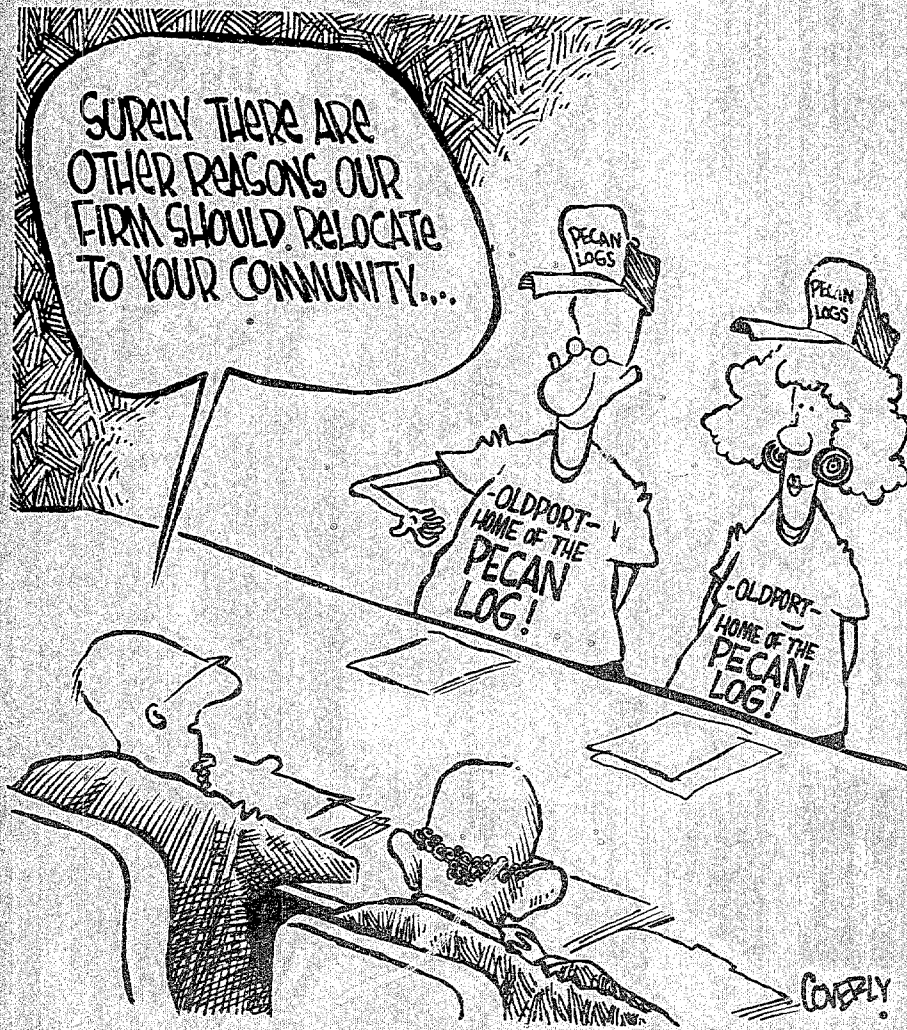


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**Determinants of Manufacturing Location:  
An Analysis of Locations in Indiana, 1986-89**

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# Contents

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1

Daniel V. Rainey and Kevin T. McNamara  
**Determinants of Manufacturing Location: An  
Analysis of Locations in Indiana Between 1936  
and 1989**

8

**Status of Indiana Families: Today and Tomorrow**

# Determinants of Manufacturing Location: An Analysis of Locations in Indiana Between 1986 and 1989



Many Indiana communities, like communities throughout the U.S., are using industrial recruitment programs as their primary economic development strategy. However, many communities are attempting to attract new investment

without a clear understanding of their potential for attracting a firm or how local policy decisions will affect the community's attractiveness to firms. Because the number of companies making new investments at any given time is less than the number of communities seeking new investments, not all communities out to recruit new firms will be successful.

Despite uncertainty about their probability of attracting a new plant, communities still focus their development programs on manufacturing recruitment (Smith and Fox 1990). A survey of business and community leaders in Arkansas found that the community leaders' ranking of what is important to a firm's location decision differed from that of business leaders in six of the 13 survey categories (Epping 1982). A survey of community leaders in Virginia indicated that few were knowledgeable about such community characteristics as water capacity, utility rates, and wage rates—all factors critical to locating firms (Kriesel 1983). This implies that many community leaders lack the proper knowledge and information required to assess their community's potential for attracting new manufacturing investment.

Community leaders need to carefully assess their community's attractiveness to firms before making policy decisions that may cost local dollars while producing little financial return. They can enhance their potential to attract new manufacturing investment through policies that affect firms' costs, such as reducing corporate tax burdens, investing in infrastructure, providing employee training assistance, and offering low interest rate loans. Some communities, however, are limited in what they can do to increase their probability of attracting a firm. Communities with poor access to markets, for instance, may never be able to attract new manufacturing investments.

This article reports on a study that examined factors affecting manufacturing location in Indiana. The study provides information that policymakers can use in formulating industrial recruitment policy. The results indicate that labor characteristics, tax and infrastructure levels, quality-of-life factors, and agglomeration characteristics are critical location factors for firms locating in Indiana. Policies that affect these factors will influence the community's attractiveness to industry.

## CONCEPTUAL AND EMPIRICAL MODEL

A firm's primary goal in selecting an industrial site is to find a location that will allow it to maximize its

profits. The profit maximization approach to industrial location contends that a firm will locate in a site that will provide it with the maximum amount of sales at the least possible total cost. The site may or may not be the least cost of production site.

