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Rural Industrial Development: To Cluster or Not to Cluster?

David L. Barkley and Mark S. Henry

Current regional industrialization strategies encourage recruitment, small business development, and business retention and expansion efforts to promote industry cluster development. In this paper, we provide an overview of the advantages and disadvantages of promoting industry clusters as an industrial development alternative for rural areas. Advantages of successful cluster promotion include stronger external economies, a more conducive environment for industrial reorganization, greater networking among firms, and more efficient use of public resources. The disadvantages of an industry cluster approach are selecting industries to target, overcoming latecomer disadvantages, and providing supportive institutions. Findings indicate that an industry cluster strategy is not appropriate for many rural communities. Areas considering cluster promotion should compare costs of initiating or expanding a cluster with the potential benefits of successful cluster development.

Rural industrialization strategies are evolutionary. Innovative efforts supplement the traditional as goals are revised; as deficiencies in current paradigms become evident; or as changes in markets, institutions, technologies, or organizations result in a new competitive environment. Thus, industrial recruitment programs (industrial parks and financial incentives) spawned entrepreneurial and small business development assistance (venture capital and incubators), which begat programs to enhance local business retention and expansion (industrial extension and technology transfers).¹

The latest link in the evolutionary chain of rural industrialization strategies is the targeting or focusing of recruitment, small business development, and retention and expansion efforts at specific industries to promote industry cluster development. Broadly defined, an industry cluster is a loose, geographically bounded collection of similar and/or related firms that together create competitive advantages for member firms and the host economy (Rosenfeld 1995).

¹Refer to Flynn and Isserman for excellent surveys of economic development policies and programs.

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In this paper, we summarize the debate concerning the advisability of industry cluster promotion as an employment generation strategy for rural areas (nonmetropolitan counties). Industry clusters proponents point to carpet manufacturing near Dalton, Georgia (230 firms, 25,000 jobs), furniture near Tupelo, Mississippi (240 firms, 22,000 jobs), and hosiery near Hickory, North Carolina (100 firms, 6,000 jobs), as examples of rural clusters with significant contributions to regional economies. Additional rural cluster success stories are predicted if industrialization programs are redirected to encourage developing new industry clusters.

Skeptics of this strategy acknowledge the benefits associated with developed industry clusters; however, they question whether this is a realistic industrialization strategy for many rural communities. Industry cluster development requires specific conditions that are attained only at significant costs. For communities deficient in these necessary conditions, the promotion of industry clusters most likely will be unproductive and a distraction from alternative employment generation strategies with greater promise, such as retail business development, tourism, retiree attraction, labor quality improvement, and infrastructure investments.

Our overview of the cluster versus no cluster debate begins with a discussion of evidence of industry clustering in nonmetro areas. Next, we categorize clusters according to firm characteristics, interactions among cluster members, and availability of community support. Then we review the potential advantages developed clusters provide local economies and the difficulties of establishing competitive clusters at new sites. We conclude with a summary of the implications of an industry cluster strategy for stimulating employment growth in rural areas and, thus, enhancing economic development prospects for nonmetro communities.²

Industry Cluster Characteristics

Industry clusters encompass firm groupings with diverse characteristics and, as a result, varied potentials for employment growth and local economic development. For example, a cluster may consist only of firms engaged in producing similar products, such as apparel, upholstered furniture, or automobile parts. Clusters also may comprise vertically integrated firms (sawmills, millwork, cabinet manufacturers), or firms linked by their reliance on similar specialized services (business and financial services, education and training services, research and development facilities), or skilled labor (chemists, machinists). Links among cluster members range from limited purchase-sale agreements to extensive cooperation and collaboration; and community support for cluster firms ranges from passive to extensive.

Thus, industry cluster types fall on a continuum from regional collections of similar firms with few links to Sternberg's sectoral clusters—firms closely linked by purchase-sale relationships and information exchange; joint marketing ventures, subcontracting, and technological learning; collaboration in product development and quality management; and shared development of local educational and labor training programs.

²The focus of this paper is industry clustering as an industrial development strategy and not as an economic development strategy. We appreciate the potentially tenuous link between industrial growth and community well-being, and interested readers may refer to Bartik or Courant for in-depth comment.

Evidence of Industry Clustering in the United States

The importance of clustering for different U.S. industries is apparent from the values of locational Gini coefficients for two-digit Standard Industrial Classification (SIC) industries. A locational Gini coefficient depicts geographical distribution of industry employment across economic regions (refer to the appendix). The coefficient value is 0.0 if industry employment is distributed equally among all regions, and the coefficient value is 0.5 if industry employment is concentrated in one region (Krugman). Figure 1 shows Gini coefficient values for two-digit SIC industries in manufacturing, transportation and public utilities, trade, finance and insurance, and services. Note that coefficient values are provided for metro and nonmetro parts of the Bureau of Economic Analysis's (BEA) economic areas for 1992. Economic areas are multicounty regions generally consisting of a metropolitan (Metropolitan Statistical Area) core and nonmetropolitan counties closely linked to that core (Henry and Drabenstott).

