keokuk, Iowa; Quincy, Illinois; then to Alton and Granite City, Illinois; finally ending at St. Louis. From St. Louis a straight line can be drawn southeasterly through Mt. Vernon, Illinois to Evansville, Indiana on the Ohio River. The southern boundary then follows the Ohio River north, taking in the cities of Owensboro and Louisville, Kentucky; Cincinnati, Portsmouth, and Ironton, Ohio; and Huntington and Parkersburg, West Virginia. Thence the line follows a due east path to Fairmont, West Virginia on the Monongahela River; Martinsburg, West Virginia, in the Panhandle; through Hagerstown, Maryland to a terminus at Baltimore. The eastern limit nearly parallels a northeasterly line through Baltimore, Philadelphia and New York City and follows from there the Atlantic Coast line to the Kennebec River in southeastern Maine. From Augusta, Maine, the northernmost city in the belt, the line extends in a southwesterly direction, taking in the south half of New Hampshire, to Albany and Troy, New York. A definite northern boundary now runs west along the Mohawk Valley to the United States-Canadian International Boundary Line at Lake Ontario and thence follows this line to Port Huron, Michigan at the southern tip of Lake Huron. The belt's limit then extends northwest to include the Saginaw Bay area, through central Michigan, and across Lake Michigan where it finally terminates at Green Bay in Wisconsin.

This great Northeastern Manufacturing Belt has developed and grown because it has all the fundamental factors necessary for development on a large scale. It has a huge market, including the greatest urban centers in North America. It has access to many raw materials, due to its proximity to the Appalachian coal field, the Eastern Interior coal field, the Anthracite coal field, the Upper Lakes iron ore field, forest areas, and rich agricultural land. Transportation is highly developed, with many rail networks, water transportation on the Great Lakes and large river lines, as well as major Atlantic ports. With the main coal field, many petroleum fields, and water power sites located in this belt, it certainly has access to all needed power. This belt is also included in the zone of climatic efficiency and contains a large labor force.

The only concentrated area outside the main manufacturing belt is the Southern Piedmont, which, along with the minor steel towns of the Birmingham district, and the Upper Tennessee Valley district, may be classified as the Southeastern Manufacturing Zone. Cotton textiles and rayon industries are of primary importance in the Piedmont area with Greensboro, Gastonia, and Charlotte, North Carolina, and Greenville and Spartansburg, South Carolina being the main centers. Winston-Salem and Durham, North Carolina are major tobacco manufacturing cities and in High Point, North Carolina and Martinsville, Virginia, furniture industries are located.

The industries of the cities of the Tennessee Valley are highly diversified, but cotton textile centers predominate.

The appearance on the map of the few remaining cities is due either to a large industry employing a great many workers in proportion to that city's population, or its being a specialized industrial suburb of a predominantly commercial city. For example, Burbank, Santa Monica, and South Gate, California, are typical small centers serving a large commercial city—in this case, Los Angeles.

The cities of Fort Worth and Dallas give a good example of the value of a map showing only cities of manufacturing specialization. Although Dallas is greatly industrialized, it is principally a distributing center, and thus does

not appear; whereas Fort Worth, having a smaller population and a larger number of production workers engaged in manufacturing, is definitely a city of specialization.

This method of indicating only those cities of manufacturing specialization serves as a base for drawing the limits of the belt. However, it is not fair to say that such cities are the only industrial cities while all others are non-industrial, as shown by the Ft. Worth-Dallas example. In order to show manufacturing cities in all parts of the United States, no matter how small, or to what degree of ubiquity they represent, a map based on total wage earners in manufacturing should be used in conjunction with this information.