The location search process for footloose firms' occurs in two steps. The first involves the selection of a particular region or state. In the regional search, the firm is looking for a place that will achieve its primary location objectives, such as ensuring access to input and output markets or establishing market share in a particular region. Until the region is determined, communities can do little to affect the location decision.

Once the region is determined, the firm searches for a specific site within the region. It tries to choose a site with a mix of low costs, suitable infrastructure, and various amenities that may not directly affect profits but are necessary to ensure a minimum quality of life for personnel. Firms generally try to minimize such costs as labor and taxes because doing so will lead to higher profits. Good infrastructure, such as highway and communication networks, provides a firm with more cost-efficient and timely transactions with input and output markets. The presence of parks, libraries, museums, and other leisure facilities provide amenities that help attract the firm's relocating employees.

Of course, production costs and amenities differ from community to community. A firm will weigh the differences in each community's production cost and output demand and analyze the incentives each community offers to determine which will allow maximization of profits. However, a firm will typically only analyze a subset of the potential sites because of the tremendous cost and time needed to examine them all. The subset consists of those sites that possess certain factors considered critical to a firm's location.

With the first stage completed and Indiana as the region chosen, this study examined factors of the second stage—choosing the specific site—that affect a firm's location decision. A brief discussion on the impact each of these factors has on this decision and the variables chosen to represent them in this study is presented below.

## Labor Characteristics

Access to labor is critical to a locating firm (Hekman 1982; Boblett 1967; Epping 1982) and can be broken down into three categories: (1) labor quality, which measures the productivity of the labor force; (2) labor availability, which represents the availability of potential employees for the firm; and (3) labor costs. Labor characteristics will be measured at the labor market area (LMA) level, which is based on the general residence-to-workplace commuting patterns of employees obtained from the 1980 census and which en-

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compasses all county and county equivalents (Tolbert and Killian 1987). The LMA measures are assumed to provide a better representation of the labor characteristics faced by the firm. Indiana's LMAs are presented in the **Figure**.

Firms tend to seek out communities that have a well-trained labor force. A high-quality work force is usually more productive, thus leading to lower production and training costs for the firm (McNamara et al. 1988). A major factor affecting labor quality is education. Therefore, data on the median years of education for a county in 1980 were obtained from the Bureau of Census and used as a measure for human capital (labor quality). Median years of education is expected to have a positive effect on location.

Labor availability refers to a firm's ability to find enough employees with the desired skills and within the desired wage rate to operate the plant. As the economic activity expands in the area the population will grow. So the LMA population of the area is believed to have a positive impact on labor availability. The unemployment rate will also be used to measure labor availability. It gives an indication of the available number of workers in the population and is expected to have a positive effect on location.

Labor costs constitute a large percentage of a firm's total costs and are generally one of the costs most companies attempt to minimize. (The price of other intermediate inputs are less varied within the region.) Thus, firms are presumed to look for cities with low wage rates, given all other factors as similar. The manufacturing wage will be included in the model as a measure for labor costs. It is anticipated that the LMA wage will have a negative impact on location.

#### **Taxes**

Corporate income and property tax rates can affect profits either directly or indirectly (Gerking and Morgan 1991). A firm's profits will decrease if the burden of an increase in taxes is borne directly by the firm. Profits will also decrease if the higher taxes are passed on to the consumer through higher prices. Higher prices will make the firm's products less competitive and it will lose market share.

However, business taxes should not be viewed strictly as another cost to the firm. Taxes are used to pay for fire and police protection, transportation networks, education facilities, and other local services and infrastructure. Companies are likely to derive some benefits from these expenditures (Newman and Sullivan 1988). The relevant question here is not which location will minimize the tax burden to the firm, but which location provides it with the most desirable overall fiscal package.

This study uses the minimum taxing district rate to represent the tax burden firms will face in the

county. The minimum tax rate was constructed as follows. In Indiana, each county is made up of several tax districts, which consist of all the communities that have the same taxing units (library, school, cities and towns, townships, counties, and other special units). The minimum rate in the county will be used to measure the local tax burden. The tax rate is assumed to have a negative impact on firm location.

In addition to the property tax, in Indiana several optional taxes are available to the county for raising revenue. These include the surtax on vehicles and taxes on personal income. Because the benefits or lack thereof will be covered separately in the government expenditures section, it is expected that these taxes will have a negative impact on firm location.

#### **Government Expenditures**

Local government expenditures can have an impact on company costs. Investments in the county's highway system can provide a firm with more efficient access to its markets, thereby lowering its costs. Welfare payments made by the county are a transfer of income from one segment of the community to another; therefore, firms receive few benefits from these expenditures. Welfare expenditures for 1986 were obtained from the 1987 census of government and are included as a measure for government expenditures.

#### **Agglomeration Economies**

Agglomeration economies refer to the cost savings associated with size and concentration of business activities. These economies increase the rate of technical progress, attract industry and capital, influence household migration decisions, and improve intra-regional spatial distribution. They consist of the size and quality of the labor market pools, the local availability of capital, financial and legal services, the presence of local professional consultants, and access to input suppliers and product markets.

The percent of the LMA's employment in manufacturing will be used as a measure for agglomeration. The percent of employment in manufacturing measures the relative size of manufacturing activity and is expected to have a positive relationship with firm location.

Agglomeration economies accruing to the firm include access to professional services, which, it is believed, can best be measured by the concentration of those services in a particular area. Therefore, the percent of the LMA's total employment classified in Standard Industrial Classification (SIC) category 87 in 1986 will also be used as a proxy for agglomeration. SIC 87 is comprised of establishments primarily engaged in providing engineering, architectural, and surveying services; accounting, auditing, and book-

