Illinois Academy of Science Transactions, Vol. 45, 1952

THEORY OF INDUSTRIAL EXPANSION

CHARLES C. COLBY
Southern Illinois University, Carbondale

The localization of manufacturing industry, and especially the areal expansion of industry, has occupied my attention at recurring intervals for many years. In 1920, during the preparation of my *Source Book for the Economic Geography of North America*, I compiled a table which showed the remarkable concentration of industry in the states north of the Ohio and Potomac rivers and east from the Mississippi to the Atlantic. In that same year my interest in the distribution of manufacturing was quickened when, during the summer, the Swedish geographer, Baron Sten De Geer, was a visiting professor in our department at the University of Chicago. De Geer had just published his study of the manufacturing belt of Europe. He argued that "geography is the science of distribution," and that industrial distributions are among the major patterns in human affairs. Some time after returning to Sweden, De Geer published his famous monograph, *The American Manufacturing Belt.*

In 1924, the University granted me six months for a field study of the distribution of manufacturing. I was especially concerned with the prospects of expansion of industry westward across the Mississippi and southward into southern Illinois and other parts of the Ohio Valley. I began work in St. Louis where the late Lewis F. Thomas was making his pioneer study of the localization of business activities in metropolitan St. Louis. Then with the assistance of Clifford Zierer, now Senior Professor of Geography at the University of California in Los Angeles, I mapped and studied industry as far eastward as metropolitan New York. Subsequently, I made a map showing the outlines of the major manufacturing districts from Chicago and St. Louis at the west to the Eastern Seaboard. This map was first published in 1930 in the Colby-Foster *Economic Geography for Secondary Schools.*

In 1931, I was asked by a group in Dallas to study the possibilities of industrial development in eastern Texas, especially in Dallas. Mrs. Colby helped with this study. We foresaw much industrial growth for eastern Texas but our work was none too popular because we predicted more industrial growth for Houston than for Dallas.

This year, in studying southern Illinois, I have returned to the question of possible greater industrial growth in the southern part of the state. I found that Oliver Beimfohr already had underway a study of the industrial potential of southern Illinois. We joined forces in compilation and in the field and have completed an industrial survey of the 32 southern counties of the state.

As I worked this year, I came to the realization that progress in the analysis of industrial expansion was handicapped by an absence of basic theory. That conviction led to the preparation of this paper.

Argument

Three conflicting ideas in regard to industrial expansion are current today. The first is shared by some labor unions and chambers of commerce. Their idea is that industrial expansion will provide employment for more people, or introduce new forms of employment into their areas. Their objective is larger payrolls. The second idea of industrial expansion is held by government. It is motivated by the desire to spread the risk of destruction from atomic bombs, and thereby make more certain that in time of war, supplies of materials will be forthcoming. The third idea is that of industrial management. In this case the goal is a high level of production which will yield a satisfactory profit on the investment.

Each of the foregoing ideas of industrial expansion might lead, (1) to an increase of manufacturing enterprise in an area where industry already is established, (2) to the decline of industry in a given industrial area, or (3) to the appearance of industry in areas where previously it had not been in evidence. Any of these types of expansion would affect the productive plant and the economy of an area, and thus would affect its economic geography.

Although the actions of labor, government, and management are likely to be interrelated in coming months and years, organized labor is becoming a new monopoly of as grave national concern as were the trusts and the railroads in their day. Government, in its enthusiasm for military and international power, appears likely to ignore the premise that it should be for the people and by the people. Industrial management in its search for profits at times seems to forget that legitimate profits must come from high levels of production effectively transferred to a higher standard of living for people in general.

Unless the current conflicting ideas of industrial expansion can be reconciled into a rational line of action, the national economy is likely to be seriously handicapped. Manufacturing now provides about 25 percent of our peacetime jobs, and output of industrial employees underlies many other kinds of economic activity. Everyone has a stake in the conflict.

Are the conflicts of interest in industrial expansion open to solution under the semi-chaos which prevails at present in the national and international scenes? One way to approach such a question is to search for the theory and the principles which underlie industrial expansion. On account of the number and variety of considerations which theoretically may be involved in the location and expansion of industry, we must search for the prime considerations, that is, for the explanation of expansion based on thought, observation, and reasoning. As any expansion of industry will involve intensification or dispersion of manufacturing forms, functions, and patterns, a rational theory of expansion must meet the tenets of the science of

distribution, that is of geography.

