Clusters and Competitive Advantage: Finding a Niche in the New Economy

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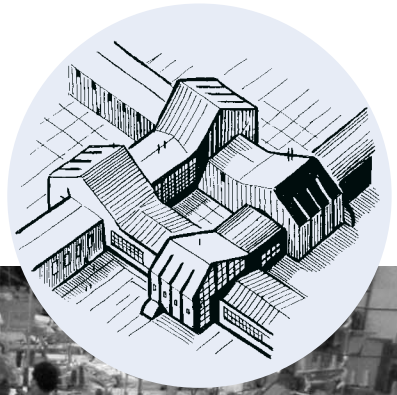

Companies using the products of textile mills have clustered in Hickory, North Carolina, and the Piedmont area.

COREY LOWENSTEIN / NEWS & OBSERVER

Industry clusters have become increasingly popular as a tool for localities, states, and regions to use in understanding their economies and taking actions to become more competitive. Indeed, industry clusters are becoming a dominant paradigm in economic development. Policy makers around the world are commissioning cluster initiatives and adopting a cluster-based approach to creating economic growth and prosperity.[1]

Internationally, the cluster approach is guiding economic and regional policy in places like Denmark and New Zealand. The World Bank advocates the approach in its work in developing countries. In the United States, the federal government's Economic Development Administration is focusing on clusters. State-level cluster strategies are under way in Arizona, Connecticut, Minnesota, Mississippi, New York, and Oregon. Metropolitan regions adopting the cluster approach include Austin, Texas; Chattanooga, Tennessee; Louisville, Kentucky; New Orleans, Louisiana; and San Diego, California.

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The most obvious cluster strategy in North Carolina centers on the renowned Research Triangle.[2] Lesser-known efforts are occurring in other parts of the state. For example, Guilford and Davidson counties recently hired consultants to help identify opportunities in target industry clusters.[3] Suffice it to say that clusters are all the rage.[4]

Despite the popularity of and recent interest in industry clusters, the process of cluster-based economic development is not well understood. At the least, policy makers and practitioners do not readily comprehend how they can use the cluster approach to boost private investment, create jobs, and expand the tax base. This article defines industry clusters, explains why they are becoming increasingly important in economic development, describes how they create competitive advantage, and illustrates what communities and regions can do to support and strengthen their business clusters.

The Need for a Better Way

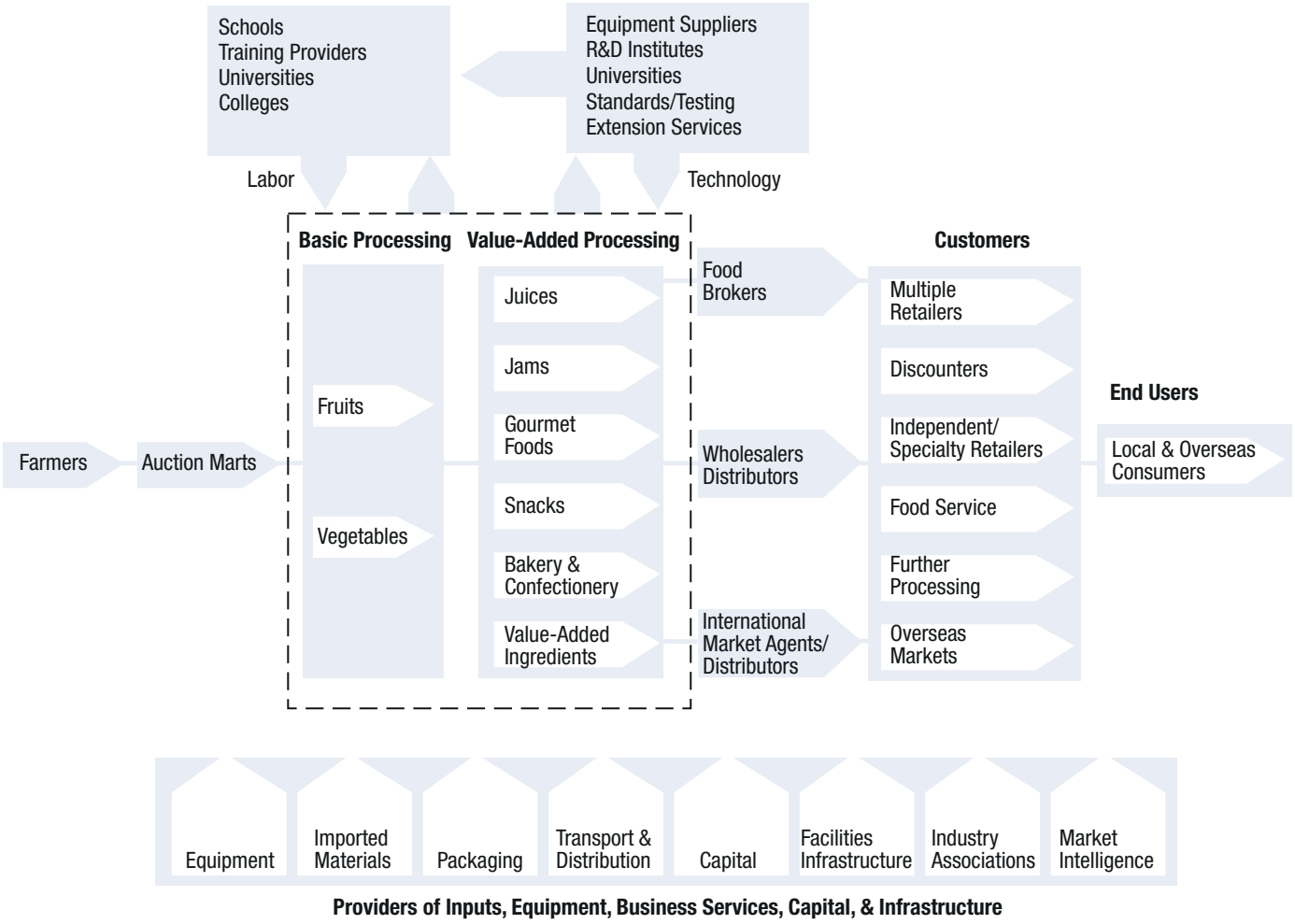
The rise of industry clusters taps into the desire among policy makers for a better way to conduct economic development—for an alternative to the proverbial "buffalo hunt" of recruiting large industrial facilities headquartered elsewhere. Growing weary of the costly, high-stakes game of incentives to lure industry, many jurisdictions are reexamining what they do to stimulate private investment and boost economic activity. Traditional approaches, which tend to emphasize external sources of growth, may be giving way to bottom-up strategies focused on generating growth from within.

