

Industry Clusters and Industry Targeting

by

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I. Introduction

The United States' economy is undergoing a well-documented structural change as a result of the globalization of markets, revolutionary technological changes, and advances in production practices. Innovation, adaptability, and entrepreneurship are recognized as keys to the sustainable development of companies and regions in the New Economy where product life cycles are short and competition is intense (Acs, 2002). A popular public policy response to the new competitive environment is to create "regional production systems" within which existing businesses become more productive and new business start-ups are encouraged.

Porter (2001) argues that a firm's productivity will be enhanced if it operates in a regional business environment characterized by a concentration of competing and cooperating firms, high quality and specialized inputs, supporting industries and institutions, and sophisticated and demanding local customers. Many state and local programs designed to foster these regional production systems focus on the promotion of existing or emerging industry clusters (NGA, 2002). Porter et al. (2004, p. 63) even propose that "viewing regional economies in terms of clusters is central to understanding the competitiveness of rural areas and how it can be improved."

In this chapter we provide an overview of the industry cluster strategy for regional economic development and the role of industry targeting in helping communities and states identify innovative clusters and design policies for cluster growth. Our discussion first defines industry clusters and provides a summary of the advantages and disadvantages to a clustering strategy. Next, we introduce the concept of industry

targeting, and the applications of industry targeting to industry cluster development. Our discussion of industry clusters and targeting focuses on their role in micropolitan or rural economic development. This is an important distinction as rural areas do not offer the inter-industry networking opportunities (urbanization economies) available in metropolitan areas. Thus, access to cluster-related benefits takes on added importance to micropolitan businesses and communities.

II. Why Industry Clusters?

Industry Clusters Identified. Porter (2001, p. 7) defines clusters as “geographically close groups of interconnected companies and associated institutions in a particular field linked by common technologies and skills.” Industry clusters are common in micropolitan areas, yet each cluster is unique because of differences in sizes, core industries, and inter-firm relationships. For example, a cluster may consist of firms engaged in producing similar products such as log homes (Montana) or houseboats (Kentucky). Establishments in these “horizontally” organized clusters benefit from the availability of a pool of skilled and specialized labor (Kim, Barkley, and Henry, 2000). Clusters also may comprise establishments in value chains (auto assembly plants and suppliers) or firms linked by their reliance on similar specialized services (e.g., research and development facilities or education and training services). Finally, McCann (1995) suggests that some industry clusters result from establishments independently selecting the same location because that location provides proximity to a shared resource or market. In this case, the establishments may have little interaction and experience few benefits from locating near one another.

Markusen (1996) also proposes that industry clusters may be categorized into four general types according to their industrial structure: Marshallian, hub-and-spoke, satellite platforms, and state-anchored clusters (table 1). Marshallian clusters are composed primarily of locally-owned, small- and medium-sized businesses in the more information and technology intensive industries. Hub-and-spoke clusters are dominated by one or several large firms surrounded by related input suppliers and service providers. Satellite platforms consist primarily of the branches of large multi-plant companies. The branch plants tend to be relatively large and independent. Finally, state-anchored industry clusters are regions where the local economy is dominated by a large public activity (e.g., university, military base, or government office) and the supplier and service sectors that develop around them. As noted in table 1, each of the above cluster types offers different inter-firm interdependencies and prospects for growth. Each cluster type also requires a different policy focus for improving the competitiveness of the cluster.

Industry Cluster Advantages and Shortcomings. Targeting industrial development programs at an industry cluster is founded on the perception that cluster growth will provide greater local economic development benefits than a less focused effort (Barkley and Henry, 1997). Four principal advantages accrue to establishments in clusters and their host communities that enhance the competitiveness of both the firms and communities.

- Industry clusters provide production and marketing cost savings (localization economies) to member firms. Sources of potential cost savings include access to specialized input and service providers; a larger pool of trained, specialized

workers; and public infrastructure investments and financial markets geared to the needs of the industry.