Patterns in figure 1 suggest the following about U.S. industry clusters:

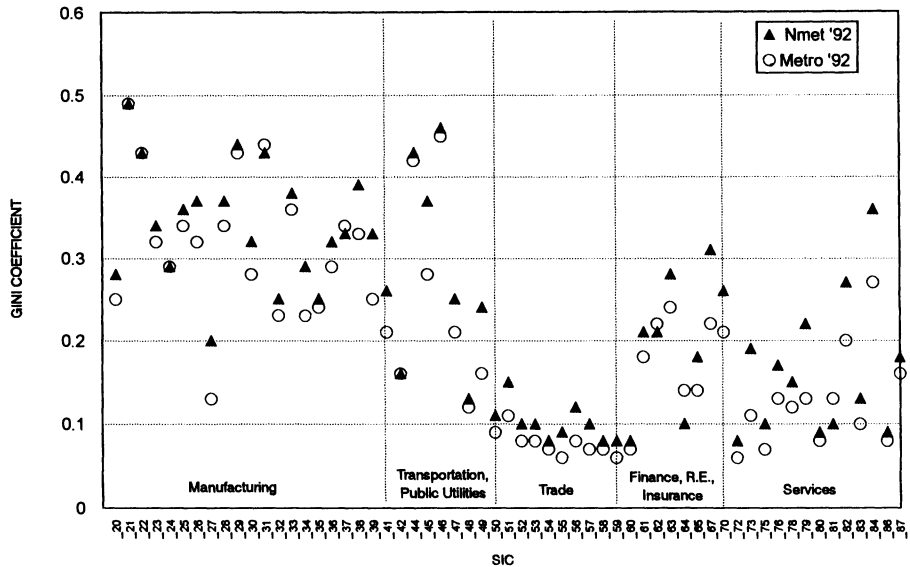
1. The extent of firm clustering variation (by two-digit SIC industry) across industry types is substantial. In manufacturing, locational clustering is significant—led by tobacco products (SIC 21), textiles (SIC 22), petroleum (SIC 29), and leather products (SIC 31). Gini coefficient values for most manufacturers are greater than 0.30. Only one industry has a Gini value less than 0.20 (printing and publishing, SIC 27). In contrast, the wholesale and retail trade sectors are highly dispersed across BEA Economic Areas. The Gini coefficients for the two-digit trade industries generally have values of 0.10 or less. Finally, service industries (SIC 70–89); finance, insurance, and real estate sectors (SIC 60–67); and transportation and public utility sectors (SIC 40–49) are typically more locationally concentrated than trade, but less concentrated than manufacturing industries. These locational Gini coefficients suggest that programs to encourage cluster development should focus on manufacturing industries and selected service sectors. Rural firm clusters will be easier (less costly) to establish if these firms are in industries where the inclination to concentrate is relatively strong.
2. With rare exceptions, Gini coefficient values are higher in nonmetro counties than in metro core counties of economic areas, which suggests that cluster benefits may be more important to rural than to urban firms. For example, clustering may enable rural firms to overcome relatively high marketing and production costs resulting from small local markets, high transportation costs, limited access to specialized services, and limited availability of skilled labor.

Industry Clusters Typology

Each industry cluster is unique because of differences in their core industry sectors, sizes, purchase-sale links, and extent of interfirm cooperation and collaboration. Markusen argues, however, that shared characteristics among industry clusters permit them to be grouped into four general types: Marshallian, hub-and-spoke, satellite platforms, and state-anchored clusters (refer to table 1).

Marshallian clusters are composed primarily of locally owned, small- and medium-size businesses. Firms in these clusters generally are concentrated in craft-based, design-intensive industries, high-technology industries, or advanced

Figure 1. Locational Gini coefficients for metro and nonmetro economic areas, 1992



producer and financial services industries (Storper and Scott). Cluster memberstransact substantial trade, and specialized services, labor markets, and institutions develop to serve the unique products/industries in the cluster. Firms consciously network to exchange information on markets, technologies, research, and production processes. Markusen cites Orange County, California, and Silicon Valley as examples of Marshallian clusters.