Also fueling the desire for a more effective approach to economic development is the nature of the new economy, which places a premium on five elements:

- Innovation and productivity
- Knowledge and skills
- Flexibility and responsiveness
- Global markets
- Quality and value

Innovation and the use of technology to enhance productivity and increase returns on investments in capital and labor are driving the new economy. Now more than ever, to stay competitive, industries rely on the intellectual capital that resides in workers and knowledge-generating institutions. The new economy is characterized by rapid change, and it knows no boundaries. Companies adjust by organizing themselves to gain the utmost flexibility in responding to trends in the global marketplace.

Figure 1. **An Example of a Fruit- and Vegetable-Processing Cluster**



Source: From unpublished report by Regional Technology Strategies, Inc.,Carrboro, N.C. Reprinted by permission.

Hickory, North Carolina, and the state's Piedmont area have high "location quotients" for furniture and fixtures. Location quotients are indicators of specialization.

The nature of the new economy is changing the context in which economic development occurs, making it more difficult for political jurisdictions to act alone in stimulating economic activity.[5] Government is organized around political boundaries, but because of globalization, economic activity is increasingly becoming boundary-free.

By definition, industry clusters are place based and contained within geographic boundaries. This suggests that, despite the emergence of a global economy that tends to ignore boundaries, place still matters. In one respect, relations between producers, buyers, and sellers depend less on proximity because of increased globalization and advances in communication and information technologies.[6] At the same time, the innovation and the knowledge that drive the new economy seem to be more rooted in the context of particular places.[7]

In this sense the role of geography has changed. Geography means something different to companies competing solely on the basis of low input costs than it does to those whose bottom line is driven by innovation, productivity, quality, and specialized niche markets. For the latter companies, "the enduring competitive advantages in a global economy lie increasingly in local things —knowledge, relationships, motivation— that distant rivals cannot match."[8]

Industry Clusters Defined

The recent buzz about industry clusters brings to mind the adage that there is nothing new under the sun. Hardly a novel concept, clustering has intellectual roots dating back to British economist Alfred Marshall and his writings on industrial districts in the early 1900s.[9] It is no great discovery that certain regions tend to specialize in particular industries. Whether it is automobile production in Detroit, semiconductor processing and software development in Silicon Valley, motion picture production and entertainment in Los Angeles, financial services in New York, or furniture manufacturing in High Point and Hickory, North Carolina, firms in related industries display a propensity to locate near one another in particular geographic areas.

This suggests that the current interest in clusters may be more of a revival than a substantial revision of earlier thinking. Writing specifically about industrial districts, the late economic development scholar Bennett Harrison raised precisely this point when he asked if clusters were in essence "old wine in new bottles."[10] At least one significant distinction can be made between industrial districts and their recent reincarnation as clusters. As discussed later, the new twist is an emphasis on collaborative interactions that occur outside the marketplace.

A number of "cluster" definitions exist, and that makes it difficult to pin down what the term "industry cluster" means. As analysts Ron Martin and Peter Sunley state, "[W]e know what they [clusters] are called, but defining exactly what they are, is much more difficult."[11] Getting bogged down in the nuances of various definitions is fairly easy. Simply stated, an industry cluster

is a geographically concentrated group of interdependent firms and supporting institutions.[12]

Interdependence is what differentiates a cluster from a mere group of businesses that happen to be located near one another. This distinction is not fully appreciated in practice. A functioning cluster is characterized by the presence of "active channels for business transactions, communications, and dialogue" among firms "that share specialized infrastructure, labor markets, and services and that are faced with common opportunities and threats."[13] A cluster is not just another name for an industry sector. Clusters extend across individual industry sectors to encompass the interrelations among them (for a typical fruit- and vegetable-processing cluster, see Figure 1).

Traditional economic development strategies, such as industrial recruitment, have focused on the needs of individual firms without considering the issues that cut across companies and industry sectors. The cluster approach focuses on enhancing the local capacity and resources needed to support groups of firms within an industry or set of related industries. It acknowledges that the competitiveness of cluster firms often is interconnected because of their reliance on shared resources.

Clusters and Competitive Advantage

The location of a critical mass of firms close together can generate certain advantages. By clustering, businesses can enjoy cost savings and efficiencies arising from economies of scale. For example, firms in a cluster can increase their profitability by doing business with nearby firms and customers, thereby reducing transaction costs. A cluster of firms in a certain industry tends to have a snowball effect by attracting similar firms, specialized resources, and support activities. In this way, clusters facilitate increased access not only to suppliers and customers but also to industry-specific inputs like a skilled workforce, technology, financing, support services, and infrastructure.

As clusters gain momentum in a region, they reinforce the region's competitive assets. When related economic activities and support services grow up around a cluster to meet its specific needs, the businesses constituting the cluster are able to specialize and focus on the activities that they do best. In much the same way that cluster businesses become more focused on doing what they do well, so do the regions in which they are located, as local institutions adapt and respond to ensure that clusters stay competitive.