- Industry clustering provides establishments with a greater ability to focus on their core activities and to adopt new production technologies and organizations (NGA, 2002). Highly competitive product markets mandate rapid adaptability to market changes, and clusters provide a more conducive environment for change.
- Industry clustering facilitates the development of links, cooperation, and collaboration among area firms. Inter-firm networking enhances information sharing in marketing, new product development, and technological upgrading. Rosenfeld (2002, p. 7) argues that “Innovation, imitation, and entrepreneurship are what propel virtually all competitive clusters.” Intra-cluster networking helps provide the knowledge spillovers critical to product development and new firm spin-offs. The importance of clusters to new firm start-ups is supported by Gabe’s (2003) findings that new business activity in an industry is positively associated with the region’s industry cluster size.

The potential benefits from cluster development have encouraged many states and communities to structure their industrial development programs around clusters. This strategy has, however, three potential pitfalls and shortcomings.

- Communities will have difficulty “picking winners,” i.e., identifying industry clusters that best fit their local economies. The development of a competitive industry cluster is most probable if a regional competitive advantage exists, often the result of past industry location patterns. Yet, Porter et al. (2004, p. 61) conclude that “There is still no rich understanding of the composition and

evolution of rural economies at the industry cluster level . . .” A further complication to “picking winners” is that the political process will be “too inclusive” rather than “too selective” when selecting industries for cluster promotion (Peck and McGuinness, 2003). The consequence is a dilution of resources available for cluster development programs.

- Many communities, especially those in micropolitan areas, have clusters in declining industries or no clusters at all. In these situations, Rosenfeld (2002, p. 13) suggests that industrial developers look for local connections to clusters in adjacent regions or “re-orienting the central theme of the cluster from some commonality of the production process to a commonality related to knowledge, innovation or entrepreneurship.”
 - A focus on cluster development may not result in balanced economic development across the region or segments of the population. Martin and Sunley (2003, p.28) argue that “The danger of a cluster-based approach to policy is that it detracts from the need to take a more holistic view of regional development.”
- Recent literature emphasizes the roles of innovation (Acs, 2002); entrepreneurship (Acs and Armington, 2003); human capital (Mathur, 1999); local quality of life (Deller et al., 2001; Florida, 2002); and social capital (Sobel, 2002; Rupasingha et al., 2005 forthcoming) in local economic development. As such, Feldman and Francis (2004, p. 135) recommend that “Rather than target specific industries or technologies, effective state policy might focus on creating conditions that would allow firms to grow and prosper.” DeBreschi and Malerba (2001) are more specific and argue that cluster development policies should focus on improving

local education and labor quality, infrastructure improvements, and small business development.

In summary, the benefits provided by a successful cluster development strategy will be realized only if the strategy addresses the above shortcomings. A well-designed industry targeting program can increase the likelihood of cluster development by helping communities identify (1) existing or potential innovative clusters; (2) industries linked to the selected clusters through value chains, labor pools, and technologies; and (3) programs to enhance innovation and entrepreneurship within the clusters. Next we provide an overview of targeting methodologies that communities may adopt to better position themselves to take advantage of cluster-based growth.

III. Cluster Targeting and Policy

Over the past ten years or so, the cluster concept has taken hold among both economic development policy makers and practitioners. Responding to the recent downturn in the economy and increased worker insecurity as a result of globalization, it appears that these long-known ideas are moving beyond political rhetoric. Nowadays, key phrases of the cluster vernacular--such as value-chains and agglomeration effects--roll off the tongue of governors, economic development agency heads and local leaders. Indeed, numerous states and regions have identified key industry clusters to serve as cornerstones of their economic development efforts. For example, Pennsylvania has prioritized its workforce development programs to focus on 17 select industry clusters.

Alongside theoretical advances, the industry cluster concept has enjoyed myriad practical innovations--primarily identification methods. From the resurgence of interest in location quotients to the emergence of neural network analysis, researchers and

consultants implement both tested and new techniques in order to help regions recognize local sectors with competitive advantages that can serve as growth engines. In practice, these sectors can range from traditional resource extractive industries to high-tech manufacturing, from financial services to retail trade.

From a policy perspective, the driving force behind cluster analysis is the desire to identify the sectors, industries, and processes that propel a regional economy. Once identified, cluster-specific economic policies can be designed to strengthen their performance or tap their potential. For example, a region promoting a food manufacturing cluster might use its workforce development funds to put together a food safety training curriculum for incumbent workers. Or, an industrial development corporation trying to lure a new business might focus their efforts on firms with business service needs similar to those already in place.

