UNLOCKING RURAL COMPETITIVENESS

The Role of Regional Clusters

January 2007

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Executive Summary

The basic purpose of this EDA-funded effort was to develop a database and methodology to help rural areas in the United States assess their regional economic competitiveness to support growth and development strategies. Principal partners were Purdue University, Indiana University, Indiana State Government, and Strategic Development Group, Inc.

The research team organized its efforts into two major projects. The goals of Project 1 were (a) to build a comprehensive national database suitable for cluster studies and (b) to use this database to analyze the following research issues:

- The linkages between cluster structure, degree of rurality, and economic performance
- The spatial clustering of industrial clusters and the interface between rural and metropolitan regions in emerging agglomeration economies
- Growth trajectories for counties that are differentiated by cluster makeup, degree of rurality and distance to metropolitan areas

The goals of Project 2 were to (a) use the database developed in Project 1 to analyze the cluster structure of a selected region, (b) supplement these secondary data with additional local knowledge, and (c) mobilize the regional constituency in a planning process that was grounded in both secondary data and localized primary data. In essence, Project 2 was a pilot study designed to create and document a prototype process for rural regional development planning and action—one that can be replicated in other rural regions of the country.

Exploring the various research questions and relationships associated with Project 1 required operational measures of three important constructs: rurality, cluster, and economic performance.

With respect to **rurality**, an Index of Relative Rurality (IRR) was created. The IRR indexes U.S. counties along a rural-urban continuum with values ranging from 0 to 1. Values on the IRR were also used to classify counties into seven different categories with three of the categories representing the "metropolitan sphere" of influence; three categories representing the "rural-metropolitan interface;" and the seventh category labeled as "the rural sphere" of influence.

Seventeen **clusters** were defined and used in the analysis. In addition, the manufacturing supercluster was broken down into six subclusters.

Key Findings from Project 1

1. Different clusters are distributed in very different ways across the nation's geography.
2. Location patterns of the 17 clusters support common perceptions of regional variation in economic activity.
3. For some clusters specialization within an individual county level may reflect a larger regional specialization pattern, but in the case of other clusters this may not occur.

4. Labeling or categorizing a region around a single cluster or economic activity is too simplistic due to the considerable co-location of clusters.

5. Most of the 17 clusters analyzed tend to be concentrated in urban counties. The clusters most strongly oriented toward urban locations are business and financial services; biomedical/biotechnology; information technology and telecommunications; and printing and publishing. The three clusters with the strongest rural orientations are agribusiness, food processing and technology; forest and wood products; and mining.

6. Although rural economies have historically lagged behind urban economies, there is scattered evidence of the possible narrowing of the gap between rural and urban economic performance.

7. The clusters most strongly associated with higher levels of economic performance are business and financial services; information technology and telecommunications; and printing and publishing.

8. Human capital (as measured by educational attainment) is the primary factor related to differences in income growth among counties.

In addition to the analysis associated with Project 1, the research team also created a database via the Web geared to obtaining indicators and cluster-based employment, wage, and establishment data critical to implementation and continued measures of progress. This database also integrates measures of rurality. The Indiana Business Research Center (IBRC) will maintain and enhance the online database that is available at www.ibrc.indiana.edu/innovation/data.html.

Key Findings from Project 2

Research Project 2 targeted Indiana's Economic Growth Region 8 (EGR 8), an eight-county region in southern Indiana that includes four metropolitan and four non-metropolitan counties. Many of the key assets in this region are located in Monroe County, the county with the largest population and the home of Indiana University. Analysis was done with and without Monroe County. Results suggest the need for an integrated two-pronged development strategy. One component would attempt to take advantage of existing cluster strengths in the more rural areas of the region. The other component would attempt to build stronger connections between the more rural counties in EGR 8 and the metropolitan assets and capacity in Monroe County.

The key organizational component for Research Project 2 was a 25-member Regional Advisory Committee (RAC). The RAC was essential and instrumental for guiding and building support for the project. In addition to the secondary data and analysis, considerable primary data were gathered through surveys, focus groups, and interviews with key informants—including existing businesses, local economic development organizations, local and regional plan commissions, and other knowledgeable stakeholders. The process for constructing an economic development strategic plan in Economic Growth Region 8 followed the normal steps used for any strategic planning exercise. The RAC and the planning effort are now focusing on cluster activation and related strategies in the following targeted areas:

- Energy; Agribusiness, Food Processing and Technology; Forest and Wood Products
- Biomedical/Biotechnology; Advanced Materials

- Arts, Entertainment, Recreation, and Visitor Industries

Lessons Learned and Important Considerations for Additional Work

- Clusters are a useful concept for strategic planning for rural regional economic development.
- Contrary to traditional thinking, most rural economies are not dependent upon agriculture.
- Non-disclosure of establishment data at detailed NAICS levels is a major obstacle to the finer-grained analysis that is most useful. This is a particular problem in analyzing rural areas because the number of establishments tends to be much smaller than in metropolitan areas.
- Mapping is a particularly helpful way to illustrate and communicate data on counties and regions.
- A successful planning activity requires at least six months to engage and collaborate successfully with regional stakeholders.
- The concepts and techniques of cluster analysis appear to be a useful tool for regional leaders; however, an educational component on the front end of the project is essential.
- Rural stakeholders may not be accustomed to thinking in regional frameworks, but are amenable to broaden their perspective.
- Surveying business executives in the region may require repeated efforts to collect an adequate number of responses.

1. Introduction

1.1. Project Background, Purpose and Goals

1.1.1. Background

In an era of increasing global competition and urbanization, many rural areas in the United States struggle to maintain their economic vitality and viability. Although there is no single comprehensive measure of economic performance, researchers agree that rural areas of the United States, in general, have historically underperformed urban areas. Typically, per capita income is lower than in metropolitan areas overall, the incidence of poverty is higher, and education levels lag. At the same time, rural America is incredibly diverse in a multitude of ways, including economic performance. For example, Isserman (2000) makes the following observation:

> … had I argued in 1950 that rural America had certain key comparative advantages, and it would grow faster over the next half-century than urban America, I probably would not have been taken seriously. But I would have been right! How can that be? The explanation is simple. Between 1950 and the present, the Office of Management and Budget took 552 counties out of rural America and reclassified them as metropolitan. Today some 71 million people, one-fourth of the U.S. population, live in what was rural America in 1950 but is considered urban America today (pp. 126).

In other words, some parts of rural America are growing so fast they ultimately become urban.

Most analysts and policymakers feel public policy directed toward improving rural economic performance has been largely ineffective (Browne 2001). The reasons for this are myriad. One aspect involves the mistaken belief that the billions of dollars the federal government spends annually in support of agriculture must surely benefit rural America. However, today's reality is that agriculture, especially farm-level production, is an extremely small portion of rural America's population and economic base. For example, Ghelfi and McGranahan (2004) note that of the roughly 2,000 non-metropolitan counties in the United States, only 420 are classified by the USDA as farming dependent (meaning 15 percent or more of earnings or employment comes from farming). Additional analysis by Drabenstott (2005) indicates job gains and population growth are generally negative in those counties most heavily dependent upon agriculture. To reinforce this point, Secretary of Agriculture Johanns (2006) made the following statement earlier this year: "If most agricultural producers are dependent upon off-farm income, then we must pay special attention to our support of rural economies and [move] beyond agriculture. To quote from a report recently released by the American Farm Bureau Federation: 'Farmers are more dependent on rural communities than rural communities are dependent on farmers.'"

Although per capita federal spending is roughly comparable between metro and non-metropolitan America, Reeder and Calhoun (2004) note the composition of the spending is very different. A far larger share of federal spending in rural areas consists of transfer payments to individuals through methods such as Social Security, food stamps, and other assistance to low-income individuals, while in urban areas a much greater share of the spending is for community and economic development investments, including infrastructure, housing, education, and business assistance.

Despite the long-standing challenges facing rural America, the cause is far from hopeless. A recent report from the Southern Growth Policies Board suggests that a positive future for rural America can be built around six pillars (Clinton et al 2005):

- Regional strategies
- Innovation-based strategies
- Entrepreneurial focus
- Maximizing the impact of industry clusters
- The infrastructure of technology
- Inclusive, grass roots involvement

In recognition of both the challenges and opportunities facing rural America, the U.S. Economic Development Administration (EDA) released a major report in 2004 titled *Competitiveness in Rural U.S. Regions: Learning and Research Agenda.* This project was led by Professor Michael Porter and the Institute for Strategy and Competitiveness at Harvard Business School. This report was summarized in the *EDA Update* as follows:

> The Porter research is particularly helpful in outlining some clear strategies for rural regions to be successful, detailing the flaws in current understanding of rural economies, and dismissing the myth that every rural region is the same. The research also suggests that America's rural regions have tremendous potential that past efforts have failed to unlock, and that a fresh and collaborative approach—based on new thinking about regional economies—is needed.
>
> Highlighted findings include:
>
> - The capacity for regional innovation is often driven by industry "clusters"—broad networks of companies, suppliers, service firms, academic institutions, and organizations in related industries that, together, bring new products or services to market.
>
> - Clusters significantly enhance the ability of regional economies to build prosperity because they act as incubators for innovation.
>
> - Clusters possess the primary elements needed to transform ideas into prosperity—universities or research centers that churn out new knowledge; companies that transform knowledge into new services or products; suppliers that provide critical components or equipment; and marketing and distribution firms that deliver the product to customers.
>
> - Regions with successful clusters enjoy higher average wages, productivity, rates of business formation, and innovation.
>
> - A specific challenge rural communities face is economic competitiveness. Rural wages in the U.S. are typically about 70 percent of urban wages, and rural communities are losing their most productive workers to cities with more opportunities.
>
> - Professor Porter's research indicates that there is a clear commitment to mobilizing the inherent potential of rural regions. What is currently lacking is an overall framework that puts individual ideas into context and provides policy makers with actionable guidance on how to develop and implement new strategies.
>
> - There is considerable consensus on many issues. For instance, there is agreement around the performance gap and the challenges confronting rural regions; agreement on the lack of coordination within the institutional network supporting rural development, and among policy makers, thought leaders, and practitioners; a growing understanding that the central issue is competitiveness; and widespread agreement on the importance of cluster thinking in rural economic development.
>
> - Overall, many participants in the research debate lament the disconnect between what is advocated and current U.S. rural economic development policy. Policy does not seem to drive rural development, but

> responds to special interests; many sensible ideas proposed by experts are not acted upon. Without a strong conceptual framework, it is not surprising that economic development efforts for rural regions have been particularly vulnerable to political pork battles between small but well-organized interest groups, frequent institutional redesigns without lasting effect, and the re-invention of old policies under new names.