Clusters provide greater opportunity for increased collaboration and networking both among firms and with supporting institutions such as government agencies, education and training providers, research institutions, and industry associations. The idea is to strengthen the linkages among these entities in order to take fuller advantage of existing and potential industry specializations within a region. A region's "social capital" is instrumental in cluster-based development because "social glue binds clusters together, contributing to the value creation process."[14]

A critical mass of firms indicates the potential for increased local and regional competitiveness. However, if firms and supporting institutions do not interact and collaborate, there is no guarantee

Table 1. **Types of Clusters and Their Characteristics**

	Critical Mass	Supply Chain	Social Network
Relations among Firms	Competitive	Competitive	Competitive and collaborative
Critical Linkages	None apparent	Market-based production; buyer-supplier relationships	Nonmarket interaction
Nature of Linkages	None apparent	Formal	Formal and informal
Resource Flows	None apparent	Goods, services, and factors of production	People, ideas, and knowledge
Level of Interdependence	Low	Moderate	High
Organizing Mechanism	Market forces	Production process	Industry association and cluster organization
Role of Supporting Institutions	Maintenance of overall business climate	Provision of specialized production inputs	Facilitation/convening of networking
Competitive Advantage	Economies of scale, specialization	Lower transaction costs; better access to suppliers	Knowledge spillovers, productivity, and skilled workers
Examples	Furniture and textiles in Hickory and Piedmont Triad (N.C.)	Detroit auto production	Catawba (N.C.) Hosiery Technology Center and Louisville (Ky.) Business Networks

Source: Author's interpretation and elaboration of the typology proposed by Ian R. Gordon & Philip McCann, *Industrial Clusters: Complexes, Agglomeration and/or Social Networks?* 37 Urban Studies 513 (2000).

that a region's clusters will realize their full potential for adding economic value. This aspect of the cluster approach acknowledges that economic activities are part of larger social systems and that the whole is greater than the sum of its parts. When the firms and the supporting institutions that constitute a cluster systematically work together toward shared goals, they create a kind of synergy that is thought to make a difference for economic development.[15] Being located close together facilitates the face-to-face interactions necessary to build the trust required for collaborating to address common challenges. In the new economy, a key benefit of clusters is that they promote greater exchange of industry-specific knowledge and better diffusion of new ideas and technologies. They can enhance innovation by enabling firms to develop sustained interactions with other firms and institutions that result in gains in productivity and innovative capacity.

A cluster of firms in a certain industry tends to have a snowball effect by attracting similar firms, specialized resources, and support activities.

Geographic proximity may be advantageous in today's knowledge-based economy because it may facilitate collective learning and informal exchange of tacit knowledge. "Tacit knowledge" is the expertise and the know-how that are not explicitly written down but that people develop over time through experience. Such knowledge resides within people, not in textbooks or training manuals, and is thought to be crucial to innovation and shared learning.[16] When firms cluster, they can more quickly learn from one another about new market opportunities and technologies.

Ways to Think about Clusters

There are different ways to think about clusters, and they have implications for how a region might implement a cluster strategy. One can conceive of clusters along a continuum, from mere critical mass to supply chains to social networks (see Table 1).[17] The simplest type of cluster requires only the existence of a geographically concentrated critical mass of firms that have common needs and operate on a sufficient scale to generate economic benefits. In a supply-chain cluster, firms engage in production-related business transactions with one another. A social-network approach presumes some level of nonmarket collaboration among the firms in a cluster.

These cluster types are not necessarily mutually exclusive, although each emphasizes certain aspects of industrial clustering that may have different implications for economic development. They all provide a partial response to the question of what distinguishes a cluster from a group of private businesses. They vary with respect to the nature and the extent of cluster relations, the level of interdependence, and the role of supporting institutions.

Clusters as Critical Mass

In the most basic sense, an industry cluster is a critical mass of firms in the same industry or related industries. Key advantages accrue to firms simply because they are located together in a place.

Table 2. **Ten Highest Regional Employment Concentrations in Two Traditional Manufacturing Industries in the U.S.**

Textile Mill Products	LQ*	Furniture and Fixtures	LQ*
Danville, Va.	27.16	Hickory, N.C.	34.99
Hickory, N.C.	23.77	Greensboro/Winston-Salem/High Point, N.C.	11.17
Greenville/Spartanburg, S.C.	11.23	Grand Rapids, Mich.	9.30
Charlotte/Gastonia/Rock Hill, N.C–S.C.	10.35	Williamsport, Pa.	7.75
Chattanooga, Tenn.–Ga.	9.98	Elkhart-Goshen, Ind.	7.70
Anniston, Ala.	8.40	Fort Smith, Ark.–Okla.	7.15
Greensboro/Winston-Salem/High Point, N.C.	8.26	Joplin, Mo.	6.01
Florence, Ala.	8.22	Killeen-Temple, Tex.	5.59
Columbus, Ga.–Ala.	8.01	Sheboygan, Wisc.	5.09
Athens, Ga.	6.94	Dubuque, Iowa	4.87

Source: Author's calculations from a special run of data from the U.S. Census Bureau, County Business Patterns dataset. The general website for the dataset is www.census.gov/epcd/cbp/view/cbpview.html.

*LQ = location quotient.

These advantages arise mostly as a result of geographic proximity rather than from any conscious effort to create or capitalize on them. When firms physically locate near related firms, there is greater *potential* for interaction and collaboration. Evidence of such linkages may not be evident, however.

Critical mass is the starting point for a cluster. It can be measured quantitatively by the degree to which an industry is concentrated in a region. The most widely used measure is the "location quotient," the ratio of the share of industry employment in a region relative to a larger reference area, typically the nation.[18] The location quotient is an indicator of regional specialization and can provide the first clue regarding the presence and relative scale of a cluster.

When defining clusters in terms of critical mass or industrial specialization, one can analyze location quotients to detect the potential clusters in a region. Many regions of the United States have high concentrations of textile and furniture industries (see Table 2), the new South among them. Over the past few decades, traditional low- to mid-skilled production work found its way to the southeastern United States to take advantage of cheaper labor and nonunion environments. For example, textile employment now is highly concentrated in regions like Danville, Virginia; Hickory, North Carolina; and Greenville/Spartanburg, South Carolina. Similarly, regions like Hickory and Greensboro/Winston-Salem/High Point, North Carolina, are known for their high concentrations of furniture manufacturing industries. The pressures of globalization have caused significant downsizing in these industries over the past twenty years.