Consequently, one outcome of the rise of cluster-based economic development is a renewed interest in economic targeting. In its modern variant, targeting is the process of identifying the industries or clusters that are most likely to prosper in a region, *given the region's characteristics*. While methods vary, most targeting programs generally have two components. The first is a means to identify clusters that have a high potential for locating or expanding in the area. In this respect, analysts assess detailed industry trends, particularly with an eye towards how industries line up with regional characteristics.

The second component is narrowing candidates to sectors that provide attractive local economic development impacts, such as future job growth, high wages, contributions to the local tax base, and minimal negative environmental impacts. After assessing potential industries, regions decide which of these characteristics are most

important and target clusters accordingly. In the end, targeting efforts aim to identify a small set of clusters that are the best match given a region's specific capabilities and preferences. These can include both existing and new industries.

Although often derided as “smokestack chasing,” a well-defined targeting strategy enables regions to focus their economic development activities. Such efforts usually include recruitment, but also may rely on local business retention and expansion activities, and entrepreneurship and small business development programs. Thus, targeting permits a more efficient use of limited economic development resources.

It is well known, however, that it is very difficult to “pick winners.” Still, thousands of economic development practitioners and state and local policy-makers work everyday on exactly that. While regional economists tend to look unfavorably upon these efforts, there is no reason to expect that this long-standing practice will disappear anytime soon. Accordingly, analysts interested in having a “real world” impact may need to accept a less than optimal outcome. While perhaps a disheartening result for purists seeking the ideal solution, policy relevance is an important virtue as well. And, frankly, working in this context is not that much of a compromise. Because efficiency remains one of the pillars of economics, we still have much to contribute. For example, we can bring our quantitative skills to bear in helping regions pare down the seemingly infinite list of potential candidates into a more manageable set; call it “conditional efficiency” (i.e., the best outcome in an imperfect world). In the remainder of this chapter we describe some of the key components of such efforts. More detail is given in the chapters that follow.

IV. Using Location Quotients in Cluster Targeting Analysis

The location quotient (LQ) is, perhaps, the most prevalent method in use today for identifying existing and potential clusters. A common application of LQs is identifying a region's importing and exporting industries. An exporting industry not only meets the local demand for its products, but also produces enough so as to sell outside of the region. An importing industry is one in which local production levels are insufficient to meet local demand.

The LQ approach is appealing in that it is both intuitive and easy to calculate from readily available data. In practice, this analysis is most informative when using the most disaggregated employment data available for the region (NAICS 3- or 4-digit). The basic formula for the location quotient is:

$$\text{LQ} = \frac{\% \text{ of Local Employment in Industry } i}{\% \text{ of National Employment in Industry } i}$$

Simply put, the LQ identifies how local industries stack up against national averages.

When interpreting the data, a LQ greater than 1.0 indicates that the economy is self-sufficient, and may even be exporting the good or service of that particular industry. Any exporting industry might be a strong candidate for further development. Used in conjunction with local expertise, the LQ can help identify industry clusters. Strategies centered on LQ analysis tend to complement their identification methods with qualitative techniques, such as focus groups and interviews with industry experts. This process can help interpret aspects of the quantitative research, develop a better picture of the

relationships among local industries, and identify similar workforce or infrastructure needs.

The LQ approach is commonly used as a stand-alone method for identifying clusters. In more sophisticated efforts, however, it serves as just one piece of a more complex puzzle. For example, Barkley and Henry (described in chapter 1.5 of the Research Papers) have derived the REDRL approach to cluster identification and targeting, following three principal steps.

1. Use the LQ to identify industry concentrations within which the region has experienced recent employment growth.
2. Construct value chains for the industry clusters selected in Step 1. Using input-output models, identify industries in the value chains with the greatest linkages to the local industry concentrations.
3. Rank the selected industries from Steps 1 and 2 by expected economic and fiscal impacts on the local economy. Methods for estimating and evaluating impacts are detailed in the forthcoming book on Community Impact Models.

One key component of their analysis is the use of relative local employment growth rates as a way to identify “promising” industries. An industry with a comparatively high growth rate may indicate an area of competitive advantage.

V. Fostering Serendipity

Despite recent advances in cluster identification methods, the fact remains that most techniques in use today classify, at best, historical and current strengths of the local economy. For example, a typical application of the location quotient method might identify an industry cluster as having a LQ greater than 1.2, for example. By this criterion, in order for any cluster to reveal itself, it must already have a relatively strong presence.