Subsequent to Porter's initial study, EDA chose to fund a follow-up study. One of the consortia funded by EDA was a partnership among Purdue University, Indiana University and the State of Indiana.

1.1.2. Purpose and Goals of the Study

The overall purpose of this study was to develop a database and methodology to help rural areas in the United States assess their regional economic competitiveness to support growth and development strategies. The team accomplished this broad goal by organizing our efforts into two major projects.

Project 1: Analysis of Cluster Data

The goals of Project 1 were to (a) build a comprehensive national database suitable for cluster studies and (b) analyze several selected issues using this database. Specifically, the research team examined three broad research questions:

1. What are the linkages between cluster structure, degree of rurality and economic performance? For example, are there systematic differences in cluster composition, specialization, and size as the degree of rurality and remoteness changes?

2. How are industry clusters distributed spatially, and how does the interface between rural and metropolitan regions affect emerging agglomeration economies? For example, do industry clusters differ in their degree of spatial clustering? What is the nature of the interface between rural and metropolitan regions? Are certain industry clusters more "distance-sensitive" than others? Do certain clusters profit from large distances to metropolitan areas?

3. What are the growth trajectories for counties that differ with respect to cluster structure, degree of rurality and distance to metropolitan areas? For example, do rural regions in close proximity to metropolitan areas grow faster than remote rural regions?

Project 2: Applying the Analysis in a Rural Region

The goals of Project 2 were to (a) apply the database and methodology developed in Project 1 to a particular rural region, (b) supplement these secondary data with additional local knowledge, and (c) mobilize the local constituency in a planning process that was grounded in both secondary data and localized primary data. The study group designed Project 2 as a pilot study with the hope to create and document a process for rural regional development planning and action that other rural regions of the country can replicate.

The pilot region chosen was Indiana's Economic Growth Region 8 (see **Figure 1**). The region's population, which was 299,888 in 2005, is growing at a modest rate, expanding by 9.6 percent during the 1990s but expected to gain only 7.2 percent in the current decade. The region is

comprised of eight counties that represent a mix of four metropolitan and four non-metropolitan counties.

Figure 1. Counties in Economic Growth Region 8

Source: Indiana Business Research Center

The four metropolitan counties are located in the northern portion of the region and include Brown County, which is part of the Indianapolis metro area but very rural in nature, as well as Monroe, Greene and Owen counties, which are part of the Bloomington metro area. The four non-metropolitan counties are Daviess, Lawrence, Martin, and Orange counties, with each reflecting different degrees of rurality. Lawrence County represents a county with a low degree of rurality; it is adjacent to a metropolitan area and has a sizable urban population. At the other end of the scale is Daviess County, which is not adjacent to a metropolitan area and has a negligible urban population.

This region is much like many parts of rural America where non-metropolitan and metropolitan counties intersect. It thus offers an excellent opportunity to take a close look at the interface of metropolitan and non-metropolitan counties and provide an in-depth assessment of differences in cluster composition, business environment, and economic performance.

Overall, the population of the eight-county region is racially homogeneous (95.6 percent are white) and its age composition, by and large, represents that of the nation as a whole. Yet, there are distinct differences between the metropolitan portion in the north and the non-metropolitan portion in the south:

- The more urbanized metropolitan areas have a young and well-educated population, reflecting the presence of Indiana University in Bloomington (Monroe County).

- The four metropolitan counties are also the prime contributors to the region's population growth. In fact, between 2000 and 2010 the population of the four metro counties is expected to increase by 12.2 percent. In contrast, the non-metropolitan counties are expected to lose population during the current decade, and this loss may further increase the average age of their population.

- As of 2000, only 10.2 percent of the adult population (age 25 or older) in the four non-metropolitan counties had at least a four-year college degree, compared to 28 percent in the four metropolitan counties.

1.2. Organizing to Accomplish this Project

This project was accomplished through teamwork. Three main teams were built around the expertise and capacity of the professional staff of three organizations:

- The Purdue University Center for Regional Development (PCRD);

- The Indiana Business Research Center (IBRC) at Indiana University's Kelley School of Business; and

- The Strategic Development Group (SDG), a private consulting group located in Bloomington, Indiana.

Each organization had a unique but interrelated role and responsibility. The PCRD has strength and capacity in cluster analysis and regional and rural development policy and took the lead on the analytics associated with Project 1. The IBRC has served for many decades as Indiana's official representative to the Census Bureau. Its rich repository of data and the intimate knowledge of various databases served as the foundation for the analytics of Project 1. The IBRC also took the lead for a survey of businesses in the pilot region. One of the strengths of SDG is its long-standing relationship with the Southern Indiana Rural Development Partnership (SIRDP), a 39-county nonprofit organization devoted to improving the economy of rural Southern Indiana. Because of its work and relationship with SIRDP, SDG was uniquely positioned to lead in the organization and mobilization of stakeholders in Economic Growth Region 8. In taking the overall lead for Project 2, SDG facilitated various meetings, focus groups and one-on-one interviews with local stakeholders. This approach appears to have created an effective and sustainable regional planning process. Finally, Indiana State Government—especially the Governor's and Lieutenant Governor's offices—were champions of this project and helped bring various resources and capacity to the table to further both Projects 1 and 2.

Given the complexity of the organizational structure associated with this project, communication and coordination were major challenges but were managed effectively through regular meetings of the entire research team. Additional coordination and communication in the form of e-mail and conference calls occurred on a more informal basis among individual team members and subgroups, as well as between the team and representatives in Indiana State Government.

1.3. Organization of this Report

The remainder of this report comprises four subsequent chapters plus extensive appendices. Also delivered along with the report is a completely digital product—an interactive database publicly accessible on the Internet at www.ibrc.indiana.edu/innovation/.

Chapter 2 provides an overview of the cluster concept, explains why clusters are important, and provides descriptions and definitions for the 17 clusters used in this study.

Chapter 3 describes the methodology and results of Project 1. The methodology for Project 1 is largely focused on the database created for this study, including issues associated with undisclosed data; measuring rurality; examining spatial variations in cost-of-living; operationalizing the concept of innovation; measuring economic performance; and evaluating the relationships across the three main constructs (rurality, innovation, and economic performance).

Chapter 4 provides the methodology and results from Project 2. The methodology describes how secondary data were supplemented with local knowledge and the processes involved in working with local stakeholders.

Chapter 5 summarizes the main findings and conclusions from the study, suggests how the work in the pilot region may be replicated elsewhere, and offers suggestions for further research and applications.

The appendices include a plethora of supporting material, including acknowledgments, maps, a glossary, cluster taxonomies, rurality codes, and survey instruments and questionnaires used in Project 2.

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2. Overview of Cluster Concepts and the Two-Project Framework

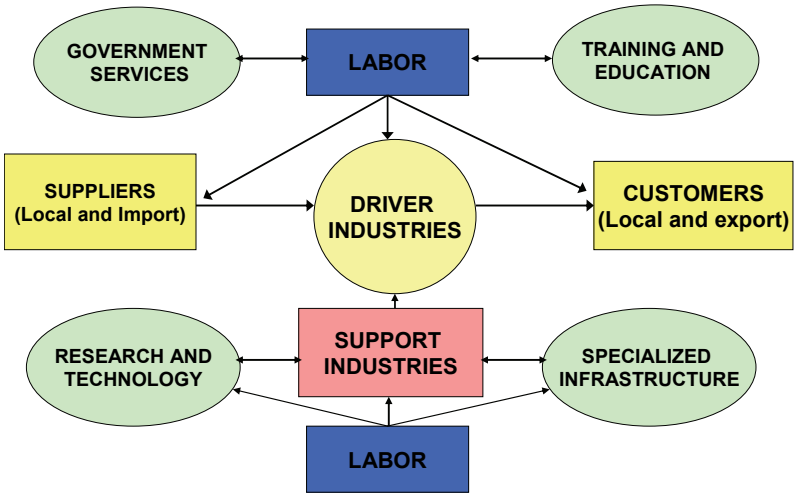
2.1. Key Concepts in Studying Clusters: Geographic and Operational Definitions

Over the last 15 to 20 years, cluster analysis has emerged as a new way of looking at economic development, integrating regional differences in development and economic specialization (Porter 1990, 2003; Sweeney and Feser 1998; Feser 2004, Cortright 2006). An increasing number of states and regions in the United States and overseas have modified their economic development strategies to focus and capitalize on the business and industry clusters where they have, or would like to have, a competitive advantage. In adopting a cluster strategy, states and regions hope to maximize their competitive advantage in existing industries and to build new strengths in the emerging industries that will replace older, declining sectors (Nolan 2003).

> There is surprisingly little disagreement over the formal definition of a 'cluster.' Most experts define it as a geographically bounded concentration of similar, related or complementary businesses, with active channels for business transactions, communications and dialogue that share specialized infrastructure, labor markets and services, and that are faced with common opportunities and threats. (Rosenfeld 2002).

Figure 2 below provides a generalized example of the cluster concept as used in this project.

Figure 2. Generalized Example of Cluster Concepts



Source: Purdue Center for Regional Development

Close geographic proximity and engagement in similar or related economic activities are the key factors leading to development of clusters. These characteristics enhance the likelihood of exchanges among cluster firms, facilitating mutual support, and economic growth. "When members of a cluster are located in close proximity, they can capture synergies that increase

productivity, innovative capacity and new business formation." (Porter 2001, p. xv). The linkages between spatial proximity and innovation potential are particularly important from a regional development perspective. In particular, supportive policies and a nurturing business environment may further strengthen the innovative milieu and thus enhance regional advantages.

