

Industry Clusters and Economic Development

Timothy Slaper, Ph.D. Director of Economic Analysis, Kelley School of Business, Indiana University Bloomington

Grace Ortuzar, Economic Research Associate, Kelley School of Business, Indiana University Bloomington

For more than two decades, policymakers and economic development professionals have stressed the importance of encouraging and supporting industry clusters to promote job creation and economic growth.

A cluster-based approach starts with the industries and assets that are already present in the region and regional stakeholders pursue initiatives to make those industries better. An approach for creating entirely new clusters in a region is a strategy to improve overall business environment conditions, by upgrading skills, access to finance and infrastructure, by streamlining government rules and regulations, by supporting local demand, and by being open to foreign investment and competition.

While clusters of industries that are present in a region do not necessarily need public sector strategies in order to exist—the industries cluster regardless—the right policies and strategies can help the businesses within a cluster become more successful and competitive. A cluster-based strategy is not, in other words, necessarily organized around attracting large entities from elsewhere.

What Makes a Cluster?

Simply put, industry clusters are regional concentrations of related industries. Clusters consist of companies, suppliers and service providers, as well as government agencies and other institutions that provide education, information, research and technical support to a regional economy. One might say that clusters are a network of economic relationships that create a competitive

advantage for the related firms in a particular region. This advantage then becomes an enticement for similar industries and suppliers to those industries to develop or relocate to a region.

Think of it this way: if you wanted to relocate your smartphone application development company from your basement in Loogootee, would you move it to Vermont or to the Bay Area? On the other hand, if you made artisanal cheeses in your barn out back and wanted to expand, would you move to the Bay Area or Vermont? Whether you know it or not, your decision on relocation is informed by the presence of strong industry clusters.

Developing industry clusters has become a key goal for regional economic development as clusters have been shown to strengthen competitiveness by increasing productivity, stimulating innovative new partnerships, even among competitors, and presenting opportunities for entrepreneurial activity.¹ Michael Porter and others have identified which industries tend to cluster together. This serves as the analytical foundation for cluster-based economic development strategies that may target certain types of industries to locate in a region to strengthen a cluster, or they may target regional resources to help bolster a developing cluster. A cluster-based development strategy may not be easy or quick to implement, but the supporting argument is that it beats a piecemeal or scattershot approach to generating jobs. Instead of looking at specific industries or types of companies, cluster analysis detects the potential spillovers of technology, skills and information that cut across industries, workers and resources.²

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The Economic Impact of Clusters

Cluster-based strategies have an economic rationale and, for the sake of argument, let's operate under the assumption that the approach will endure. The question then becomes, what else does an economic development practitioner need to know? We posit that applying the cluster framework to economic impact studies can provide a more comprehensive picture of the potential benefits of a cluster-based strategy.

Economic impact studies typically ask the question: if Production Plant Z with 100 workers is located in Acornville, how many more jobs will be created in the region?³ The size of the regional impact depends on the industry for Production Plant Z. If it is a food processing plant, the workers may not be as well compensated compared to a gas turbine assembly plant. In other words, just as all employment multipliers are not the same industry to industry, employment multipliers vary based on a type of cluster.

One of the benefits of clusters is that they are easier to get one's hands

around. It is a more manageable set than detailed industries. There are some 450 industries in a detailed input-output table, which is the table of industry inter-relationships used to estimate the economic impact of an economic event (like establishing a new production plant). Meanwhile, there are 67 industry clusters. While there are more clusters than can easily fit on a page, the greatly reduced set makes analysis and results easier to absorb for the average analyst, policymaker or practitioner.

The 67 clusters are grouped into two large categories: “traded” (51 clusters) and “local.” Local relates to those industries that generally serve the regional population, including health care, food services, residential construction or personal services. While these local clusters may be very interrelated, may share workers and are important for the well-being of the local population, they don’t inject money into the local economy. Traded industries, on the other hand, do inject money into the local economy. Traded industries, generally speaking, make for and sell to those outside the local economy. Economic impact studies are generally focused on traded industries.

IBRC researchers assigned the full set of 450 “economic impact” industries into the 67 clusters to determine which industry clusters would have the greatest effect on the economic development of a region. Put another way, an attempt to draft a regional economic development strategy by assessing the potential economic impact of some 450 individual industries would be overwhelming. The attempt to convey the potential impact of a new project—say a new production plant—on 450 industries runs the risk of overloading economic development practitioners with too much information. Furthermore, this level of disaggregation may overlook the linkages and profitable

connections between industries within the same cluster.

Using the Porter cluster aggregation scheme, IBRC researchers estimated output, employment and total value added multipliers for a five-county region in south central Indiana⁴ together with the state of Indiana and the entire nation. If the five counties comprised a region that was in the process of coordinating their economic development strategy and efforts—these five counties are more of a hypothetical than a real region with a common development strategy—then the magnitude of the multipliers could be one of many criteria for defining the focus of their partnership.

The larger the multiplier, the larger the ripple effects for a particular industry cluster. For example, an employment multiplier of 1.9 in the medical devices cluster suggests that for every 10 employees hired in that cluster, another 9 jobs would be created in the region in this and other clusters (both traded and local).

The Role of Regional Purchase Coefficients

It is important to note that due to variations in how much of the regional consumption of inputs (for example, a raw material like

wood for making furniture) can be supplied by regional production—a measure called the regional purchase coefficient—multipliers for one particular industry or cluster can vary greatly between regions. The regional purchase coefficient (RPC) is the proportion of the total demand for an input by all users in the study area that can be supplied by producers located within the study area.