Hub-and-spoke clusters are dominated by one or several large firms surrounded by input suppliers and service providers, such as Detroit and Seattle. Smaller firms may evolve in the district to buy from or sell to an anchor firm or to take advantage of agglomerative externalities attributed to the anchor firm’s presence. Markusen notes that cooperation exists between small and large firms in the cluster (generally on the terms of the hub firm), but noticeably absent is much cooperation among competitor firms to spread risks, stabilize markets, and share innovations.

Satellite platforms are industry clusters dominated by branches of externally based, multiplant firms, such as North Carolina’s Research Triangle Park. Markusen says these branches are more or less stand-alone. Scale economies in each branch are moderately high. Minimal intracluster trade or networking occurs among branches, and the incidence of spin-off activities (entrepreneurship and suppliers) is relatively small.

Finally, Markusen identifies **state-anchored industry clusters** as regions where the local business structure is dominated by a public or nonprofit entity, such as a military base, defense plant, university, or government office. Supplier and service sectors develop around these entities. However, indigenous firms are less important to the development of these clusters than in Marshallian or hub-and-spoke clusters.

Markusen notes that all four cluster types are promising employment generation strategies for regional economies. However, the likelihood of developing a cluster in a rural location, and programs implemented to encourage such development, vary

Table 1. Markhusen'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

markedly by cluster type. U.S. rural areas have been more successful in developing hub-and-spoke, satellite, and state-anchored clusters than in fostering Marshallian clusters. Marshallian clusters are disproportionately located in metro areas because smaller firms place significant importance on proximity to skilled labor, specialized services, and input and product markets. Nonmetro areas deficient in these attributes are at a competitive disadvantage in developing Marshallian clusters.

Differences among the four clusters' characteristics suggest alternative strategies for cluster growth. Regions with Marshallian clusters focus on programs to enhance entrepreneurial activity, small business development, and intracluster cooperation and collaboration. Employment growth in regions with satellite clusters is determined primarily by the ability of these regions to recruit new branches. Development efforts in areas with hub-and-spoke clusters focus on programs to retain and expand hub firms and to encourage stronger backward links to local supplying firms (spokes). Finally, the growth of state-anchored clusters depends on the area's ability to expand funding and political support for core public entities.

In summary, industry clusters differ significantly with respect to characteristics of the dominant sectors, extent of interdependencies among firms, and availability of governmental and institutional support. Differences among clusters' attributes affect their employment generation potentials and the selection of the appropriate cluster development strategy. Thus, definitive assessments of costs and benefits associated with cluster development are impossible without detailed information pertaining to cluster characteristics. However, insights into the desirability and appropriateness of an industry cluster strategy are provided by comparing the potential advantages and disadvantages associated with such a strategy.

Advantages of an Industry Cluster Strategy

Targeting industrial development programs at an industry cluster is based on the assumption that such a strategy will provide greater local economic development benefits than those associated with a more diverse industrialization effort. For discussion purposes, these advantages are grouped into four areas:

- Industry clusters provide production and marketing cost savings (localization economies) to member firms.
- Industry clusters provide enhanced opportunities for cluster firms to focus on fewer activities and to adopt new production technologies and organizations, that is, clustering facilitates a restructuring of firms' production activities.
- Industry clusters facilitate the development of links, cooperation, and collaboration among area firms, that is, clustering stimulates networking.
- Industry clusters allow communities to focus industrial development programs on the needs of specific industries.

Clustering Strengthens Localization Economies

The concentration of an industry at a particular location may result in significant cost savings or economies to firms in the cluster. These economies—external to the firms but internal to the cluster—are localization economies. Sources of potential cost savings include

- a greater availability of specialized intermediate input suppliers and business services;
- a larger pool of trained, specialized workers;
- public infrastructure investments (energy, water, waste treatment, transportation) geared to the needs of a particular industrial sector;
- financial markets familiar with the industry's product markets and production processes;
- an enhanced likelihood of firms sharing information on markets, research and development programs, and production methods.

In addition, cluster member investments and growth may benefit others in the cluster by providing higher-quality or lower-cost inputs, attracting new customers to the area, or encouraging public investments in infrastructure that benefit all area businesses (Harrison).

Regional growth models developed within the umbrella of the new growth theory demonstrate that localization economies can lead to a concentration of industrial activity at a limited number of sites, thus stimulating additional locational advantages that encourage further cluster growth.³ Recent empirical research supports the positive role industry concentrations play in regional growth and development. In studies using comparisons among states, metropolitan areas, and nonmetropolitan areas, clustering of an industry's activity in an area is

³Interested readers may refer to Romer, David and Rosenbloom, Krugman, and Venables.

positively related to the industry's employment growth, labor productivity, and wage rates.⁴ Research also indicates that industry clusters enhance the spread of technology, information, and training opportunities among area firms.⁵

In summary, clustering of similar and related firms provides benefits to members of these clusters, and the availability of these benefits (localization economies) enhances the growth potential of the firms and their host regions.⁶ A rural example of this process of positive feedback is provided by the integrated catfish industry cluster of the Mississippi Delta. This cluster consists of firms involved in raising, processing, distribution, and marketing of catfish products and businesses providing support services for the industry. The success of this industry cluster has stimulated economic activity in a persistent poverty area of the South.