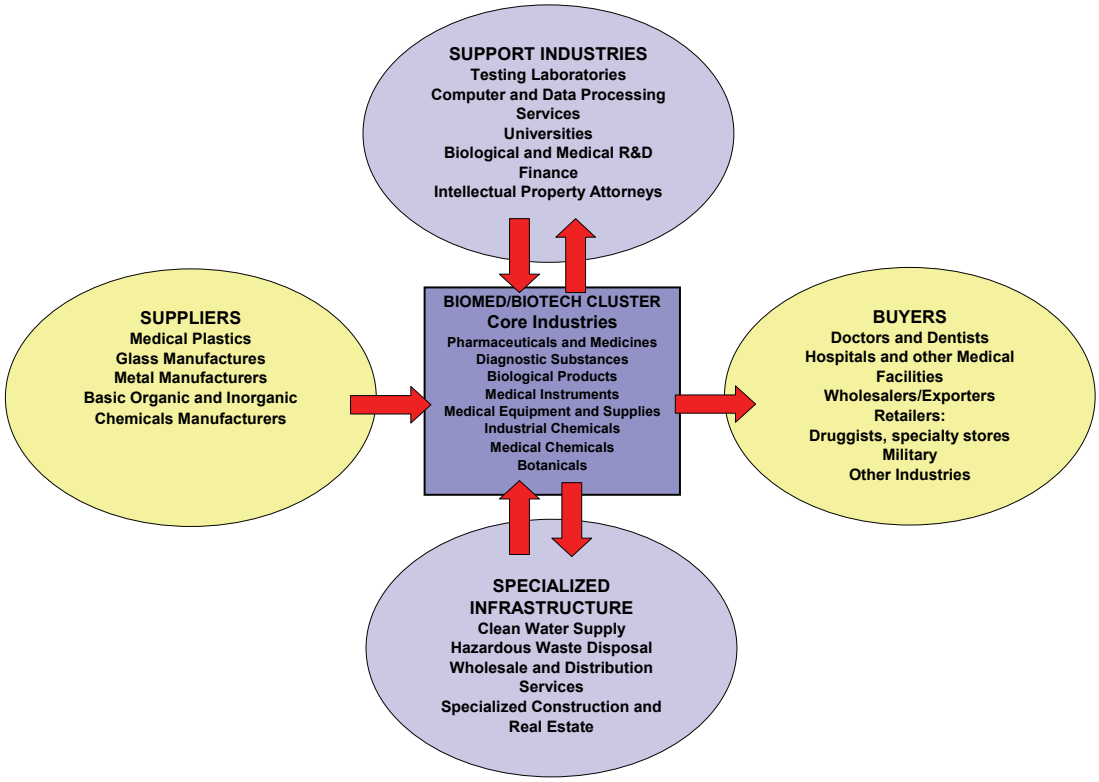
Although Cortright (2006) rightly points out that "clusters" cannot be a precisely defined term and should be understood as an umbrella concept, a national or statewide analysis cannot be performed without a clear definition of which industries belong to a cluster. There are a number of very promising approaches to identifying clusters. For example, Porter (2003) distinguishes among 41 clusters, with relationships between firms (sectors and subsectors) "tested" by using statistical correlation and input-output (I-O) matrices. Feser and Bergman (2000) developed what they call a template of U.S. clusters based on a case study of North Carolina, using factor analysis to distinguish 23 manufacturing clusters.

The Porter group at Harvard Business School further differentiates its cluster list into three types of clusters: traded clusters (exporting industries), local clusters (products and services mainly consumed or traded within the region, such as construction and retail) and resource-based clusters (clusters based on natural resources, such as coal, oil and forestry—note that these can also be classified as traded clusters because of their export potential). Feser and Bergman's cluster template does not explicitly include service-based clusters (what Porter calls local clusters).

It is important to understand that economic clusters are not mutually exclusive in terms of the industries that comprise them. The driver industries are the target and provide the name for the cluster, while the supporting industries may span the typical categories of economic sectors. These sectors are united in their foundational support of the driver industries.

For example, in the biomed/biotech cluster, the driver or core industries include pharmaceuticals and medical equipment manufacturing (see **Figure 3**). These core industries, among others in this cluster, are supported by testing laboratories, financial services, and intellectual property attorneys. Infrastructure needs such as water, hazardous waste disposal, roads and telecommunications are needed and provided by other industries. Their suppliers include businesses that provide plastics and other necessary materials and their customers include doctors, dentists and hospitals. Many of these customers, suppliers, infrastructure providers and support industries also serve other clusters.

Figure 3. Breakdown of the Biomed/Biotech Cluster



Because of its versatility, the cluster approach to economic development is both useful and popular. Used to its full extent, a cluster strategy can potentially hit many targets at once and address different issues at the same time. For example, a cluster does not just include a set of driver industries, but a host of other input and support industries, as well as potential customers for the products of the driver industries. Furthermore, such a cluster strategy will typically call for action in several areas such as workforce training and education curricula, as well as infrastructure, communications and energy issues. Additionally, a cluster strategy can serve as a vehicle for collaboration and increase the cohesiveness of public policy initiatives.

2.2. Overview of the Two-Project Framework

Research Project 1 relied exclusively on secondary data and included two distinct components. The first component involved the development of a comprehensive database suitable for cluster studies and the analysis of regional development issues for the state of Indiana, its counties and its regions. The second component involved the development of a database and analytical approaches for use by rural regions anywhere in the nation as a starting point in evaluating their economic clusters and support economic development strategies. This latter database also enabled the research team to address issues outlined in the Introduction:

- The linkages between cluster structure, degree of rurality and economic performance
- The spatial concentration of industrial clusters and the interface between rural and metropolitan regions

- Growth trajectories for counties that are differentiated by cluster makeup, degree of rurality and distance to metropolitan areas

The first component of Research Project 1 relied upon Indiana's unsuppressed Covered Employment and Wages (CEW) data at the six-digit NAICS level.[1]

Because a public source of unsuppressed county-level data for the rest of the nation was unavailable, regular CEW data for all other U.S. counties and states were used. [2] These data contained varying degrees of suppression at the four-, five- and six-digit NAICS levels, especially for thinly populated areas, which are usually rural in nature.[3]

To minimize the problems caused by data suppression, the research team revised cluster definitions to use three-digit NAICS sectors wherever possible for the nationwide county analysis, minimizing reliance upon more-detailed NAICS levels as much as possible. With this approach, data suppression problems were reduced considerably; but even at the three-digit level, not all counties were able to be included in certain parts of the analysis.

The database is enhanced with information on basic demographic and social indicators to provide users with a more comprehensive understanding of regional challenges and opportunities for growth.

The database contains data sets from the following sources:

- **Quarterly Census of Employment and Wages (CEW)** from the U.S. Bureau of Labor Statistics**.** The Indiana Business Research Center (IBRC) administers the confidential research version of this file for the state. Additionally, the IBRC maintains public data for all U.S. counties by NAICS back to 1990 for establishments, wages, and jobs.

- **Longitudinal Employment and Household Dynamics (LEHD)** from the Census Bureau**.** This file is used to help determine longitudinal birth, death, and transition demographics of businesses in the selected county or region. This dataset also provides important information on the age and sex of workers by industry, wages of new hires versus existing workers, turnover rates and more. The research versions of these data were used for this study.

- **Demographics, educational attainment, occupation, housing, and income data from the national decennial census**

- **County data on occupation and commuting** contained in the 1990 and 2000 Equal Employment Opportunity (EEO) special tabulations compiled by the U.S. Census Bureau.

[1] NAICS, the North American Industry Classification System, is the standard system for classifying establishments according to their principal business activity. Detailed information is available at http://www.census.gov/epcd/www/naics.html.

[2] We have excluded Hawaii and Alaska, focusing our research on the 48 contiguous states. The economies of Hawaii and Alaska are sufficiently different from the rest of the nation that the team felt that inclusion would skew the benchmark analysis, and their great distances from other states would complicate analysis of spatial effects in clustering.

[3] To protect establishments' confidentiality, the federal government suppresses disclosure of data when there are very few establishments, or when one establishment accounts for 80 percent or more of employment or wages in a given sector. Thus, suppression is more likely in cases involving small local areas or finely-differentiated sectors (e.g., those classified by six-digit NAICS codes).

- **Rural-Urban Continuum Codes and Urban Influence Codes** from the USDA's Economic Research Service.

Research Project 2 targeted Indiana's Economic Growth Region 8. The research team engaged the local stakeholders in this eight-county region and made extensive use of the data and analysis generated in the first component of Research Project 1. Project 2 also involved considerable primary data collection and stakeholder organization and mobilization to initiate a comprehensive planning effort in this pilot region. Subsequent sections of this report describe the primary data and local engagement processes, providing a detailed example for similar studies to be conducted in other regions.

2.2.1. Project 1: Research Questions for National Analysis

This research project draws upon the growing literature on agglomeration economies that have placed regions prominently in the center of discussion (Porter 1990, 2003, 2004; Krugman 1991; Saxenian 1996; Sweeney and Feser 1998; Fujita, Krugman and Venables 1999; Bergman and Feser 2001; Cortright 2002; Carnegie Mellon 2002; Rosenthal and Strange 2003). In an idealized sense, industrial clusters consist of a number of firms that share two characteristics: they are located in close geographic proximity to each other (i.e., within a region) and they engage in a similar economic activity (e.g., electronics industry). These two commonalities set the stage for formal and informal inter-firm information exchanges and thus foster learning, innovation, and ultimately economic growth.

The present study addressed three research issues to enhance understanding of industry clusters and provide a more nuanced perspective on the role of clusters in rural regions.

Linkages between Cluster Structure, Degree of Rurality and Economic Performance

Are there systematic differences in cluster composition, specialization and size as the degree of rurality and remoteness change? Do these differences contribute to differences in economic performance among regions? Our hypothesis is that important differences will occur although it is not easy to specify a priori what the nature of those differences may be. For example, an agribusiness, food processing and technology cluster built around the intensive type of agriculture found in the fruit and vegetable growing regions in California and Florida may very well have a different impact on the local and regional economy than will an agribusiness cluster linked to the sheep and cattle industry in Wyoming and Montana.

Exploring these types of research questions and relationships requires operational definitions and constructs of three concepts: rurality, clusters, and economic performance.

- **Rurality.** An Index of Relative Rurality was constructed to provide a continuous measure of rurality for all U.S. counties along a *rural-urban continuum.* This is a significant improvement over previous classifications that typically place each county in a discrete category.