For example, if the RPC for hardwood is 0.4, then 40 percent of the local demand for hardwood can be met by local loggers and millworks, while 60 percent of the demand for hardwood must be satisfied from outside the region. Multipliers increase as the region expands in scope because as the geographic area expands, it becomes increasingly likely that a region can supply its own inputs. Thus, national multipliers are larger than state multipliers, and these in turn are larger than the multipliers of the five-county, south-central Indiana region.

Employment Multipliers by Cluster

Table 1 shows the 10 clusters with the largest employment multipliers for the five-county region. The upstream chemical products cluster—which includes petrochemical

TABLE 1: Top 10 Clusters by Regional Employment Multiplier

Cluster Name	Regional Employment Multiplier	State Employment Multiplier	National Employment Multiplier
Upstream Chemical Products	4.4	4.5	21.7
Biopharmaceutical	3.5	5.6	8.7
Music and Sound Recording	3.2	4.0	7.8
Food Processing and Manufacturing	2.9	4.0	7.8
Upstream Metal Manufacturing	2.6	4.1	7.2
Electric Power Generation and Transmission	2.5	3.0	4.9
Downstream Chemical Products	2.4	3.5	7.6
Communications Equipment and Services	2.4	2.9	4.9
Aerospace Vehicles and Defense	2.1	2.8	5.5
Information Technology and Analytical Instruments	2.1	2.6	6.3

Source: Indiana Business Research Center

manufacturing, industrial gas manufacturing, basic organic chemical manufacturing, as well as synthetic rubber manufacturing—leads the regional employment multiplier ranking. This 4.4 employment multiplier indicates that for every 10 employees hired in that cluster, another 34 jobs are created in other clusters (both local and traded). These jobs may be created in other industries and clusters that supply upstream chemical production, and a large share of the jobs created would be generated locally to help provide goods and services—health care, auto repair and kitchen renovations, for example—to those 10 new workers.

Another cluster that would have considerable employment ripple effects in the area is the biopharmaceutical cluster.

As expected, for each cluster, all the state employment multipliers are slightly larger than the regional multipliers, and the national multipliers are even larger still. The relative size of the multiplier can provide some insights into the regional and state economy. If the multipliers are similar, then it is likely that the two areas share a similar density of firms and industries that can supply a particular cluster. On the other hand, if the multipliers differ greatly, then one area may lack a critical link in a supply chain that would require sourcing an input from outside the region.

Of course, before committing to any industry or cluster-based development strategy, one would have to do more homework to determine any potential snags in the availability of resources and inputs, just as one would also evaluate the depth and breadth of a region's labor shed before landing on a set of target industries. The purpose of knowing the cluster multipliers is to hint at which clusters may be more favorable to investigate further.

As stated above, the national multipliers are largest because

of greater breadth, depth and geographic scope of a cluster or an industry's supply chain. One may wonder, however, why the upstream chemicals production has such a large multiplier. This large value reflects several important features of the cluster:

1. There are industries in this cluster that are not present in Indiana and some of those industries have very large multipliers. So, the industry mix, or profile, of a state will influence the size of an industry's, or cluster's, multiplier.
2. There is a massive capital requirement for plant and equipment. The physical scale of a chemical plant can be awe-inspiring, and much of that equipment may not be sourced within a region.
3. That massive complex requires a lot of maintenance and repair. There is a lot of money spent on contractors to supply the labor and materials to maintain these facilities.
4. Despite the size of the plant and equipment, relatively few workers are needed to operate the plant compared to an assembly plant or slaughterhouse. In other words, the denominator is relatively small.
5. The workers, both production and engineering, tend to be well compensated compared to those working in many other lower-skilled occupations. This contributes to a greater number of "induced" employment—jobs generated to serve local needs—for every job added in upstream chemicals as opposed to, say, food processing.

An appendix at www.ibrc.indiana.edu/ibr/2015/spring/appendix.xls presents the entire list of traded and local cluster multipliers for Indiana. (Note that local clusters tend to have lower multipliers.)

Conclusion

In recent years, there has been much talk about cluster-based economic development strategies. The purpose of this article is to provide a quick overview of the theory and to provide economic development practitioners some numbers to contemplate and possibly apply as they consider drafting and implementing cluster-based economic development strategies.

What we see is that all clusters are not created equal in terms of employment effects. We have also broached the issue that targeting one cluster over another would depend on the supply chain and workforce requirements. This latter work must be carefully done. It can't be done in a brief article. But, we hope, that this material will help enrich the conversations that will ultimately result in a sound application of cluster-based economic development strategies. □

Notes

1. M. Porter, "Clusters and the New Economics of Competition," *Harvard Business Review*, November 1, 1998.
2. "Clusters 101," U.S. Cluster Mapping, www.clustermapping.us/content/clusters-101.
3. The opposite question is also asked: if Production Plant X with 100 workers closes, what will the economic ripple effects be in terms of jobs or regional income?
4. This region was constructed to anticipate the possible economic effects and linkages of the completion of Interstate-69 and is instructive for showing how multipliers get larger as the region of analysis gets larger.

View the entire list of traded and local cluster multipliers for Indiana at www.ibrc.indiana.edu/ibr/2015/spring/appendix.xls.