Clustering Facilitates Industrial Restructuring

Well-documented in the literature is the transition in industrial organization from large, vertically integrated firms engaged in mass production to relatively small, vertically disintegrated firms focused on specialty or batch production.⁷ This change in industrial structure is attributed to a number of interrelated forces. Increased competition in the new global economy encourages businesses to divest of noncore activities to concentrate resources on core specialties. The emergence of new production technologies (robotics and computer-aided design, manufacturing, and sorting and handling) and production organizations (flexible machining and labor cells) improves the competitiveness of small- and medium-scale firms. Firms may cut labor costs or insulate themselves from production irregularities by subcontracting to suppliers in secondary labor markets. And independent firms using scale economies not available to the vertically integrated firm may more efficiently produce specialized inputs and services.

Vertical disintegration and the adoption of more flexible manufacturing organizations and production technologies appear to be more prominent and easily attained among firms in industry clusters (Holmes). Proximity between the more specialized firms and their input suppliers and product markets enhances the flow of goods through the production system, a particularly important consideration for firms using just-in-time inventory replacement procedures (Smith and Florida). Ready access to product and input markets also is beneficial to firm survival because shortened product life cycles mandate quicker adaptability to

⁴Refer to Henderson; Sveikaukas, Gowdy, and Funk; Selting, Allanach, and Loveridge; Ciccone and Hall; O'hUallachain and Satterthwaite; Henry and Drabenstott; and Gibbs and Bernat.

⁵Evidence of the geographical localization of technological and knowledge spillovers is available in Audretsch and Feldman; Jaffe, Trajtenberg, and Henderson; and Antonelli.

⁶This research also notes, however, that the importance of localization effects is limited, varies significantly among industry cluster types, and declines as city size increases (Henderson, Moomaw, Soroka). Moreover, O'hUallachain and Satterthwaite suggest that the role of localization economies in regional industrial development is passive or supportive and not active or creative. Thus, while localization economies help to explain the growth of an industry cluster, these external economies provide limited insights into the root causes of the cluster's existence.

⁷Refer to, for example, Piore and Sable, Hansen (1988), Porter, Storper and Scott, Malecki, and Barkley.

market changes. And a spatial concentration of industry activity provides the pool of skilled labor required by the computer-aided technologies and flexible manufacturing organizations (Rauch 1993b; Berman, Bound, and Griliches). Thus, Scott (1986) concludes that vertical disintegration encourages clustering, and clustering encourages vertical disintegration. That is, the larger clusters become, the more attractive these clusters are as potential locations for small, vertically disintegrated firms focused on small batch production.⁸

Clustering Stimulates Networking among Firms

Networking is cooperation among firms to take advantage of complementarities, exploit new markets, integrate activities, or pool resources or knowledge to achieve economies of scale or address common problems (Rosenfeld 1995). Networks are horizontal if they link firms needing similar specialized services or technologies or vertical if they link firms performing different functions in the value-added chain (Rosenfeld 1992). Horizontal networks include interfirm arrangements to conduct research and product development, share the cost of specialized services or equipment, collect marketing information, and supply markets. Vertical networks include shared information and expertise among buyers and suppliers and collaboration on product design, engineering, and marketing. Vertical and horizontal networks give smaller firms scale economies and access to information and markets normally available only to larger firms.

Collaboration and cooperation associated with networks occur more naturally and frequently in industry clusters (Harrison, Rosenfeld 1995). For example, a Malecki and Tootle survey of U.S. rural manufacturing networks finds that firms in networks perceive significant advantages from cooperation with their counterparts. Networking firms were more likely than nonnetworking firms to engage in collaborating and information sharing in marketing, new product development, and technological upgrading. Networking firms also reported that interfirm cooperation and collaboration enhanced competitiveness, profitability, and locational stability.

The Tri-State Manufacturers Association (serving western Minnesota and eastern North and South Dakota) is an example of a formal network established to help rural manufacturers (Rosenfeld 1995). The association has one hundred member firms concentrated in metalworking industries. Association activities include identifying complementary capabilities, marketing products, upgrading quality control systems, initiating volume purchase agreements, and establishing joint labor training programs.