- **Cluster.** The research team defined 17 clusters at the six-digit NAICS level. One of these clusters, the manufacturing supercluster, was subsequently disaggregated into six more-specialized subclusters.[4] Although there is no universally defined or accepted set of clusters,

[4] The term supercluster was given to the manufacturing cluster in order to highlight the fact that it is broken into subclusters.

the basic principles underlying the cluster concept were used to specify the 17 used in this study. **Table 1** lists these clusters and a detailed listing of the industries comprising each cluster is provided in **Appendix I**.

- **Regional Economic Performance.** The research team constructed composite measures of economic performance for counties from five foundation variables: median household income; average wage; unemployment rate; poverty rate; and average annual change in employment.

Table 1. List of Clusters

	Clusters
1	Advanced Materials
2	Agribusiness, Food Processing and Technology
3	Apparel and Textiles
4	Arts, Entertainment, Recreation and Visitor Industries
5	Biomedical/Biotechnical (Life Sciences)
6	Business and Financial Services
7	Chemicals and Chemical-Based Products
8	Defense and Security
9	Education and Knowledge Creation
10	Energy (Fossil and Renewable)
11	Forest and Wood Products
12	Glass and Ceramics
13	Information Technology and Telecommunications
14	Manufacturing Supercluster
	Primary Metals
	Fabricated Metal Products
	Machinery
	Computer and Electronic Products
	Electrical Equipment, Appliance and Components
	Transportation Equipment
15	Mining
16	Printing and Publishing
17	Transportation and Logistics

This measurement scheme for these three constructs allowed for the multi-dimensional classification of all counties, facilitating insights into the linkages between cluster composition, degree of rurality, and economic performance. Mapping the locations of different types of clusters provided additional insights, including the identification of "hot spots" of economic decline or economic growth; and to examine differences in cluster composition and degree of rurality between these two types of hot spots.

Spatial Clustering and the Rural-Metropolitan Interface

Do industry clusters differ in their degree of spatial clustering? What is the nature of the interface between rural and metropolitan regions? Are certain industry clusters more "distance-sensitive" than others? That is, to enhance a region's prosperity, do distance-sensitive clusters require a shorter distance to large metropolitan agglomerations? Do certain clusters profit from longer distances to metropolitan agglomerations? The research team took a two-pronged approach to tackle these questions.

First, the research team used nearest neighbor analysis to explore the distance dependency of each industry cluster (Boots and Getis 1988). This approach allows differentiation of industry clusters by the degree to which they are clustered geographically. Basing the nearest neighbor analysis on employment-weighted distances permitted differentiation of clusters by their proximity to large metropolitan areas.

A second type of analysis used regression models to estimate—separately for each industry cluster—the effect of distance to metropolitan areas on economic performance. The statistical models measured how closely several indicators of economic performance and county characteristics, such as degree of rurality, were related."

The results of this analysis were used to evaluate hypotheses concerning economic performance. For the most distance-sensitive industrial clusters, the hypothesis was that economic performance peaks in close proximity to metropolitan areas and decays rapidly with increasing distance from the metropolitan area. In contrast, the study group hypothesized that the least distance-sensitive industrial clusters reach their peak performance in remote rural areas.

Growth Trajectories

What is the future growth trajectory of rural counties? The literature suggests rural counties follow a different growth path than metropolitan counties (Porter 2003), yet little is known about the roles of industry clusters, proximity to metropolitan areas and degree of rurality in shaping the different growth trajectories. These issues were addressed by estimating regression models relating change in economic performance to several factors, including economic performance in the base year, dominant cluster types, degree of rurality and distance from metropolitan areas. These types of regression models—also referred to as conditional convergence models and other variations of that theme (Barro and Sala-i-Martin 1992; Chatterji and Dewhurst 1996)—allowed examination of whether differences in the economic performance of urban and rural regions will likely converge (narrow) or diverge (widen) over time.

This information also allows us to assess whether the variation in the economic performance of various rural areas is likely to increase or decrease over time; and to determine which industrial clusters are most likely to contribute to changes in such variation.

2.2.2. Project 2: Applying Cluster Insights in a Rural Region

The Selected Study Region

The region chosen for Project 2 was Indiana's Economic Growth Region 8 (EGR 8). The region's population, which was 299,888 in 2005, is growing at a modest rate, expanding by 9.6 percent during the 1990s but expected to gain only 7.2 percent in the current decade. The region is

comprised of eight counties that represent a mix of four metropolitan and four non-metropolitan counties (see **Figure 1** in Section 1.1.2).

Research and Analysis Plan of Work

The research team began Project 2 with a thorough analysis of secondary data—economic, demographic and public administrative records—to develop a solid understanding of the performance of the region's economy and how it is changing. The database developed in Project 1 was also analyzed to identify existing industries, clusters, and subclusters that have performed well in terms of current levels and growth rates for employment, earnings, establishments, and other indicators, paying particular attention to "emerging" clusters and subclusters. Emerging clusters are those that currently have a location quotient that is less than 1 (where 1 is equal to the national share of the cluster concerned), but where the location quotient has been rising over the study period. These clusters are often thought of as having the potential to become part of the "star" category of clusters.

This analysis was augmented with primary data gathered through surveys, focus groups and interviews with key informants, including existing businesses, local economic development organizations (LEDOs), local and regional plan commissions, and other knowledgeable stakeholders in the eight counties. These data provided insight into the quality of the region's business environment and generated an inventory of regional assets that could be leveraged to help the region grow, and regional liabilities that may represent barriers to growth.

Economic Development Strategy and Implementation

The research team established an initial group of economic development partners from the region. These partners included elected officials, business proprietors, LEDOs and knowledgeable representatives from the social services, education, and related sectors. The research team was assisted in forming and working with this partnership by the Purdue Cooperative Extension Service and by the Southern Indiana Regional Development Project (SIRDP), which has coordinated a network of organizations and task forces in this region for more than a decade in an effort to strengthen the economy of rural southern Indiana.

The regional partnership assisted the research team in understanding the region's unique characteristics and assets, gaining cooperation from regional parties with the study's survey and other data-gathering efforts, providing input into and feedback on the economic development strategies that arose from the study, and implementing recommendations resulting from this research. This buy-in by key regional stakeholders is crucial in ensuring that the study's findings lead to concerted efforts to enhance the region's economic growth.

The process for developing the economic development strategy plan in Economic Growth Region 8 followed the normal paths used for any comprehensive or strategic planning exercise—taking account of other plans in and around the region; conducting studies; communicating implications; developing a set of goals and strategies that can result in an implementation plan; and establishing a benchmarking system for monitoring and evaluation of results.

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3. Project 1: Analysis of Data for All U.S. Counties

3.1. The Nationwide Analysis

The nationwide analysis focused on the counties of the continental United States and employed the U.S. county database compiled for this project.[5] The database includes a broad series of economic, social, and demographic data that are geo-referenced at the county level. The data analysis was exploratory in nature, as data suppression problems were not conducive to rigorous hypothesis testing. The analysis proceeded in four steps.

First, the research team defined and measured the key constructs at the core of this project:

- Industry clusters
- Rurality, with a special focus on the rural-metropolitan interface
- Economic performance

It is important to keep in mind that, due to the somewhat elusive nature of these constructs, it is impossible to assess how precisely the operationalized measures capture the constructs.

Second, the analysis focused on the locational patterns of industry clusters, describing the similarities and searching for shared patterns (i.e., co-location of different industry clusters). The employed methods include bivariate analyses involving correlations and comparisons of means. In addition, the research team created a series of maps to visualize spatial patterns and employed spatial techniques such as nearest neighbor analysis (Boots and Getis 1988). Nearest neighbor analysis is a technique based on the spacing of points, in this case the midpoints of counties specializing in a particular cluster. Specifically, it looks at the distances among counties specialized in a particular industry cluster. The spatial clustering is evaluated nationwide using the so-called nearest neighbor statistic, *R*.[6] Values smaller than 1 indicate that the counties specialized in a cluster are spatially concentrated within the continental United States. Distances to nearest neighbors with the same specialization were also used to estimate the average spatial extent of regional specialization and to distinguish between clusters that are prone to small-scale regional specialization and those that tend to operate at larger spatial scales.

In a third step, the research team explored the linkages among the three key constructs of (1) industry clusters, (2) rurality, and (3) economic performance. The analysis focused on identifying

[5] In total, 3,108 counties are included in the analysis.

[6] The nearest neighbor statistic, *R*, is defined as $R = 2\frac{1}{n}\sum_{i=1}^{n} d_i \Big/ \sqrt{\frac{A}{n}}$, where *n* is the number of highly specialized counties (note: *n* varies by industry cluster), d_i is the distance to the nearest neighbor, and *A* is the area of the continental United States.

urban-oriented and rural-oriented industry clusters and assessing systematic differences in economic performance by industry cluster and degree of rurality.

In the final portion of the nationwide analysis, the research team focused on the future growth trajectory of U.S. counties with a special emphasis on the role played by degree of rurality. Toward that end, the research team estimated regression models that related per capita income growth to a series of predictors, including per capita income in the base year, industry mix, rurality, and innovation potential (represented by human capital, using educational attainment measures as proxy variables). These regression models—also referred to as convergence models (Barro and Sala-i-Martin 1992, Chatterji and Dewhurst 1996)—were used to infer whether, and at what speed, economic performance in rural and urban counties converges over time.

3.2. Defining the Key Constructs

3.2.1. Methodology for Defining Clusters and Analyzing Cluster Data

Defining Clusters

For this study, the research team developed a set of cluster definitions that could be usefully applied to analyzing a primarily rural region in Indiana, and that could also be applied to the entire United States, using county-level data as a base, and emphasizing rural areas. The team re-examined a set of cluster definitions used in preparing a state and regional economic development plan for Indiana in 2005 and then researched the cluster component lists used by Porter and Feser for the entire United States to supplement and modify the existing Indiana list of clusters. [7]

The team decided that, since the emphasis of this study was primarily rural regions, some of Porter's 41 traded clusters did not need to be included in the research—for example, Porter's jewelry and precious metals cluster, which is more likely to appear in large metropolitan areas such as New York. Further, raw precious metals also appear in the mining cluster, which *is* included in this study. Another factor in the decision to whittle down the number of clusters in this study was the restricted time allowed to complete the work. In this situation, the team decided to simplify while giving the most comprehensive cluster coverage possible.