Of the three ideas of industrial expansion, the one emphasizing profit appears to be most rational in terms of the science of distribution. This is due to the fact that in order to get high levels of production, the basic factor in profits, the expansion must permit industry to make efficient use of natural resources, human resources, and market demand. The objective is to place expansion in a line of flow from resources to consumption, or in other terms, to take full advantage of the regional and interregional patterns of demand and supply. In this connection, it is evident that any theory of industrial expansion must be in harmony with the essentials of pattern—geography—and also with the essentials of price or cost—economics.

Any useful theory of industrial expansion must take account of incentives which lead men to assume the risks inevitably associated with industrial enterprises. These incentives may be classified into six types.

Type one depends on the use of local raw materials as, for example, the lumber industry of northern Michigan and Wisconsin depended upon the large stands of native white pine.

Type two derives from the site of invention. The Ford Motor Company in metropolitan Detroit is an example. Mr. Ford invented his automobile in a suburb of Detroit, and Detroit has always been the home of the parent company.

Type three derives from expansion of an industry from an area in which a parent organization has been established for a long time into a new area. United States Steel at Gary, Indiana, is an illustration. This company originated in metropolitan Pittsburgh but having outgrown its facilities there, it established a new and greater plant at the head of Lake Michigan. As it was a going concern long before it made its appearance in Indiana, and as Gary possessed well-known regional advantages, the new plant in the new area has been highly successful.

Type four is the development of industry in an area in response to a big or a new market demand. The manufacturing of lumberman's supplies in Portland, Oregon, and Seattle illustrates the idea. Lumbering operations in the Pacific Northwest are so different from what they were in the lake states that the kind of saws, the kind of tools, and the kind of clothing well-suited to operations in the lake states did not suit the conditions in the Northwest. As a result, new industries sprang up to meet the new demand.

Type five comes from the initiative of previously established wholesale houses, or other marketing agencies. The boot and shoe industry in St. Louis is an example. In the early days, St. Louis wholesalers bought their shoes from Massachusetts, New Jersey, and other eastern states. Subsequently, they manufactured shoes on their own premises by bringing the parts of shoes in carload lots and at low rates to St. Louis where they were assembled into finished products and sold through already established channels.

Type six represents individual or group initiative in imitating or following the example of successful in-

dustries already established. In North Carolina, for example, the cotton mills originally were of three sorts. Some were branches of New England factories and some were started by wholesale firms operating out of Baltimore. Others were started by local people who argued that they could make a success of cotton manufacturing on their own. In some cases, a company was organized by local people and stock sold as low as $.25 a share in order that everyone in the community could be part owner of the enterprise. Some of these firms turned out to be eminently successful and were and still are owned and operated by local people.

The history of manufacturing in the United States furnishes abundant evidence that successful industry can develop in any of these ways or in any combination of them. It should be understood, however, that acquaintance with the technology of an industry is necessary before a man is stimulated to improve a part of that technology. All the famous men in the early days of the automobile industry had training in some phase of the transportation business. Buick and Studebaker, for example, were carriage and wagon manufacturers before they went into the automobile manufacturing. Chrysler came out of railway transportation and Ford had worked in a plant which made engines that powered the early naphtha launches.

Much light has been thrown on the problems of industrial expansion by McLaughlin and Robock in their remarkably fine study, *Why Industry Moves South.*[1] They point out that businessmen choose locations for industrial plants in order to obtain low costs or a high sales volume, or both. They also argue that "anyone hoping to understand or influence the geographic distribution of manufacturing plants must become familiar with the specific objectives underlying this type of business decision." In analyzing the large amount of case material made available to them in their study of the recent expansion of industry in the South, McLaughlin and Robock found that most plant locations were oriented in terms of materials, labor, or markets.

In considering the importance of location in terms of materials, these authors point out that where materials are perishable or not freely transportable, where costs of materials are an important part of total delivered costs, or where the materials are more expensive to carry than the finished product, an industry should be located close to the point of material production. This is especially true if it is important to increase the supply of materials.