Such an analysis, though useful, can be incomplete or (misleading) for a number of reasons. First, like a mutual fund, past performance is no guarantee of future success-- a lesson confirmed by many long-lost rural manufacturing industries. Consequently, relying solely on established industries can be a limiting, or even wrong-headed, strategy.

A related effect of requiring a strong historical presence is that most cluster identification methods are incapable of identifying emerging or potential industries. As a result, cluster analysts often arrive “too late.” Rather than helping regions build advantages, the analysts’ role is generally one of trying to explain why the cluster emerged. Often unable to do so, we commonly attribute cluster emergence to ‘serendipity,’ a wholly unsatisfactory concept.

While analysts have developed a sophisticated set of tools for identifying clusters, we offer precious few methods for identifying nascent clusters. In the dynamic global economy, however, it is likely that rural growth will be driven by emerging industries at least as much as by existing ones. As a result, the practice of economic development also requires methods for identifying potential. Simply put, communities can no longer count on “getting lucky.”

Shields and Vivanco (2003) confront this issue in their ‘back-of-the-envelope’ method for identifying new opportunities for aggregate employment growth in rural Pennsylvania. Here, they compare employment trends in rural Pennsylvania with rural counties in “similar” states to identify the state’s rural industries that are not doing as well as their peers. In pinpointing the industries, three criteria had to be satisfied:

1. The industry needed to exhibit positive growth at the US level from 1990-2000.
2. The aggregate industry growth rate in the rural counties of the comparison states had to exceed the US average.

3. The aggregate industry growth rate for the US had to exceed the aggregate growth rate for rural Pennsylvania counties.

In a nutshell, this analysis identifies rural Pennsylvania industries that are being greatly outperformed by both comparison places and the US. While a methodological cousin of the Barkley and Henry approach, the Shields and Vivanco (2003) model focuses on new targets rather than existing strengths, in essence asking “why not here?”

For more sophisticated efforts, econometric models offer a promising method for identifying emerging or potential industries. For example, Goode and Hastings (1989) and Leatherman et al. (2002) modeled business location decisions taking into account most of the variables identified as important in business growth. The Northeast Industrial Targeting system modeled the community requirements of 69 aggregate manufacturing sectors, using 730 non-metropolitan communities in the northeast United States. The Plains Economic Targeting System (PETS) matched industry requirements of 78 industry sectors to the characteristics of 414 counties in the six Great Plains states (Leatherman et al. 2002). In both models, results were used to identify the industries that offer the highest probability of success for each community, with subsequent development efforts focused on those industries.

Typically, economic development professionals apply these results to industrial attraction strategies. Today the challenge many small communities face requires developing strategies to help existing business use these results to expand existing markets or products. In such cases the resources that go into attending conventions and making calls now go into taking time to visit local firms and creating coaching

relationships that help them be more resourceful in understanding and using the results of the analysis.

VI. A Reality Check

While there are a number of methods for identifying clusters, it is important to recognize that the choice of the targeted industry is as much a political decision as an economic one. Industry targeting programs are likely to involve business, labor, and government, each with their own goals, interests and stakeholders. Thus, methodological problems are only one component of efforts to identify clusters that may succeed locally and in the national or global market place. Achieving consensus among interested parties, or at least enough agreement to enact and carry out expensive public programs, remains a major challenge.

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Table 1. Markusen's Typology of Industry Clusters (Markhusen)

Cluster Type	Characteristics of Member Firms	Intracluster Interdependencies	Employment Growth Prospects
Marshallian	Small and medium locally owned firms	Substantial interfirm trade, collaboration, strong institutional support	Dependent on synergies, economies provided by cluster
Hub-and-spoke	One or several large firms with numerous smaller suppliers and service firms	Cooperation between large firms, smaller suppliers on terms of large firms	Dependent on growth prospects of large (hub) firms
Satellite platforms	Medium and large branch plants	Minimum interfirm trade, networking	Dependent on region's ability to recruit, retain branch plants
State-anchored	Large public or non-profit entity and related, supplying service firms	Restricted to buy-sell relationships between public entity, suppliers	Dependent on region's ability to expand political support for public facility