While industry clusters enhance networking among firms, network performance and the resulting benefits to firms vary significantly among clusters. Leborgne and Lipietz attribute differences in network performance to the distribution of power and commonality of interests among cluster firms. Interfirm networks are less developed in clusters dominated by a few firms, such as hub-

⁸While clusters are attractive locations for restructuring firms, it is not clear that rural areas are competitive locations for such clusters. Schoenberger proposes that industrial restructuring will result in a reconcentration of industrial activity in urban centers. Yet, Bernat and Barkley and Hinschberger found urban-to-rural employment shifts among U.S. manufacturing industries exhibiting significant restructuring. These two studies also note, however, that employment decentralization was weakest among the restructuring manufacturing industries that produced high-tech products or experienced rapid employment growth.

and-spoke clusters, and in clusters where benefits from cooperation are perceived as limited, such as satellite platforms. Malecki and Tootle also note that the more successful networks are those that become embedded in their host regions. Embedded networks draw on the resources of public and private organizations to facilitate provision of network services (finance, business advice, training, marketing, technical upgrading, and information clearinghouse) and maintain the fragile compromise between competition and cooperation. The importance of embedding to the success of networks resonates throughout the literature. Scott (1986), for example, argues that the most sustainable and dynamic clusters are those in regions that provide supportive institutional and cultural environments.

Clustering Permits Greater Focusing of Public Resources

Focusing industry development efforts on specific industry clusters lets regions use limited economic development resources more efficiently (Carlson and Mattoon):

- A clusters approach enables regions to focus their recruitment, retention and expansion, and small business development programs instead of trying to provide assistance for every existing and potential type of business. This tailoring of development initiatives permits clearer identification of specific industry needs and enables (for a given budget expenditure) the provision of fewer but more highly valued program offerings. In addition, financial inducements required to attract cluster members may be reduced because the availability of localization economies increases firms' profits relative to noncluster locations.
- Because of links between firms in a cluster, programs supporting specific businesses have relatively large multiplier effects for the area economy. The total employment and income gains from recruiting (or retaining) cluster members will most likely exceed those associated with noncluster firms of similar size.
- A focused industrialization program enables communities to match employment opportunities provided by area businesses with skills and occupational and educational characteristics of the indigenous labor force (Gillis and Shaffer). This cross-hairs approach for industrial development (targeting based on industry and labor force characteristics) enables a community to construct a more holistic employment generation strategy based on what it would like most to have and what it can do best (Thompson and Thompson).
- Cluster firms may be integrated more strongly into the local economy than a random collection of branch plants (Mair). This integration or local dependence is particularly significant as cluster firms become embedded in the local economy. Mair says intensified local dependence should contribute to cluster firms' greater interest in local affairs and higher level of community involvement.⁹

⁹Mair cautions, however, that local involvement by cluster firms should not extend to local subservience to the companies or the inability to conduct dispassionate or unbiased policy. An example of the risks associated with dependence on one industry or sector is provided by the bidding war between Marshalltown, Iowa, and Columbus, Ohio, for the location of a consolidated Lennox manufacturing facility. Marshalltown (the birthplace of Lennox) retained the facility only after committing approximately \$20 million for land, facilities, and labor training (refer to Ehrenhalt).

Table 2. Examples of initial state key industry selections (Rosenfeld 1995)

Arizona	Alabama	Illinois	Oregon	Florida	New York
Information	Micro-electronics	Food processing	Forest products	Space industries	Biomedical
Business services	New materials	Industrial machinery	Agricultural products	Laser/optics	Optics & imaging
Aerospace	Biotechnology	Electrical equipment	High-tech	Health technology	Advanced machinery
Health/biomedical	Telecommunications	Manufacturing inputs	Metals	Information industries	Environmental technologies
Mineral/mining	Civilian aircraft	Transportation equipment	Fisheries	Biomedical	Information technologies
Agriculture/food	Machine tools	Electronics	Film & video	Defense industries	Business & financial processing services
Transportation	Computers	Health/biomedical	Biotechnology		Information, media & design
Tourism		Transportation, distribution	Software		
Environmental technologies		Export service	Plastics		
Optics		Travel	Aerospace		
Software		Coal mining	Tourism		
		Telecommunications equipment	Environmental services		

Many state and local economic development practitioners recognize the benefits associated with a focused industrial development program. As such, numerous states and localities have undertaken studies to identify key sectors or clusters—generally those industries currently important to the area economy or industries perceived to provide the greatest potential future benefits, such as job growth, high wages, new technologies, and new firm spin-offs. Table 2 lists industries identified in selected state-level targeting analyses. Targeted industries receive (to varying degrees) special attention with respect to financial inducements, labor training, research and venture capital assistance, industrial extension assistance, and infrastructure and network development.