The numbers in Table 2 indicate which regions have higher shares of employment in textiles and furniture manufacturing than the national average. However, they tell nothing about the extent to which the firms in these regions actually interact and function as a cluster. Nor do they communicate why the firms are located in their region, rather than in another, and what specific advantages they enjoy from being where they are. In other words, the data show where critical mass within certain industries exists but do not indicate whether the firms recognize that they are a cluster and behave like one. The firms may or may not transact business with one another, hire from a shared workforce, use the same business services, or exchange industry-specific ideas and knowledge. If they do not, a critical mass of firms in an industry may constitute a "latent" cluster because it lacks the interaction and resource flows needed to maximize the benefits that clusters can generate.[19]

Clusters as Supply Chains

A more sophisticated way to think about clusters is to view them as production supply chains. What moves a cluster along the continuum from critical mass to a more advanced stage is the interrelations or "flows" between firms in an industry sector or group of related sectors. In a supply-chain cluster, these flows occur when firms transact business with one another in making a product. The predominant flows in this type of cluster are the goods and the services exchanged in buy-sell market transactions as part of the production process. The focus is the purchasing relations among firms, their suppliers, and their customers (see the center portion of Figure 1).

These market-based relations between firms are more difficult to measure. However, methods exist that attempt to capture the trading relationships in a chain of production and determine which types of companies are likely to transact business with one another.[20]

The idea of clusters as supply chains explicitly incorporates a focus on interdependence. Interrelations among firms in this type of cluster are largely market-based business transactions. These formal input-output, buyer-supplier relations involve backward and forward linkages that are geographically concentrated.[21] By trading with other firms in proximity to them, the firms in a given supply chain reduce their transaction costs because they minimize transport and shipping distances. Examples of this type of cluster are the petrochemical

and oil refining industries in the New Orleans and Houston regions.

Clusters as Social Networks

Many contemporary cluster definitions emphasize the social-network aspects of clustering. From this perspective the driving force is the qualitative, often informal social relationships that occur not only among firms but also between firms and supporting local institutions. In this type of cluster, people, ideas, information, knowledge, and technology flow back and forth among firms and supporting institutions. The literature on clusters suggests that the strength and the dynamism of industry clusters are enhanced not only by the presence of supporting institutions and organizations but also by the nature and the extent of relations among firms, universities, and government agencies.[22] The collaborative nature of these relations is embodied in the concept of "social capital." (For more information about social capital, see the article by Anita R. Brown-Graham and Susan Austin on page 14.)

Supply-chain clusters are based on market-based, buy-sell relations in a production chain, whereas cluster-based social networks emphasize linkages and i nteractions that occur outside the marketplace.[23] Some business networks are considered "hard," consisting of firms that work together on purchasing, production, or marketing.[24] The social-network type of cluster is "soft" and loosely organized, with firms collaborating to "solve common problems, share information, or acquire new skills."[25] In practice these soft networks often involve firms collaborating on issues like technological innovation and worker training.

Cluster-based social networks focus on "formal and informal flows of information or knowledge, the role of social ties or trust in governing transactions within clusters, and the importance of local pools of specialized labor."[26] From this perspective, proximity matters to the extent that it helps create the synergy required for a critical mass of firms and supporting organizations to function as a socioeconomic system and engage in collaborative activities. Cluster-based social networks are less about pure individual competition among firms and more about collaborative competition.[27] The role of local institutions in supporting cluster-based development is heightened in this type of cluster. Louisville's Business Networks program is a good example of a social-network cluster (see the sidebar on this page).

Ways to Use Clusters in Economic Development

Each of the three types of clusters has implications for what a region might do to gain a competitive advantage in the new economy. Having a critical mass is a prerequisite for reaping the full benefits of cluster-based development, so cluster strategies usually begin with an economic analysis to identify the groups of industries with above-average concentrations in a region. This quantitative analysis is typically supplemented with qualitative information to settle on the clusters to target. A thorough analysis lays the groundwork for the specific steps that a region will take to move beyond simply having a critical mass to ensuring that target clusters grow and remain competitive. To move along the cluster spectrum from critical mass to cluster-based networking often requires an institutionalized mechanism for collaboration.

By identifying the drivers of a regional economy and the socioeconomic relationships that undergird it, cluster analysis provides a way for regions to find and support a niche in the new economy.

Research and experience suggest that a region can use clusters for economic development in at least four ways:[28]

- As an analytical tool for understanding a regional economy and identifying where it might have a competitive advantage
- As a framework for regional collaboration both within and across jurisdictions
- As a basis for improving the delivery of economic development services
- As a way to prepare the workforce to meet the needs of a regional economy

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Louisville Business Networks

Since 1993 the region encompassing Louisville, Kentucky, has been implementing a social-network type of cluster strategy, the Business Networks program, by facilitating a process for firms in targeted industries to collaborate on specific problems that have been difficult for them to tackle individually. The idea is to assemble competitors to think about ways they can work together on issues that they all face, while still competing with one another.

Originally administered by the Louisville/Jefferson County Office for Economic Development, the program initially created networks for food processing, metalworking, plastics, printing, and transportation/trucking. Over time, as a response to the new economy, the program has instituted networks for information technology, logistics, new manufacturing, and call centers.

In 1998 the Greater Louisville Chamber of Commerce, also known as Greater Louisville, Inc., assumed responsibility for the Business Networks program under contract with the Office for Economic Development. Greater Louisville, Inc., currently manages and facilitates nine business networks.