Nevertheless, simplification in terms of numbers of clusters examined does not mean, at least in this case, that the list of industries that comprise each cluster is simple. Rather, the opposite is the case for most of the clusters that the team has discerned. The team took the approach that the list of components in each defined cluster should be as inclusive and broad as feasible within the parameters determined by the cluster literature, so as to allow rural areas to identify and work with at least some cluster industries and employment. Consequently, the list of components in each cluster was enriched by researching a large number of cluster studies and initiatives throughout the

[7] In 2005, the (then) Indiana Economic Development Council conducted a study of business clusters in the Indiana economy based on geographic location in the Indiana Department of Commerce's twelve economic regions. Fourteen statewide clusters were identified as being of potential importance to Indiana for this study: advanced business services; advanced logistics; advanced manufacturing; advanced materials; agribusiness, food processing and technology; arts, entertainment, recreation and visitor services; biomedical/biotechnical (life sciences); chemicals; earth products; educational services; environmental technology; forest and wood products; information, communications and media; and information technology. The analysis is archived at http://www.ibrc.indiana.edu/iedc_strategic_plans.html.

United States and internationally where appropriate (e.g., Canada and Australia). It should be noted that this review, while broad ranging, was by no means exhaustive.

The team was fortunate to be able to analyze unsuppressed county-level data for Indiana. Based on this analysis, the team defined 17 clusters at a very fine scale of six-digit NAICS codes. One of these clusters is a large manufacturing supercluster that was subsequently disaggregated into six more-specialized manufacturing subclusters.[8] This yielded a total of 17 major clusters and six subclusters. The clusters are listed in **Table 1** of Section 2.2.1, and the detailed compositions are included in **Appendix I**.

Using six-digit NAICS data for a cluster study is rather unusual because, at the county level, data for a large number of these detailed industries are usually suppressed to maintain the confidentiality of firms that may be present in only small numbers in a geographic area as small as a county. Data suppression leads to disadvantages such as the inability to measure full cluster employment and number of firms and difficulty of identifying gaps in the cluster (where an industry that contributes to the cluster is not present, thereby providing an opportunity to fill the gap, perform import substitution, and strengthen the cluster overall).

To overcome this problem, cluster researchers usually attempt to estimate the size of employment and number of firms in an area by developing algorithms to estimate the missing numbers or purchasing such estimates commercially. Another way of dealing with the difficulty is to question local experts such as economic development officials, or to conduct a survey of existing firms. Researchers may also try to resolve the problem by defining the cluster components at broader levels of NAICS codes, such as using three-digit codes.

While the research team had access to the unsuppressed Covered Employment and Wages (CEW) data set for Indiana and its counties, it was not so fortunate at the national level and had to resort to aggregating the cluster components for many of the clusters up to the three-digit level, subtracting out the six-digit NAICS industries that are not included in the original cluster definition (see **Appendix I** for a list of both the detailed six-digit and the aggregated cluster definitions). In a few cases, however, such aggregation may result in inclusion of certain industries that are not in the cluster definition.[9] It is thus acknowledged that some distortion exists in the resulting U.S. data set.

Despite these limitations, several reasons support the use of CEW data:

- It is the only count of establishments and employment available for the entire nation and the lag time is two to three quarters. The Bureau of Labor Statistics has made significant strides with these data to make them available as quickly and broadly as possible. The fact that the establishment count is now released, regardless of whether the employment number is disclosed, is a significant step in providing knowledge of the cluster's existence at the bare minimum.

[8] The term supercluster was given to the manufacturing cluster in order to highlight the fact that it is broken into subclusters.

[9] If an industry that needs to be subtracted out of a cluster total is not disclosed at the six-digit level, it will automatically be reflected in the cluster totals when using the aggregated cluster definitions. For example, the detailed bio/biotech cluster includes 46 six-digit industries. The aggregated definition, on the other hand, includes two three-digit subsectors, three four-digit industry groups, and seven six-digit industries. However, only part of the Ambulatory Health Care Services subsector (NAICS 621) should be included in the definition, so three of its four-digit industry groups are removed from that subsector total (NAICS 6211, 6212 and 6213). If one of those industry groups is not disclosed, there is no way to remove it from the subsector total.

- Economic developers working with their state workforce agencies should be able to obtain the data themselves for in-depth analysis and be better able to update their benchmarks over time.

- Unlike commercial data, CEW data are available for free.

A Note about the Education and Knowledge Creation Cluster

The education and knowledge creation cluster is a "special case" in this cluster analysis. Analysts seeking to conduct their own research into this important group of activities will need to bear in mind the following special circumstances that make this cluster challenging to describe accurately:

1. The full six-digit NAICS code definition of this cluster (found in **Appendix I**) does **not** include NAICS 6111 (Elementary and Secondary Schools), concentrating rather on the presence of colleges and universities, trade schools and other specialized training and educational institutions. This definition has been applied to the pilot region portion of the study (Economic Growth Region 8 in Indiana) and for the state of Indiana's other regions. For the Indiana portion of the analysis, the research team had access to unsuppressed data, making all such establishments available for study.

2. For the national-level portion of the analysis, where all data is subject to the regular rules of suppression, NAICS 6111 **has** been included in the cluster definition. The background and reasons for this are as follows:

    a) At the national level (analysis for each county in the United States), there is a great deal of suppression of data on colleges and universities (NAICS 6112 and 6113), since many counties contain very few of these institutions. Therefore, much of the information regarding higher education and research is suppressed in county-level data sets such as CEW, County Business Patterns, and the REIS data.

    b) Due to the high likelihood of undercounting for higher education establishments in the education and knowledge creation cluster, there is some justification for adding the elementary and secondary school data to the U.S. county analysis to provide more information, especially for rural counties where education establishments (local school systems in particular) are often very important employers in local economies. Additionally, although colleges, universities and other adult education facilities may be seen as more important in the role of knowledge creation than elementary schools, and more likely to produce "exports" in the form of knowledge products and enrollment of students from outside of the county or region, nevertheless students produced by the local elementary and secondary schools are definitely part of the supply chain providing "inputs" to the higher levels of the cluster.

    c) Analysis of this cluster, however, revealed that elementary and secondary schools are also highly likely to be subject to data suppression. This occurs not only on the basis of the standard rules of suppression, but many counties also have limited disclosure due to secondary suppression—that is, suppression to prevent the calculation of withheld data for another area. Therefore, it is not possible to predict where suppression of county elementary school data will occur.

d) Therefore, the data available for NAICS codes 6111, 6112 and 6113 is **all** highly likely to reflect undercounting in the U.S. counties analysis—even more so than in other clusters studied for this report. Users should thus be cautious in interpreting the data for the education and knowledge creation cluster in the database provided by this project.

e) A satisfactory solution to these problems requires further research. However, local county cluster analysts can overcome some of the difficulties caused by suppression in this cluster by inquiring from local colleges, universities, and schools systems what their total employment is or was in the years under study, and adding these numbers back into the cluster totals shown in the database at the county level. It will not be necessary to add the numbers into the cluster at the total U.S. level because these data were either not suppressed or subject to minimal suppression.

Measuring Clusters

Three principal methods for measuring and evaluating clusters are location quotient (LQ) analysis, shift-share analysis and input-output (I-O) analysis. This report includes the results of the first two types of analysis and recommends that I-O analysis be conducted once a decision has been reached to pursue a cluster strategy in any particular region. I-O analysis will assist in estimating the impacts of any targeted changes to the clusters, and will show which cluster industries are most closely connected with each other in the region. For this latter task, however, the researcher should not rely on I-O analysis alone, but should supplement the task with first-hand information garnered from regional firms and economic developers.

Location Quotient Analysis

Measurement of growth rates and location quotients for each industry in a cluster, as well as the total cluster, is the first step towards determining where the region's comparative advantage lies.[10] Location quotients show where industry sectors in particular localities are more strongly represented than they are in the nation as a whole. *To the extent that a particular location quotient is greater than 1, the area is considered to be more specialized in that industry or cluster than the nation is, and industries in the cluster are assumed to be producing for export as well as local consumption.* The dynamics of specialization can be measured by comparing changes in the location quotients of entire clusters and component industry sectors over time.

[10] Location quotients may be calculated on the basis of an industry's or cluster's employment, its number of establishments, or certain other measures of economic activity. This study computed LQs based on employment. The calculation is:

$$\text{Location Quotient} = \frac{E1/E2}{N1/N2}$$

Where:

E1 = Regional Employment in Industry X
E2 = Total Regional Employment
N1 = National Employment in Industry X
N2 = Total National Employment

If LQ < 1, region is less specialized in industry X, and needs to import goods to satisfy local demand
If LQ = 1, region produces just enough in industry X to satisfy local demand
If LQ > 1, region is more specialized in industry X and exports the industry's output to other regions

The first task in cluster analysis is to assemble cluster data for two (or more) different time periods in the study region or county, calculate the location quotients for each cluster total, and each component sector or subsector, and measure changes over time in the size of the location quotients.

In this project, the research team used data from the CEW annual data sets for Indiana and the nation, with a base year of 2001 and comparison year of 2004. The base year of 2001 was chosen because this is the first year CEW data are available based on NAICS codes rather than the Standard Industrial Classification (SIC) codes. The team realized that attempting to meaningfully translate SIC codes into NAICS codes is fraught with well-documented problems, and the only real alternative is to establish a baseline year and to continue measuring from 2001 until enough years have passed to begin establishing trends. Simply put, there is a large disconnect between the way industry data were previously classified and the way they are classified now. The disadvantage of this base year is that the resulting time span is not yet long enough to establish solid trends. Because of this, it will be difficult to measure reliable trends until a few more years have passed.