Shortcomings of an Industry Cluster Strategy

The potential benefits associated with industry groupings are strong inducements for a community to pursue an industrialization strategy focused on industry clusters. The principal shortcoming inherent in following such a strategy is that the likelihood of success, for many rural communities, will be small. Viable industry clusters are difficult to establish for three reasons:

- Communities will have difficulty identifying clusters that best fit their local economies and firms that are most desirable for these clusters.
- Communities late in developing industry clusters are unlikely to provide competitive advantages available in areas with larger, more established clusters.
- Communities will have difficulty developing the institutional environment required to support the establishment and growth of industry clusters.

Communities Will Have Difficulty Picking Winners

Rosenfeld (1992) proposes that rural areas should target their industrial development efforts as a means of attaining a first level of agglomeration. A prerequisite to this targeting is identification of local competitive advantage based on labor force characteristics, local endowments of a unique variety, availability and quality of public and private infrastructure, and proximity to input and product markets. With local competitive advantage established, regional industrialization efforts next must identify successful firms with strong links to the local economy and provide the services and infrastructure necessary to ensure these firms remain successful (Carlson and Mattoon). Thus, designing a successful cluster program and nurturing member firms require an extensive understanding of the region and its economic processes (Isserman, Rosenfeld 1995).

Many regional scientists are skeptical about public officials' (and private consultants') abilities to either identify local competitive advantage or to select good industries/firms to target, technologies to promote, or programs to assist specific sectors. Regional competitive advantage changes over time in response to new technologies, tastes, and institutions (Cunningham). It is a leap of faith to assume that local development authorities appreciate regional, national, and international economic processes well enough to accurately assess local competitive advantage.

Also, regional competitive advantage may result more from past industry location patterns than current resource availability (Storper and Scott). If so, we arrive at the less-than-insightful conclusion that a region has an advantage in doing *x* because a lot of *x* is already being done. Further complicating the local advantage analysis is that we often do not comprehend circumstances under which activity *x* initially developed. Or, the initial reason for the clustering of that activity can be traced back to some seemingly trivial historical accident (Krugman) or serendipitous event (Rosenfeld 1995). One of Krugman's favorite examples of a cluster success story is the carpet industry in Dalton, Georgia. This industry agglomeration evolved from businesses producing tufted quilts, which evolved from one lady making one quilt for a wedding present. An active imagination or unusual clairvoyance would be needed to predict Dalton's future competitive advantage in carpet manufacturing based on the popularity of a novel quilt design.

In addition, the selection of specific targets for industry clusters is problematic because projections of industrywide growth prospects are notoriously unreliable; growth prospects change over time in response to market forces and product cycles; and individual firms in an industry may exhibit employment and sales trends counter to that of the industry as a whole. Courant (p. 874) recognizes the futility of picking winners, and he concludes, "We simply do not know enough about which specific industries to subsidize to have any realistic hope of doing more good than harm by engaging in subsidies." Even Rosenfeld (1995), a leading proponent of a cluster's strategy for rural

development, admits that it is unlikely that local governments possess the knowledge necessary to understand clusters and their dynamics.¹⁰

Evidence of the difficulty of identifying winners is provided in an analysis of South Carolina's industrialization strategy (Lamie). South Carolina selected secondary wood products manufacturers (SIC 24 and 25) as one of their target industrial sectors—a selection based on an existing core of primary wood products manufacturers in the state (South Carolina Department of Commerce). Yet, Lamie found that only three of the thirty four-digit SIC wood products industries (wood preserving, reconstituted wood products, and household furniture) were promising candidates for targeting based on the industry's projected local economic effects and likelihood for locating in the state. Lamie's findings indicate that the selection of promising cluster candidates requires industry-specific information on production trends, labor requirements, locations of product markets and input and service suppliers, and historical location patterns.

Latecomers May Not Be Competitive

The benefits available to members of a cluster provide early agglomerations of firms distinct competitive advantages over late imitators (Scott 1993, Rauch 1993a). Early sites provide localization economies, specialized infrastructure investments, and institutional support not readily available in newer or smaller clusters. Late-comer clusters also are less likely to provide the well-developed and embedded interfirm networks necessary for sustained cluster growth. Harrison proposes that intracluster networks require an elevated level of interfirm trust that evolves from a lengthy experience of contracting, recontracting, informal deal-making, and sharing of common support services. Thus, trust is built through experience that requires time, a commodity in short supply among new or evolving clusters.