The stated mission of the program is to help retain and nurture companies by facilitating results-oriented interactions among businesses with common interests. The networks are intended to achieve what individual member firms cannot do alone by focusing on joint marketing and purchasing, strategic alliances, improved technologies, and public policy. The program is supported by local government funds and membership dues.

find and support a niche in the new economy. Cluster-based development is a framework for regional collaboration because it emphasizes the value of creating linkages among firms and the institutions that support them. By restructuring government assistance around target industries, the administration of economic development programs can become more focused, efficient, and potentially effective. Finally, by targeting job training programs to the specific needs of key industry clusters, regions can equip workers with readily marketable skills, and firms will benefit from a workforce with industry-specific knowledge.

Cluster-based economic development involves identifying the areas in which a region or a community is best suited to add value in the new economy.

The Research Triangle region's cluster strategy, which was just recently initiated, is an example of how a multijurisdictional region in North Carolina is refocusing its economic development efforts on meeting the needs of its key industry clusters to stay competitive.[29] The impetus for the Research Triangle initiative was a study conducted by cluster advocate Michael Porter. The 2001 study, titled *Clusters of Innovation*, recommended that the region devise an updated economic development vision and cluster-focused action plan to ensure continued competitiveness in the changing new economy.

To move from the initial cluster analysis to implementation, the Research Triangle Regional Partnership, in collaboration with other regional, state, and local economic development organizations, created a high-level task force of business and education leaders to chart a new vision and plan for the region. This thirty-seven member committee, called the Future Cluster Competitiveness Task Force, commissioned additional studies to inform the cluster strategy.

In early 2004 the task force released its final report, *Staying on Top: Winning the Job Wars of the Future*. The report sets forth the details of a five-year, $5 million cluster-based strategy to create 100,000 new jobs and expand employment in all thirteen counties that constitute the Research Triangle region. It recommends actions to promote the growth of ten industry clusters in which the region has a competitive advantage.

The Research Triangle region, which is considered a model of economic development success around the world, is well positioned for continued prosperity. Despite its past success and tremendous assets, the region's leaders recognize that they cannot rest on their laurels. The new economy is changing so rapidly that the region must try to stay in front of the trends if it is to respond effectively to opportunities and remain competitive.

The Research Triangle cluster strategy has an explicit regional focus and is deliberate in its efforts to connect the region's nonmetropolitan counties to its future economic prosperity. Also, the strategy is expected to produce a higher-quality workforce, with the skills that target industries need, by strengthening linkages between institutions of higher education and economic development entities.

Workforce development is a common issue around which a cluster strategy might form. The special skills required to produce a particular good or service are one of the shared needs that cluster firms may want to address collectively. The firms and the institutions involved in a particular cluster can collaborate to match the supply and the capabilities of the local workforce to industry needs.

For example, Arizona has adopted a comprehensive workforce development plan that forecasts worker demand in the state's key industry clusters, identifies gaps in training for cluster-specific occupations, and ensures that all training programs teach the skills needed by cluster firms.[30] Indiana's state-level Workforce Department now targets specific industry clusters. As part of the Advance Indiana program, staff are assigned to work with certain industries and specialize in understanding the workforce needs of the state's major economic growth engines.

In North Carolina the Community College System developed a plan for creating Industry Cluster Resource Centers on certain community college campuses around the state.[31] The plan was completed in 2000 but has not yet been implemented. These specialized knowledge and training centers would focus on the needs of key industry clusters in each of the state's seven economic development regions. They would be "one-stop shops for an industry cluster, somewhere member firms can go for help in translating their organizational needs into education and training requirements, or for expertise that can enhance their competitiveness."[32]

The plan identifies the target clusters in each region that the proposed centers would serve, and it outlines a competitive-bid process for colleges interested in hosting a center. Also, it recommends that the Research Triangle be the location of a cluster center focused on biotechnology and pharmaceuticals; that the proposed center in eastern North Carolina emphasize medical services and laboratories; and that the Piedmont Triad and Advantage West regions host centers with expertise in metalworking and plastics, respectively.

The experience of cluster-based economic development in a number of states and regions offers the following guidance for increasing the likelihood that a cluster strategy will be effective.

1. Find a niche and fill it.

Cluster-based economic development involves identifying the areas in which a region or a community is best suited to add value in the new economy. Using critical mass and industrial specialization as starting points makes sense. The next step entails examining the needs of a region's existing industry concentrations and devising ways to keep them competitive. The idea is for a region to figure out what it has to offer that is special in the new economy and to devise ways to leverage its strengths.

It is important to be both strategic and realistic in sizing up a region and positioning it to capitalize on future economic opportunities. Many communities and regions try to imitate what others are doing in economic development. Cluster-based development helps a region figure out what is special about its economy and gives it distinction. A

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The state's Research Triangle is home to numerous biotechnology enterprises. Here a worker checks whether a system to purify substances is working properly.

region's competitive advantage could very well be related to its traditional economic base, which may be undergoing transition.

Winston-Salem, in the Piedmont Triad region of North Carolina, is a good example. Biotechnology companies are attracted to the biomedical research capacity at Wake Forest University. Biotechnology-related production is a logical extension of the region's traditional manufacturing base. As biotechnology evolves from ideas in the laboratory to products in the marketplace, there will be an increasing need for production workers. The people in the Piedmont Triad region already know how to make furniture and textile products. With additional training and upgrading of skills, they can make biotechnology-related products. So this is a viable cluster for Winston-Salem to target. An indicator of the demand for jobs in biomanufacturing is that Forsyth Technical Community College had more than 100 applicants last fall for its new biotechnology training program. When students graduate, they almost are guaranteed a job, according to the president of the college.[33]

Every region and community seems to want a biotechnology cluster, but not every region has the appropriate conditions, institutional infrastructure, and economic base to support one. Indeed, for many regions a biotechnology cluster is wishful thinking—a long shot at best. The point is to connect a cluster strategy to the areas in which a region has some existing or realistically potential strength.

Focusing on economic niches means that companies and regions will specialize in certain activities. One of the counterarguments to cluster-based development is that it sacrifices economic diversification for increased specialization. According to this view, specialization connotes a lack of economic diversity and vice versa. If so, then the promotion of industry clusters runs the risk of creating highly specialized regional economies that are vulnerable to cyclical declines in certain industries.