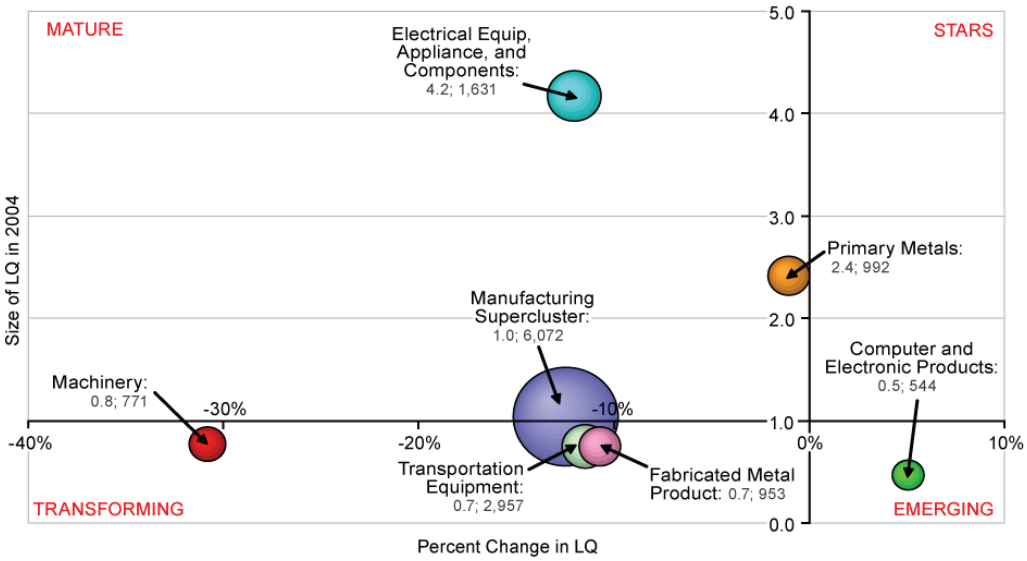
When the location quotients for each cluster have been calculated, along with the changes in LQ from the base year, the clusters are then sorted according to a method developed by the Boston Consulting Group.[11] Doing so shows which ones are more or less specialized than the nation, and whether they are increasing or decreasing in their degree of specialization. The data can be displayed in a bubble chart similar to the one for EGR 8 shown in **Figure 4**.

According to this method of sorting the data, sectors and clusters in the area under study may be classified into the following four categories:

- **"Stars"**—clusters that are relatively specialized (LQ > 1) compared to the national economy and are becoming even more specialized over time within the study area
- **"Emerging"**—clusters that are relatively unspecialized (LQ < 1) compared to the national economy but are becoming more specialized over time within the study area
- **"Mature"**—clusters that are relatively specialized (LQ > 1) compared to the national economy but are becoming less specialized over time within the study area
- **"Transforming"**—clusters that are relatively unspecialized (LQ < 1) compared to the national economy and are becoming even less specialized over time within the study area

[11] In the 1970s, the Boston Consulting Group (BCG) developed a simple conceptual framework named the Growth-Share Matrix that had a significant impact on business thinking. This matrix has proven highly adaptable to uses such as initial cluster analysis and assessment. For more on the BCG Growth-Share Matrix, visit http://www.bcg.com/this_is_bcg/mission/growth_share_matrix.html.

Figure 4. Subclusters in EGR 8's Manufacturing Supercluster: Size, Location Quotients and Percent Change in LQ, 2001-2004



Note: The supercluster represents the sum of all six subclusters
Source: PCRD, using BLS-CEW data provided by the IBRC, 2006

This initial analysis of a region's clusters begins to give policymakers and other stakeholders an idea of what is happening in the local economy, and which industries and clusters might need support to mitigate decline or to give an extra boost to growth.

The location quotients for each cluster in 2004 are shown along the vertical axis of the chart. A location quotient of 1 means that the clusters are present in Indiana's Economic Growth Region 8 (EGR 8) to the same degree as they are in the nation. Higher location quotients (upper half of the chart) indicate that the cluster is more concentrated in the region compared to the nation—the region is more specialized in those industries and clusters.

A location quotient of less than 1 (lower half of **Figure 4**) means that those clusters in EGR 8 are represented to a lesser degree in the region than they are in the nation. For example, in EGR 8, the less specialized subclusters include machinery, transportation equipment, and fabricated metals—which are becoming less specialized in the area compared to the nation—and computer and electronic products manufacturing, which is becoming more specialized and therefore may hold promise for future expansion (it is an "emerging" cluster).

Assessing both size and direction of the change in cluster location quotients adds a dynamic element to the analysis, enabling a preliminary evaluation of current cluster performance and providing some guidance as to which clusters might be candidates for targeting.

The dynamic element is shown on the horizontal axis of the chart, representing the percentage change in LQ for each cluster from 2001 to 2004. On the right-hand side of the chart, the location quotients are increasing; on the left-hand side, the location quotients are decreasing. Examining the position of each regional cluster in the bubble chart can assist the analyst in beginning to make choices about which clusters are worth targeting. The process for selecting clusters as candidates for targeting is discussed further in the next section.

Shift-Share Analysis

Although location quotients are useful in giving an initial picture of strengths and weaknesses in a local economy, they do not explain the sources of change, give a full picture of how the composition of local employment differs from national patterns, or explain how the performance of the local economy differs from that of the nation. Shift-share analysis can help provide this missing information.

Shift-share analysis seeks to explain changes in an economy by decomposing actual changes that have occurred into three main sources: [12]

1. **The influence of national growth (or decline) on industry or cluster X.**

   This is called the "national share" of change. For example, between 2001 and 2004, total employment in the United States as measured by the CEW data shrank by 0.3 percent. The national share factor applies this -0.3 percent to cluster employment in the base year (2001) and estimates how local employment would be expected to change if the national influence had equally affected every industry in the cluster.

2. **The influence of industry share on the growth (or decline) of industry or cluster X.**

   "Industry share" reflects the rate of change in each individual industry at the national level—for example, how much employment changed in all manufacturing industries throughout the nation from 2001 to 2004. The industry share indicates how much of a local change in employment can be attributed to national growth or decline in the industry in question. As with the national component, the percent change in employment by the industry nationally is applied to the total change in local employment in the industry.

SHIFT SHARE ANALYSIS

Actual Shift in Employment in Industry X
- *Shift due to national change*
- *Shift due to industrial trend in industry X*
= Shift due to regional trends and conditions

Source: Center for Economic Education, University of Cincinnati, 1996.

3. **The regional share effect on growth (or decline) of industry or cluster X.**

   The national share and the industry share reveal the changes that would have occurred in the local economy if it corresponded exactly to national and industrial structure and trends. When these two computed shares are subtracted from the *actual* shift in employment locally, a residual change remains. This is the change in employment that cannot be explained by either general economic conditions (the national share) or industrial trends (the industry share). This change, the "regional share," reveals the effects of region-specific factors on local employment. The regional share effect tells us that certain industries enjoy advantages (or disadvantages in the case of declines) due to the regional economy, resulting from factors such as labor force skills, access to transportation, excellent supply chains, effective and efficient service delivery, and so on.

[12] This section on shift-share analysis is largely adapted from the excellent explanation given in *Greater Cincinnati's Target Industries*, Center for Economic Education, University of Cincinnati, September, 1996.

In shift-share analysis, the best target clusters for economic development efforts are typically those with the largest regional-share effect on growth. However, there are some important additional considerations. First, clusters do not usually represent just one industry or one industry sector—there will be several industries and subsectors within a cluster, and they can be expected to differ in their regional share effects. These differences can reveal to a cluster analyst where to focus efforts to strengthen and build the cluster. Secondly, a locality or region may decide to target resources to a cluster even if, overall, the regional share effect is small or negative. This could happen, for example, if the state government has decided to allocate large resources to development of corresponding sectors statewide, and these sectors happen to be weak in a local economy.

Input-Output Analysis

The final part of the technical analysis to identify clusters and to measure their strength and likely impacts on a local or regional economy is the input-output analysis. This analysis is a highly technical exercise based upon the development of input-output tables and multipliers (for jobs, earnings, and output) for each sector, subsector and industry of the economy.

The national input-output table developed by the Bureau of Economic Analysis (BEA) of the U.S. Department of Commerce is often used to create input-output tables for sub-national geographies (states or counties). These tables are used not only to calculate the impacts of a shock to the economy, but also used to show the strength of interactions (purchases and sales) between related sectors of the economy. Because of this, input-output analysis is used to evaluate the strength of the interrelationships between industries within a cluster.

The BEA provides multipliers, such as jobs, earnings, and output, derived from input-output tables known as RIMS II (Regional Input-Output Modeling System) on a county or regional basis. Additionally, there are many commercial groups that market models based on input-output analysis. Embedded within these models are regional input-output tables that are available in various forms. Each of these models could be used for economic impact analysis for the current year, and a few could forecast economic impacts into the future. Providers of such models include Minnesota IMPLAN Group, Regional Dynamics (ReDyn), Economic Modeling Specialists, Inc. (EMSI), and Regional Economic Models, Inc. (REMI).

Criteria for Selecting Target Industries and Clusters

Criteria for selecting clusters and industry sectors within them to target for development may include a combination of the following:

- Average payroll wages equal to or higher than the national industry average
- Relative immunity to recessions (e.g., food, household products, pharmaceuticals, etc.)
- High total earnings
- High potential to generate tax revenues
- Export products, or potential for export
- Potential for import substitution (i.e., an industry or cluster that fills a need currently being supplied from outside the region)
- A high amount of value-added in the region
- A high industry multiplier (the amount of money generated in the regional economy for each dollar spent by the industry in the region; or, similarly, the additional jobs generated as a result of employment of a worker in the industry)

- A cluster location quotient substantially larger than 1.
- A cluster that is experiencing or has experienced both national and regional employment growth
- A cluster and its industries whose growth is attributed more to regional factors than to national or industry mix factors as demonstrated by shift-share analysis (i.e., it enjoys a "regional advantage")
- Positive local employment growth projections
- Part a group of industries targeted by the state government for development, or capable of attracting state attention

This list, drawn from the collective wisdom of many other cluster studies,[13] is not intended to be exhaustive and additional or different criteria may be used as appropriate.

3.2.2. Measuring Rurality[14]

Rurality is a vague concept. Being rural as opposed to urban, or the related notion of degree of rurality, is an attribute that people easily attach to a place based on their perceptions of its characteristics. These may include low population density, abundance of farmland, and remoteness from urban areas.

In contrast to the colloquial use of "rural" and "urban," researchers and policy makers require a precise definition. However, there is no consensus about how to define or measure the concept of rurality. Moreover, many existing measures are ill suited, if not flawed. As Isserman (2005) pointed out, rural research and rural policy are based on ill-defined distinctions between rural and urban. He criticized the common use of the metropolitan/non-metropolitan distinction (Office of Management and Budget 2000, 2003) as a proxy for, or even worse, as synonymous with, a rural-urban distinction.

A similar criticism applies to the rural-urban continuum code and the urban influence code defined by the USDA's Economic Research Service. Although their names and numeric coding suggest a "continuous" and monotonic increase of rurality with increasing numbers on the coding scales, this perception is illusory as the codes obscure the distinction between metro and non-metro counties. As a result, many counties with low population size and low density are allocated to the same category as highly urban counties.