Disadvantages facing latecomer clusters are evident in the continuing effort by Myrtle Beach, South Carolina, to become the Branson, Missouri, of the East. Each year, millions of tourists visit the Myrtle Beach area for its beaches and golf courses. And millions of dollars have been invested in country music theaters to serve visitors to the area. Yet, the country music industry in Myrtle Beach is only a minor threat to the Branson cluster as a destination for country music fans.

Can latecomers overcome advantages inherent in existing clusters? The consensus of regional scientists is yes, but only under special circumstances. Krugman, for example, proposes that new clusters can compete with existing industry concentrations if the starting positions are not too unequal, workers and firms can relocate rapidly, and increasing returns are realized early by imitators. Scott (1993)

¹⁰Rosenfeld (1995) suggests that information necessary for identifying industry clusters can be acquired through in-depth analysis of the regional economy and local firms. In *Industrial-Strength Strategies: Regional Business Clusters and Public Policy*, he dedicates a twenty-six-page chapter to the types of information communities might collect and analyze to prepare for a clustering effort. An excellent and highly useful database would result from following the recommendations of this chapter. It is our contention, however, that few rural communities possess the time, patience, financial resources, or technical expertise to pursue such analysis. Assistance from area universities or the state cooperative extension service might alleviate these resource constraints.

suggests that late imitators may succeed if there are unique local resources or characteristics or an industrial structure exists onto which the new activities may be grafted. And Hansen (1990) and Rauch (1993a) show that, under specific conditions, regional wage differences or locally provided subsidies may be sufficient to overcome localization economies available in early clusters. Scott (1993, p. 227) cautions, however, that "...where such initial advantages are lacking, only massive, concerted, and extremely expensive action by central government authorities is likely to produce results, and even then,...the net effects are apt to be ambiguous."

Supportive Institutions Are Not Easily Established

The industry cluster literature is remarkably consistent in its description of the institutional environment required to nurture and support clusters. Recommended are changes in political, economic, and institutional conditions to discourage antagonistic competition and engender trust, cooperation, coordination, flexibility, and collective action (Hirst and Zeitlin). Indeed, the free market model and policies to promote competition are discouraged because interfirm rivalries impede networking and the provision of collective services, such as labor training programs, marketing information, technology development and transfer, and new product development. Thus, Lorenz concludes that the question of intentional creation of industry clusters reduces, in part, to the question of changing beliefs.

Are beliefs and institutions in rural areas readily changed to permit widespread development of industry clusters? Proponents of New Institutional Economics are not optimistic. Libecap argues that we cannot be confident that optimal (or even near-optimal) institutional arrangements will emerge because cooperative behavior and beneficial market exchange are limited by incomplete information, bounded rationality, opportunistic behavior, and asset fixity and specificity. Libecap (p. 28) concludes that "...a political consensus for promoting economic development will occur only when the aggregate gains are expected to be very large, when the distribution of the benefits and costs is quite clear, and when the community is small enough and cohesive enough to reach agreement on compensating those who might be harmed."

The difficulty of providing supportive institutional environments is noted in case studies of attempts to establish industry clusters in rural areas. In his research on European clusters, Camagni finds that conducive environments exist in lagging regions, but they are rare and not fully developed. Christopherson and Redfield also find little in the way of the cooperative links, infrastructure development, and research and development investments in the advanced ceramics district centered on Corning, Inc., in Corning, New York. The employment generation potential of this rural hub-and-spoke cluster is limited because an integrated network of producers and suppliers is absent and successful spoke firms are viewed as competitors by Corning, Inc., and prime candidates for acquisition.¹¹ Ramsay documents the roles of local history, culture, and social and economic structures in thwarting

¹¹The social and demographic diversity evidenced by some rural communities (particularly those in the South) also may impede development of a conducive environment for industrial districts. Both Camagni and Harrison find that successful districts tended to be racially and culturally homogeneous.

industrialization efforts in rural Somerset County, Maryland, in the 1980s. Finally, Hansen (1993) suggests that many rural areas are unpromising seedbeds for Marshallian clusters because of their legacies of large corporate farms, tenant farming, low education levels, discrimination, and reliance on government subsidies.¹²

In summary, the historical and cultural vestiges that contribute to the evolution of a supportive industrial environment are most likely absent in many rural areas. Programs to overcome these shortcomings, such as leadership training, community-level consensus building and strategic planning, brokers to facilitate collective services, and buyer and seller networks, have been initiated in several states, but it is premature to judge the universality or long-term development potential of these efforts.¹³