However, another view suggests that specialization and diversity are not necessarily incompatible.[34] The ideal scenario is to have a regional economy that is both specialized within certain niches and industrially diverse. In other words, the goal is to pursue multiple specializations within a broader context of economic diversity.[35] Regional economies can be highly specialized in certain industries and still possess a healthy mix of economic activities overall.

2. Move beyond critical mass.
Clusters can be more than a critical mass of firms. They represent a process and an existing or potential set of relationships. Theoretically the scale and the critical mass of industry alone will generate a competitive advantage when firms are located in proximity to one another. From this perspective, increased competitiveness is essentially an unintentional byproduct of firms in an industry being physically located together.

However, a more systematic approach to cluster-based development places more weight on the role of deliberate interaction and collaboration in generating competitive advantage. That is, the economic development benefits of clusters are likely to be enhanced when the region moves beyond critical mass to leverage its key industries.

Thus it is useful to distinguish between industry clusters defined in terms of critical mass and clustering as a deliberate, collaborative process. Regions that recognize this distinction and attempt to link the two elements will likely derive a wider range of economic development benefits. Clusters must be understood in terms of industrial concentration but also as a qualitative process for organizing a region to support target industries in which a critical mass already exists. A critical mass in a particular industry can form in a region somewhat serendipitously. Taking full advantage of cluster-based economic development requires a region to institute a process for systematically facilitating synergy within target clusters.

3. Focus on the ties that bind.
To figure out how best to intervene to support a particular cluster requires an understanding of what holds the cluster together and what is the rationale for its location. In most cases, some unique factors cause firms to cluster in a certain place. Regional economist Ann Markusen suggests that regions can learn from "sticky places" that have been successful in attracting and keeping increasingly mobile private investment. She notes that the Italian industrial districts she studied "owe their stickiness to the role of small, innovative firms, embedded within a regionally cooperative system of industrial governance which enables them to adapt and flourish despite globalizing tendencies."[36]

Although cluster firms may compete for business, they also do business with one another and have common needs for specialized resources, technology, or infrastructure. The reliance on shared resources partially explains why certain clusters tend to emerge in particular locations. For example, the Yadkin Valley region of North Carolina has a rapidly growing cluster of wine companies, in part because of the region's ability to grow the right kinds of grapes. Transportation and logistics firms are attracted to the Memphis, Tennessee, region, which is known as America's distribution center because of its extensive network of interstate highways and rail lines and its substantial air freight capacity. Similarly the Piedmont Triad region of North Carolina is positioned to become a distribution and logistics center with the arrival of the FedEx mid-Atlantic hub.

By focusing on clusters of businesses, rather than individual firms, the public sector can take advantage of economies of scale in delivering economic development services.

4. Strengthen linkages.
Collaborative linkages are the mechanism through which clusters come to life and create a truly competitive advantage for a region. What differentiates clusters from traditional industry sectors is the linkages and the interdependencies that exist, or could potentially exist, among firms and between firms and supporting institutions. By strengthening critical linkages such as those identified in the next sections, regions will position themselves to compete better in the global economy.

Linking Firms within Clusters

Proximity affords the opportunity for higher levels of interaction among firms, but it offers no direct means for such interaction. Typically, some forum for facilitating collaboration and networking must be in place to activate a cluster and create the synergy that translates into competitive advantage.

Louisville has instituted a process for bringing together firms in target industry clusters. Through its Business Networks Program, the city provides a mechanism for collaboration among firms on a number of issues affecting the competitiveness of member companies. The program represents a practical example of how cluster-based networking among firms is being applied as part of a regional economic development strategy. It is not yet known whether these cluster-based business networks are producing any tangible economic development results in Louisville, but the process by which they are attempting to do so is itself instructive (see the sidebar on page 49).

The Catawba Valley Hosiery Technology Center, in Hickory, North Carolina, is an example of an institutionalized process for bringing together the firms in a particular industry cluster to collaborate on the issues that threaten their ability to compete in the new economy.[37] The Hosiery Technology Center opened in 1990 at Catawba Valley Community College to help hosiery and sock manufacturers in the region modernize their production processes in order to compete with low-cost producers overseas. The center trains production workers and educates managers in the latest technologies and innovations in the industry. It also facilitates networking among the region's hosiery companies, which has given them a greater sense of collective identity in the face of stiff foreign competition. As a result of the center's work, hosiery firms in the Catawba Valley collaborate more with one another, invest more in training workers and new technologies, and have a better sense of what they need to do in order to stay competitive and survive in a somewhat unstable industry.[38]

Linking Political Jurisdictions

Many jurisdictions recognize the need to collaborate across political boundaries in pursuing economic development, but find it difficult to do so. Clusters can serve as a framework to help them approach economic development as a regional issue.

In an increasingly global economy, regions consisting of multiple jurisdictions are the most viable economic units.[39] Economic activities do not recognize political boundaries, so it is important to understand the economic interdependencies that cut across city, county, and state lines. Going it alone in the global economy is nearly impossible, given that individual jurisdictions usually do not possess the scale and the comprehensive sets of critical inputs and services required to compete. The question is how to overcome the barriers to regional collaboration and provide incentives for jurisdictions to work together on economic development.

Conclusion: Lessons for Governance and Policy

Some analysts debate whether industry clusters can be created from scratch in a region. The prevailing wisdom suggests that, in most instances, clusters locate in certain regions mostly because of historical accident or chance rather than because of any deliberate strategic effort.[40] Yet the proliferation of cluster-based strategies and policies suggests that communities might play a role in developing industry clusters.

A critical mass can form within an industry without much direct intervention and support from government. But can or should government do more to help a region move beyond critical mass and capitalize on its key industries and economic drivers?