To remedy these shortcomings, Isserman (2005) suggested a rural-urban density typology that is independent of OMB's metropolitan/non-metropolitan differentiation. It utilizes thresholds for three variables—population density, the percent of the population living in urban areas as delineated by the U.S. Census Bureau, and the population size of the largest urban area—to define

[13] Some of these criteria have been adapted from a 1996 study *Greater Cincinnati's Target Industries*, done for the Cincinnati Gas and Electric Company (Cinergy) by the University of Cincinnati Center for Economic Education, which identified industries in the Greater Cincinnati area that would be "most likely to be successful in the region and enhance the economic efficiency of the existing industry structure."

[14] Parts of this section are based on a more extensive discussion in Waldorf, B. (2006). *A Continuous Multi-dimensional Measure of Rurality: Moving Beyond Threshold Measures*. Paper selected for the Annual Meetings of the Association of Agricultural Economics, Long Beach, CA, July 2006. http://agecon.lib.umn.edu/cgi-bin/pdf_view.pl?paperid=21522&ftype=.pdf

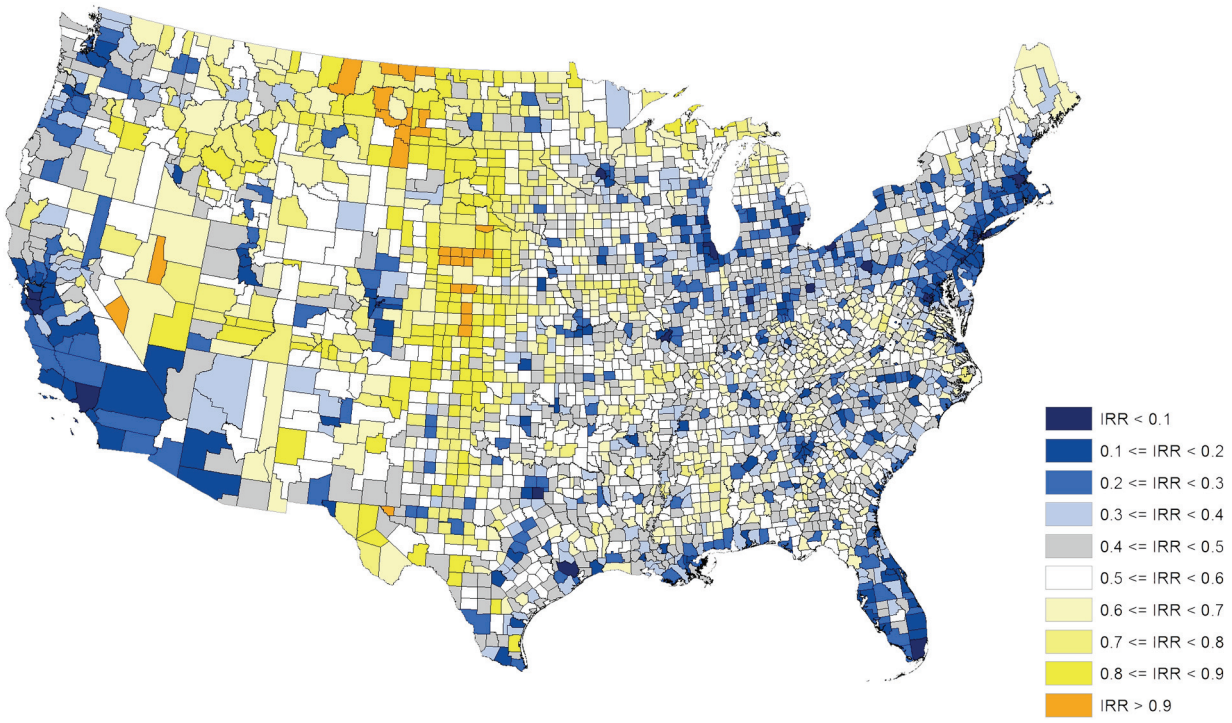
1,790 rural and 171 urban counties. The remaining counties not meeting the threshold criteria are subsequently labeled "mixed rural" (1,022 counties) or "mixed urban" (158 counties) and this distinction is made solely based on a population density threshold.

Although Isserman's typology avoids using the misleading metro/non-metro classification, it does fall into the so-called "threshold trap." That is, it utilizes thresholds to define a finite number of rurality categories. Not only are thresholds arbitrary, but they also create artificial similarities and dissimilarities. That is, by imposing artificial boundaries between the categories, similar counties may be classified as different, whereas counties that are very dissimilar may be grouped together in the same category.

As a result of the shortcomings of Isserman's methods, this project used a recently introduced, continuous, multidimensional measure of rurality (Waldorf 2006), the Index of Relative Rurality (IRR). The IRR does not answer the question 'Is a county rural or urban?' but instead addresses the question 'What is a county's degree of rurality?' It improves our understanding of rurality, is independent of OMB's metropolitan/non-metropolitan distinction, and does not fall into the threshold trap. Its ability to offer a more sensitive perspective on the intricate relationships between rurality, industrial clusters, and economic performance was important for this project.

The IRR is based on four dimensions of rurality: population, population density, extent of urbanized area, and distance to the nearest metropolitan area. These dimensions are unquestioned in terms of their contribution to rurality and are incorporated implicitly in many existing rurality definitions. The index is scaled from 0 to 1, with 0 representing the most urban place and 1 representing the most rural place. **Figure 5** (also found in **Appendix VII**) shows the variations in the index across counties in the continental United States in 2000.

Figure 5. Index of Relative Rurality, 2000



Source: Department of Agricultural Economics, Purdue University

The lowest rurality scores (i.e., highly urban areas) are recorded for counties along the coasts as well as for the urban centers along the Great Lakes. Counties east of the Mississippi have low to medium levels of rurality; the most rural county east of the Mississippi is Keweenaw, MI, with an IRR value of 0.895. Moving west from the Midwest to the Great Plains coincides with a distinct increase in rurality. In fact, extreme rurality (IRR > 0.8) is widely prevalent in many counties of the Great Plains and the Mountain States.

Table 2 and **Table 3** show the correspondence between the IRR, the rural-urban continuum code (RUCC), and the urban influence code (UIC). As expected, the IRR increases commensurate with the RUCC (see **Table 2**). However, the range of the IRR within each category of the RUCC is large, especially for the metropolitan counties (RUCC = 1, 2, or 3). This occurs because metropolitan areas often include several counties, not just the county containing the core "central city." Adjacent but outlying counties that are socially and economically linked to the core city are also included. Often, these outlying counties are quite rural in terms of total population, population density, etc. Hence, there can be extreme heterogeneity within a multi-county metropolitan area.

Table 2. Index of Relative Rurality (IRR) by Rural-Urban Continuum Code (RUCC)

RUCC	Definition	Number of Counties	Average IRR	Std. Dev. of IRR	Minimum IRR	Maximum IRR
1	Counties in metro areas > 1 million	413	0.32	0.18	0.00	0.70
2	Counties in metro areas of 250,000 to 1 million	322	0.35	0.15	0.10	0.71
3	Counties in metro areas < 250,000	350	0.38	0.14	0.15	0.74
4	Urban population > 20,000, adjacent to a metro area	218	0.40	0.05	0.22	0.54
5	Urban population > 20,000, not adjacent to a metro area	101	0.45	0.06	0.32	0.65
6	Urban population of 2,500 to 19,999, adjacent to a metro area	608	0.51	0.06	0.24	0.68
7	Urban population of 2,500 to 19,999, not adjacent to metro area	440	0.55	0.07	0.32	0.78
8	Completely rural or < 2,500 urban population, adjacent to a metro area	232	0.67	0.06	0.56	0.87
9	Completely rural or < 2,500 urban population, not adjacent to a metro area	424	0.76	0.09	0.56	1.00
Grand Total		3,108	0.50	0.18	0.00	1.00

Source: Department of Agricultural Economics, Purdue University

As with the RUCC, the relationship between the IRR and the UIC correlated in the expected direction (see **Table 3**). In addition, as was the case with the RUCC, there is wide IRR variation within each UIC category, particularly in the two metropolitan categories (UIC = 1 or 2). In sum, the IRR offers a scale for relative rurality that avoids the confusing effects of inclusion in metro boundaries. As a continuous measure, the IRR provides a convenient and sensitive scale for assessing how rural and urban areas differ with respect to other variables. An illustration of the use of the IRR in this fashion to examine cost-of-living differences is presented in **Appendix IV**.

Table 3. Index of Relative Rurality (IRR) by Urban Influence Code (UIC)

UIC	Definition	Number of Counties	Average IRR	Std. Dev. of IRR	Minimum IRR	Maximum IRR
1	Large metro area of > 1 million residents	413	0.32	0.18	0.00	0.70
2	Small metro area of < 1 million residents	672	0.37	0.15	0.10	0.74
3	Micropolitan area adjacent to large metro area	92	0.44	0.06	0.28	0.68
4	Non-core area adjacent to large metro area	123	0.57	0.08	0.29	0.81
5	Micropolitan area adjacent to small metro area	301	0.44	0.07	0.22	0.75
6	Non-core area adjacent to small metro area with own town	357	0.53	0.06	0.24	0.70
7	Non-core area adjacent to small metro area no own town	182	0.66	0.07	0.46	0.87
8	Micropolitan area not adjacent to a metro area	275	0.53	0.12	0.32	0.97
9	Non-core area adjacent to micro area with own town	201	0.57	0.06	0.43	0.81
10	Non-core area adjacent to micro area with no own town	196	0.75	0.08	0.51	0.97
11	Non-core area not adjacent to metro or micro area with own town	129	0.58	0.08	0.32	0.83
12	Non-core area not adjacent to metro or micro area with no own town	167	0.77	0.10	0.47	1.00
Grand Total		3,108	0.50	0.18	0.00	1.00

Source: Department of Agricultural Economics, Purdue University

3.2.3. Defining the Rural-Metropolitan Interface

The concept of a rural-metropolitan interface is rooted in the idea that rurality plays out differently for counties within the influence of a metropolitan area versus places that are far away from a metropolitan area. The most obvious reason for this difference is accessibility to the amenities of a metro area, such as airports, shopping, and cultural opportunities. Metropolitan areas also offer agglomeration economies from which nearby places may benefit. To define the rural-metropolitan interface adequately, neither measure discussed previously is sufficient. The urban influence code measures accessibility to a metro area well, but performs poorly in capturing a county's rural character—especially for counties within metropolitan areas. The IRR can capture the rurality of a place based on a set of widely accepted characteristics (small size, low density, remoteness) but, because of the index's composite nature, cannot be used to pinpoint the county's location relative to a metro area.[15] Thus, while each measure alone is insufficient to capture the idea of a rural-metropolitan interface, when combined they are well suited to do so, as they are responsive to both rurality and metro-accessibility.