Orientation of industrial expansion in terms of labor is wise if the cost of labor is a big part of the total cost, and if the cost of transportation is an insignificant part. If a process calls for much labor, the expansion should be into an area of lower-cost labor. In this connection I wish to point out that this does not imply that labor may not be well paid in an area where labor costs are

[1] Glenn E. McLaughlin and Stefan Robock, Why industry moves south: National Planning Association, Committee of the South, Report 3, 1949.

lower than elsewhere. It does imply, however, that the regional advantages of housing, food, clothing, and heating, namely the geographic basis for lower labor costs, are passed on, in part at least, to the manufacturer. If labor or any other group tries to divert all of this advantage to itself, it destroys the regional advantage for manufacturing enterprises.

Expansion in terms of markets according to McLaughlin and Robock should take place:

a. Where finished products are perishable or not freely transportable.
b. Where transport costs are an important part of total delivered costs and the finished product is more expensive to carry than the materials required.
c. Where service, convenience to the customer, or regional loyalty is involved in achieving the desired level of sales.

A theory of industrial expansion must provide for an adjustment to pattern and cost in terms of three types of orientation, namely, orientation in relation to material resources (including power), to labor resources, and to market demands. Evidence in support of the theory comes from many directions. For example, of the new plant locations in the South studied by McLaughlin and Robock, 30 percent were located in relation to materials, 25 percent in relation to labor, and 45 percent in relation to markets.

Expansion in terms of materials is illustrated by the localization of about 85 percent of the petro-chemical industry in eastern Texas to take advantage of the huge regional reserves of petroleum and natural gas. An example of expansion oriented to labor supply is the recent establishment of a factory making women's cotton dresses at Herrin in southern Illinois. Because of a surplus of labor in the area, the company found no difficulty in hiring the 600 women workers essential in its operation. Industry oriented to markets is well illustrated by the recent rapid expansion of manufacturing in metropolitan Los Angeles to take advantage of the ever-growing markets on the West Coast.

Some industrial localization is strongly oriented to one of the three conditions just described. Actually, however, every successful expansion probably is oriented to a combination of the three. This truth emphasizes the attractive quality of regions which possess raw materials, labor, and markets in reasonable juxtaposition. By reasonable juxtaposition I mean effective alignment in terms of distance and space, and harmonious arrangement in terms of cost. Obviously an area that possesses the whole battery of advantages is more certain to witness industrial expansion than areas that possess only a single type of advantage. Such a regional equipment of materials, labor, and markets explains the continuous growth of industry in the major manufacturing belt extending from Chicago and St. Louis at the west to Boston, New York, and Baltimore at the east. It is not surprising that this belt got about 80 percent of the government contracts for manufactured products during World War II.

The preceding argument does not encourage the expectation of a great dispersion of manufacturing, even under the threat of the atom bomb and the Federal Government's present encouragement of dispersal.

The concentration of manufacturing in the great transportation and commercial centers like New York, Chicago, and Los Angeles is logical because they possess marked advantages in the assemblage of raw materials, the availability of labor, and in accessibility to markets. For this reason, it is to be hoped that the threat of atomic attack and the interest of the government in functional dispersal will not cause industry to expand along illogical and costly lines.

Formulation

The preceding analysis has shown that our theory of industrial expansion should be in harmony with the major types of industrial expansion, namely (1) further growth of an industry in an area long occupied by industry, (2) outward or peripheral expansion about the borders of an industrial belt, (3) migration of industry from a parent area into an area previously without industry, and (4) the birth of industrial development in a new area under regional creative effort.

The major premise of our theory is that the entire industrial structure evolves from creative ideas implemented by inventions, processes, and methods into an advance in productive technology. This means that the mind of man is an all-important essential.

The second premise is that the beginnings of productive technology are highly regional and develop out of long experience with simpler forms of the same type of productive effort. An example was the invention of the spinning-jenny and the power looms in the Manchester section of England where textile manufacture had slowly flowered in the hands of the guilds.

The third premise is that productive technology should be oriented in orderly fashion to materials, power, labor, and markets. Localization of a particular establishment in relation to one of these essentials may be wise, but such orientation will not produce the large well-balanced display of industry which raises it to a major rank in the economy of a region.

The fourth premise is that orientation of industries to materials, power, labor, and markets seldom or ever is attained in a single region, but instead is secured by interregional alignments in which low-cost continuous transportation is a prime factor.

The final premise is that only a relatively few areas in the world are so well placed and so well equipped with the essential natural and intellectual resources, that large-scale and diversified industry can become a major segment of their economy.

In conclusion may I point out that if our theory is sound, it might be utilized in judging the merits of plans for the expenditure of money and effort on the part of our Federal Government in foreign areas.