Implications for Rural Industrial Development Policy

Our purpose in this paper is to provide a review of the potential for industry clusters as a rural industrialization strategy. Our findings indicate that development of an industry cluster can provide significant advantages to a regional economy through enhanced external economies, synergies from intracluster networking, and stronger multiplier effects because of reduced leaks. The principal shortcomings inherent in a clusters strategy (picking winners, disadvantages to latecomers, institutional constraints) relate to the difficulty of establishing a cluster in a location where an industry agglomeration is not present. The key for policy prescription, therefore, is to compare the costs of initiating or expanding a cluster with the potential benefits of successful cluster development. Based on these potential costs and benefits, we think most rural communities will fall into one of three general categories with respect to the advisability of adopting a clustering strategy:

1. Communities with well-developed industry agglomerations will most likely find that programs to expand clusters will be reasonable strategies for industrial development. Rosenfeld (1992, 1995) recommends three program initiatives for these communities:
 - a. Communities can support, through public leadership and financial incentives, development of industry organizations that help firms develop a shared vision, identify similar interests, and pursue new opportunities.
 - b. Communities can assist in creating broker and catalyst services that help firms discover what they need and where to find it. Services

¹²Rosenfeld (1995) is more optimistic than Hansen (1993) regarding the potential for cluster development in traditionally agricultural regions. He proposes that the agricultural tradition of rural areas favors development of small, entrepreneurial units of production.

¹³It is generally assumed (based on preliminary anecdotal and empirical evidence) that cluster development will enhance the employment generation potential of the host area. Unclear, however, are the implications of an industry agglomeration on the stability of area employment over time (Brown and Pheasant, Neumann and Topel, Lande) or the influences of product life cycle forces on cluster cohesiveness and long-term viability (Krugman, Norton). In addition, we know little about the effect of cluster development on the attractiveness of a location to non-cluster firms. If clusters destabilize local employment or deter potential employers in other sectors, then these additional disadvantages must be included in the policy calculus.

- include analyzing market and technology trends; encouraging cooperation and collaboration in marketing, sales, and input purchases; identifying specialized services of common interest; and providing applied research, labor training, and business assistance programs.
- c. Communities can provide a publicly subsidized center that focuses on the needs of a specific industry cluster. Services of such centers include training in technologies and management techniques, sponsoring generic research, and providing access to information.
2. Rural communities with small industry clusters may wish to pursue a cluster promotion strategy if such a strategy is not too costly. Smaller clusters generally will be disadvantaged in competing with larger, established industry clusters. The established cluster often will offer firms the highest profit potential because of proximity to input suppliers, availability of specialized labor and business services, and provision of supportive infrastructure investments and institutions. To be competitive, communities with smaller clusters may need to offer financial inducements to prospective firms, invest in specialized infrastructure, and/or subsidize labor-training programs. The costs of these programs may be small or large, depending on the specific industry, community characteristics, and the head start earlier clusters attained. Thus, assessments of the costs of overcoming latecomer disadvantages must be undertaken case by case.
 3. Communities with no distinct industry agglomerations (or clusters of declining sectors) will most likely find little success in a clustering strategy. In this case, Courant suggests that local governments focus their efforts on efficiently providing local public services and improving the quality of the regional labor force. Such efforts, in conjunction with an active small-business-development program, will give these communities a receptive environment for the historical accident or serendipitous event that possibly could be nurtured into a new industry cluster.

In summary, the promotion of industry clusters, like rural industrialization strategies that preceded it, is not the industrial development solution for all rural communities. The clustering approach is most promising for communities with existing, well-developed agglomerations in dynamic, rapidly growing industries. Rural areas with concentrations in declining sectors or areas with diverse industrial bases probably should continue to concentrate their industry development resources in the more traditional program areas—recruitment, small business development, and retention and expansion. The difficulties and costs associated with developing new industry clusters in these communities render clustering an impractical employment generation strategy. Thus, a clustering approach favors nonmetro areas with past successes in industrial development, and the advantages provided by successful application of this strategy most likely will result in strong employment growth for these haves at the expense of the have nots. But this is nothing new in the checkered history of rural industrial development programs.

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Appendix

To compute the locational Gini coefficient provided in the text, we use procedures suggested in Krugman. Recall that the locational Gini ranges from 0 (perfect dispersion across regions) to 0.50 (all industry activity concentrated in a single region). The regions used in this paper are the metro and nonmetro parts of the BEA Component Economic Areas that have a metro core (280 total regions).

The formula for the locational Gini coefficient, G , for a given industry is

$$G = \Delta/4\mu \quad (A1)$$

where

μ = mean of R for all regions,

$$\Delta = \frac{1}{n(n-1)} \sum_{i=1}^n \sum_{j=1}^n |R_i - R_j|,$$

$$R_i(j) = \frac{\text{the share of national employment in the industry in region } i(j)}{\text{the share of total national employment in region } i(j)},$$

n = number of regions.