Government intervention at some basic level appears crucial. Many observers prefer a limited but supportive

NC Grape Council

The Yadkin Valley region of North Carolina has a rapidly growing cluster of wine companies, in part because of the region's ability to grow the right kinds of grapes.

role for government in cluster-based development. Government's role in cluster-based development could be more focused, though not necessarily enlarged. The cluster approach is useful for assessing the structure of a regional economy and identifying critical linkages. When local policy makers better understand how their regional economy functions and which industries are the drivers, then they can deploy economic development resources more strategically to enhance regional competitiveness. By focusing on clusters of businesses, rather than individual firms, the public sector can take advantage of economies of scale in delivering economic development services. In addition, clusters provide an opportunity for a region to improve the skills of its workforce by providing training more tailored to the specific needs of key industry groups.

Industry clusters tend to thrive in places where their needs for specialized inputs and services are being met. So a logical role for government in cluster development is to make cluster-related investments in education and job training, infrastructure, innovation, and the organizations that provide these services.

Clusters provide a forum for dialogue between business and government, and a framework for collaboration. Government can be the catalyst for collaboration on a cluster strategy when no other entity is willing to assume such a role. It can facilitate the process by engaging the appropriate local institutions and coordinating public resources to support the effort. When collaboration is facilitated and institutionalized, clusters are a means for strengthening a region's social capital, which is captured in social relationships and the capacity of organizations to work together toward shared goals. Research suggests that regions rich in social capital tend to generate more economic prosperity. To encourage collaboration, government might require that firms applying for incentives, grant funds, and other types of public assistance do so in partnership with other firms in a particular cluster.

The ultimate question for policy makers contemplating an industry cluster strategy is whether such a strategy truly makes a difference in economic development. The competitive advantage that industries enjoy from clustering can spill over to give communities and regions a competitive edge. What a region does to leverage the potential of its industrial concentrations may matter more than simply having a critical mass of firms.

The promise of cluster-based economic development appears to be based on a completely logical premise: the way to achieve competitive advantage is to identify strengths and systematically build on them. Policy makers and practitioners around the globe hope that the approach bears fruit. Over time, as communities and regions implementing cluster strategies begin to assess and evaluate their impacts, more information will become available about their effectiveness.

In the meantime the most significant value of industry clusters lies in their use as a framework for understanding how regional economies function, organizing economic development efforts, and enabling collaboration. If nothing else, clusters aid public-sector planning by providing a new way of thinking about the structure of regional economies and the delivery of economic development services. The cluster approach helps decision makers to identify the drivers of the regional economy and the sources of competitive advantage. It helps a region determine what it does well—what its niche is in the new economy.

Notes

1. Stuart A. Rosenfeld, Creating Smart Systems: A Guide to Cluster Strategies in Less Favoured Regions (Luxembourg: European Comm'n, 2002).

2. *See* www.researchtriangleregion.com for more information on the Research Triangle cluster strategy.

3. *See* Greensboro and Guilford County Cluster Analysis, 2001, at www.forwardgreensboro.com/graphics/cluster.pdf. In summer 2001 the Greensboro Economic Development Partnership hired the Natelson Company, a California-based consulting firm, to conduct the Guilford County cluster study. A team of graduate students from the Sloan School of Management at the Massachusetts Institute of Technology conducted a more detailed follow-up study for the partnership in June 2002. *See* www.forwardgreensboro.com/graphics/MIT_Industry_Cluster_Study.pdf. Davidson County identified target business clusters as part of a larger strategic planning effort. For more information, *see* www.davidsoncountyworks.org/davidsonvision.pdf.

4. The current interest in industry clusters is due in part to the effective advocacy of scholars and analysts like Harvard professor Michael Porter and consultant Stuart Rosenfeld, a contributor to this special issue of POPULAR GOVERNMENT (see the article on page 23). *See* Michael E. Porter, *Clusters and the New Economics of Competition*, HARVARD BUSINESS REVIEW, Nov.–Dec. 1998, at 77; Rob Gurwitt, *Michael Porter: Cluster Power*, GOVERNING MAGAZINE, Apr. 2000, at 72; STUART A. ROSENFELD, INDUSTRIAL STRENGTH STRATEGIES: REGIONAL BUSINESS CLUSTERS AND PUBLIC POLICY (Washington, D.C.: Aspen Inst., 1995).

5. Jennifer P. Montana, *The Changing Nature of Regional Competitiveness*, JOURNAL OF CITY AND STATE PUBLIC AFFAIRS, Spring 2001, at 9.

6. Jan G. Lambooy, *Knowledge and Urban Economic Development: An Evolutionary Perspective*, URBAN STUDIES, May 2002, at 1019.

7. Michael Storper, *The Resurgence of Regional Economies, Ten Years Later: The Region as a Nexus of Untraded Interdependencies*, 2 EUROPEAN URBAN AND REGIONAL STUDIES 191 (1995). Tacit knowledge in particular tends to be place based. In contrast to knowledge that can be readily codified and transmitted across distance and space, tacit knowledge is less amenable to such dissemination. Maryann P. Feldman, *Location and Innovation: The New Economic Geography of Innovation, Spillovers, and Agglomeration*, in OXFORD HANDBOOK OF ECONOMIC GEOGRAPHY (Gordon L. Clark et al. eds., Oxford, Eng.: Oxford Univ. Press, 2000). Proximity facilitates the face-to-face interactions through which tacit knowledge is exchanged.

8. Porter, *Clusters and the New Economics*, at 78.

9. ALFRED MARSHALL, PRINCIPLES OF ECONOMICS (8th ed., London: Macmillan, 1920).

10. Bennett Harrison, *Industrial Districts: Old Wine in New Bottles?* 26 REGIONAL STUDIES 469 (1992).

11. Ron Martin & Peter Sunley, *Deconstructing Clusters: Chaotic Concept or Policy Panacea?* 3 JOURNAL OF ECONOMIC GEOGRAPHY 5, 10 (2003).

12. Michael E. Porter, *Location, Competition, and Economic Development: Local Clusters in a Global Economy*, 14 ECONOMIC DEVELOPMENT QUARTERLY 15 (2000).

13. STUART A. ROSENFELD, OVERACHIEVERS—BUSINESS CLUSTERS THAT WORK: PROSPECTS FOR REGIONAL DEVELOPMENT 13 (Chapel Hill, N.C.: Regional Tech. Strategies, Inc., 1996).

14. Michael E. Porter, *Clusters and Competition: New Agendas for Companies, Governments, and Institutions*, in ON COMPETITION 225 (Michael E. Porter ed., Boston: Harvard Business Sch. Publ'g, 1998).

15. ROSENFELD, OVERACHIEVERS.

16, Bjorn T. Asheim, *Industrial Districts as Learning Regions: A Condition for Prosperity,* 4 EUROPEAN PLANNING STUDIES 379 (1996).

17. Ian R. Gordon & Philip McCann, *Industrial Clusters: Complexes, Agglomeration and/or Social Networks?* 37 URBAN STUDIES 513 (2000).

18. Mark S. Miller et al., *Location Quotient: A Basic Tool for Economic Development Analysis*, 9 ECONOMIC DEVELOPMENT REVIEW 65 (1991).

19. Michael J. Enright, *The Globalization of Competition and the Localization of Competitive Advantage: Policies toward Regional Clustering*, in THE GLOBALIZATION OF MULTINATIONAL ENTERPRISE ACTIVITY AND ECONOMIC DEVELOPMENT (N. Hood & S. Young eds., Hampshire, U.K.: Macmillan, 2000).

20. *See* Edward J. Feser & Edward Bergman, *National Industry Cluster Templates: A Framework for Applied Regional Cluster Analysis*, 34 REGIONAL STUDIES 1 (2000).

21. EMIL MALIZIA & EDWARD J. FESER, UNDERSTANDING LOCAL ECONOMIC DEVELOPMENT (New Brunswick, N.J.: Center for Urban Policy Research, 1999).

22. Chris Hendry et al., *Industry Clusters as Commercial, Knowledge and Institutional Networks*, in INTERFIRM NETWORKS: ORGANIZATION AND INDUSTRIAL COMPETITIVENESS (A. Grandori ed., London: Routledge, 1999).

23. The literature refers to these nonmarket relationships as "non-traded" interdependencies. *See* Storper, *The Resurgence*.

24. L. Gelsing, *Innovation and the Development of Industrial Networks*, in NATIONAL SYSTEMS OF INNOVATION (B. Lundvall ed., London: Pinter, 1992); Stuart A. Rosenfeld, *Does Cooperation Enhance Competitiveness? Assessing the Impacts of Inter-firm Collaboration*, 25 RESEARCH POLICY 247 (1996).

25. Rosenfeld, *Does Cooperation Enhance Competitiveness?* at 248.

26. Edward J. Feser et al., *A Descriptive Analysis of Discrete U.S. Industrial Complexes*, JOURNAL OF REGIONAL SCIENCE (forthcoming), available at www.urban.uiuc.edu/faculty/feser/PUBS/Complexes.pdf.

27. Jong-Il You & Frank Wilkinson, *Competition and Cooperation: Toward Understanding Industrial Districts*, 6 REVIEW OF POLITICAL ECONOMY 259 (1994).

28. *See* STUART A. ROSENFELD, A GOVERNOR'S GUIDE TO CLUSTER-BASED ECONOMIC DEVELOPMENT (Washington, D.C.: National Governors Ass'n, 2002); ROBERT TURNER, A FRAMEWORK FOR CLUSTER-BASED ECONOMIC DEVELOPMENT POLICIES, Working Paper (Albany, N.Y.: Nelson Rockefeller Inst. of Gov't, 2001).

29. For more information on the Research Triangle cluster strategy and for access to a number of background reports, *see* www.researchtriangleregion.com.

30. Mary Jo Waits, *The Added Value of the Industry Cluster Approach to Economic Analysis, Strategy Development, and Service Delivery*, 14 ECONOMIC DEVELOPMENT QUARTERLY 35, 48 (2000).

31. *See* LUCY GORHAM ET AL., MAINTAINING COMPETITIVENESS IN THE NEW MILLENNIUM: A PLAN TO ESTABLISH INDUSTRY CLUSTER RESOURCE CENTERS IN NORTH CAROLINA (Chapel Hill, N.C.: Office of Economic Dev., Univ. of N.C., Dec. 2000).

32. GORHAM ET AL., MAINTAINING COMPETITIVENESS, at 1.

33. *See Forsyth Tech's Getting Wave of Biotech Students*, BUSINESS JOURNAL OF THE GREATER TRIAD AREA, Aug. 6, 2003, available at http://triad.bizjournals.com/triad/stories/2003/08/04/daily25.html.

34. Amy K. Glasmeier, *Economic Geography in Practice: Local Economic Development Policy*, in OXFORD HANDBOOK OF ECONOMIC GEOGRAPHY (Gordon Clark et al. eds., Oxford, Eng.: Oxford Univ. Press, 2000).

35. MALIZIA & FESER, UNDERSTANDING LOCAL ECONOMIC DEVELOPMENT.

36. Ann Markusen, *Sticky Places in Slippery Space: A Typology of Industrial Districts*, 72 ECONOMIC GEOGRAPHY 293, 294 (1996).

37. *See* ROSENFELD, INDUSTRIAL STRENGTH STRATEGIES, for a detailed discussion of the background of the Hosiery Technology Center. *See also* REGIONAL TECHNOLOGY STRATEGIES, INC., CULTIVATING SUCCESSFUL RURAL ECONOMIES: BENCHMARK PRACTICES AT COMMUNITY & TECHNICAL COLLEGES (Carrboro, N.C.: Regional Tech. Strategies, 2001), available at www.rtsinc.org/benchmark.

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39. WILLIAM R. BARNES & LARRY C. LEDEBUR, THE NEW REGIONAL ECONOMIES: THE U.S. COMMON MARKET AND THE GLOBAL ECONOMY (Thousand Oaks, Cal.: Sage Pubs., 1998).

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