The research team developed seven levels that are jointly defined by rurality and metropolitan access.

- Levels *A* and *B* refer to highly urban metropolitan core counties. They differ by population size (above versus below 500,000).

[15] While remoteness—measured as distance to a metropolitan area—is included in the index of relative rurality, the composite nature of the index does not allow us to identify whether a county's index is high because of its remoteness from a metro area or because of, for example, low population density.

- Levels *C* and *D* are outlying metropolitan counties. They differ by degree of rurality (IRR above versus below 0.4).

- Levels *E* and *F* are non-metropolitan counties adjacent to a metropolitan area. They, too, differ by the degree of rurality (above versus below 0.4).

- Finally, level *G* includes non-metropolitan counties that are not adjacent to a metropolitan area.

It is in levels D, E, and F where the metropolitan sphere meets the rural sphere. These three levels will be referred to as the rural-metropolitan interface. **Table 4** provides the definitions and an Indiana example for each level of the rural-metropolitan interface.

Table 4. Definitions of the Rural-Metropolitan Interface Levels

Level	Definition	Location Relative to Metro Area	Degree of Rurality	Example in Indiana
Metropolitan Sphere				
A	Metropolitan central counties with a population of at least 500,000.	Within	Low	Marion County (Indianapolis metro)
B	Metropolitan central counties with a population of less than 500,000.	Within	Low	Tippecanoe County (Lafayette metro)
C	Outlying metropolitan counties with IRR < 0.4	Within	Low	Hancock County (Indianapolis metro)
Rural-Metropolitan Interface				
D	Outlying metropolitan counties with IRR ≥ 0.4	Within	High	Brown County (Indianapolis metro)
E	Non-metropolitan counties adjacent to a metropolitan area and IRR < 0.4	Adjacent	Low	Henry County (east of Indianapolis metro)
F	Non-metropolitan counties adjacent to a metropolitan area and IRR ≥ 0.4	Adjacent	High	Orange County
Rural Sphere				
G	Non-metropolitan counties not adjacent to a metropolitan area	Remote	High	Daviess County

Source: Department of Agricultural Economics, Purdue University

Table 5 shows the relationship between each of the seven levels defined above, the Index of Relative Rurality, and the distance to the closest metropolitan core. On average, both the rurality (IRR) and the distance to the metropolitan center increase as we proceed from level A to level G. Only the 400 counties of level D deviate from this trend and deserve particular attention. These counties are part of metropolitan areas but are very rural in character. In fact, they are typically more rural than the 108 counties of level E that are adjacent but not within a metro area. Level D counties are also the counties with the fastest population growth, amounting to 17.87 percent between 1990 and 2000 compared to only 13.13 percent for the entire population in the 3,108 counties of the continental United States. As a result, they slightly increased their share of the total population. In contrast, counties outside metropolitan areas (levels E, F, and G) had a below-average population growth and thus a dwindling population share during the 1990s.

Table 5. Rural-Metropolitan Level by Population Share, Population Growth, Index of Relative Rurality, and Distance to Metropolitan Center

Rural-Metropolitan Level	Number of Counties	Share of Total Population		Population Growth: 1990-2000 [%]	Index of Relative Rurality		Distance to Metropolitan Center [km]	
		1990	2000		Average	Std. Dev.	Average	Std. Dev.
Metropolitan Sphere								
A	64	29.80	29.57	12.25	0.112	0.040	0.0	0.0
B	294	19.42	19.30	12.38	0.253	0.066	0.0	0.0
C	327	28.78	29.62	16.46	0.263	0.089	39.3	14.5
Rural-Metropolitan Interface								
D	400	4.08	4.25	17.87	0.527	0.078	48.0	17.8
E	108	2.63	2.55	9.55	0.360	0.037	47.7	14.5
F	947	9.05	8.86	10.83	0.543	0.092	65.6	25.2
Rural Sphere								
G	968	6.25	5.86	6.12	0.632	0.138	133.3	58.3

Source: Department of Agricultural Economics, Purdue University

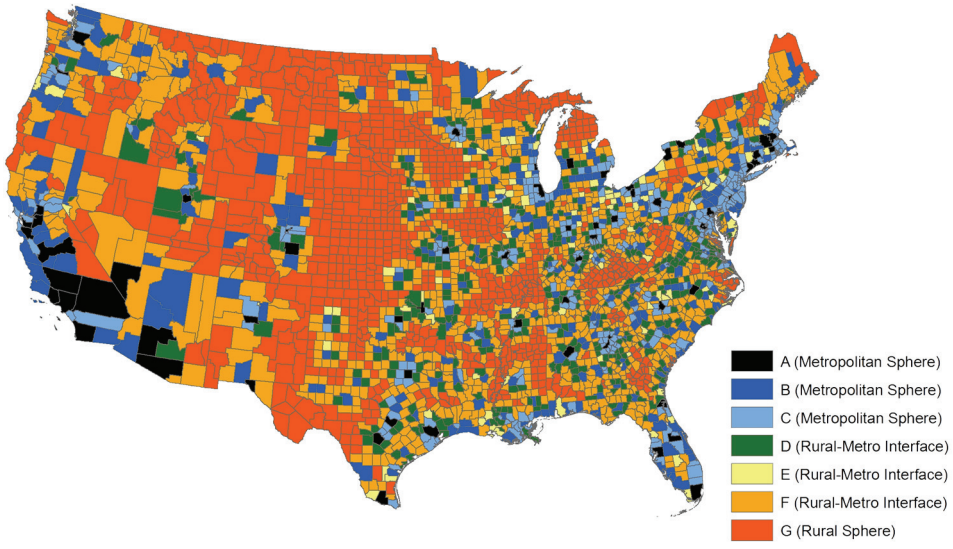
Figure 6 (also found in **Appendix VII**) shows the spatial distribution of the seven rural-metropolitan levels. Three features are most notable:

1. There is an abundance of metropolitan counties along the coasts and the Great Lakes.

2. The counties of the rural-metropolitan interface (levels D, E, and F) form rings around the highly urban core of the metropolitan areas.

3. In the western part of the United States, the rural-metropolitan interface consists primarily of level F counties. These are counties that are rural in character and adjacent to metropolitan core counties. A reason for the absence of level D and level E counties is undoubtedly the large size of counties that are often big enough to encompass a good deal of the urban sprawl.

Figure 6. Rural-Metropolitan Levels, 2000



Source: Department of Agricultural Economics, Purdue University

3.2.4. Measuring Economic Performance

Nine indicators are used to describe the economic health and economic performance of U.S. counties. Four indicators describe the baseline situation in 2000:

- Median household income of a county, which is a general indicator of households' well-being and includes all sources of household income such as transfer payments, wages and investment income.
- Average wage in a county, which specifically measures the economic well-being of the working population.
- Unemployment rate, which is an indicator of excess labor supply and pressure on the job market.
- Poverty rate, which quantifies the proportion of the population living in families whose family incomes falls below the threshold[16] deemed necessary to meet basic needs of food, shelter, etc.

In addition, five indicators are used to describe recent changes in the economic situation. These include average annual change since 2000 for the four indicators listed above, plus the average annual change in covered employment.

Table 6 shows averages, standard deviations, and ranges of the nine economic indicators across the 3,108 counties of the continental United States. As expected, the indicators vary widely across counties. Particularly remarkable is the wide variation in the indicators marking recent changes as they range from negative to positive values. For example, change in total covered employment varied from a decline of 9.6 percent to an increase of 17.1 percent per year during the 2000 to 2004 period. Similarly, recent changes in poverty rates range from a drop of 3 percentage points to an increase of 1.6 percentage points per year.

Table 6. Summary Statistics for Economic Indicators for U.S. Counties

Economic Indicator	Minimum	Maximum	Median	Mean	Std. Dev.
Median Household Income					
2000	$15,231	$91,210	$34,697	$36,285	$8,969
Avg annual change 2000–03	-4.9%	10.2%	0.4%	0.4%	1.2%
Average wage					
2000	$10,359	$76,355	$23,958	$25,027	$5,712
Avg annual change 2000–04	-6.7%	29.7%	3.3%	3.4%	1.6%
Unemployment Rate					
2000	1.3%	17.5%	4.0%	4.3%	1.7%
Avg annual percentage point change 2000–04	-1.0	1.9	0.3	0.3	0.3
Poverty Rate					
2000	1.7%	42.2%	12.3%	13.3%	5.6%
Avg annual percentage point change 2000–03	-3.0	1.6	0.1	0.0	0.4

[16] Thresholds vary by family size and number of children.

Economic Indicator	Minimum	Maximum	Median	Mean	Std. Dev.
Total Covered Employment					
Avg annual change 2000–04	-9.6%	17.1%	0.0%	0.1%	2.4%

Source: Department of Agricultural Economics, Purdue University

The indicators are used to classify counties by their economic situation, based on two dimensions. The first dimension describes the baseline situation as poor, medium, or good. The thresholds are defined by deviations from the average by at least half a standard deviation for at least three of the four baseline variables. For example, a county whose unemployment and poverty rates exceed the respective averages by at least half a standard deviation and whose median household income is smaller than the average minus half a standard deviation is classified as having a poor economic baseline.

The second dimension describes the relative trend in economic performance as downward, stable, or upward. This dimension uses the five variables of economic change, with thresholds defined by deviations from the average by more than half a standard deviation for at least three variables. For example, a county with employment and income growth exceeding the average by more than half a standard deviation, and the poverty rate declining by more than the average plus half the standard deviation is categorized as experiencing an upward trend in economic performance. Joining the two dimensions yields nine different types. The distribution of the 3,108 counties across the nine types is summarized in **Table 7** and visualized in **Figure 7** (also found in **Appendix VII**).

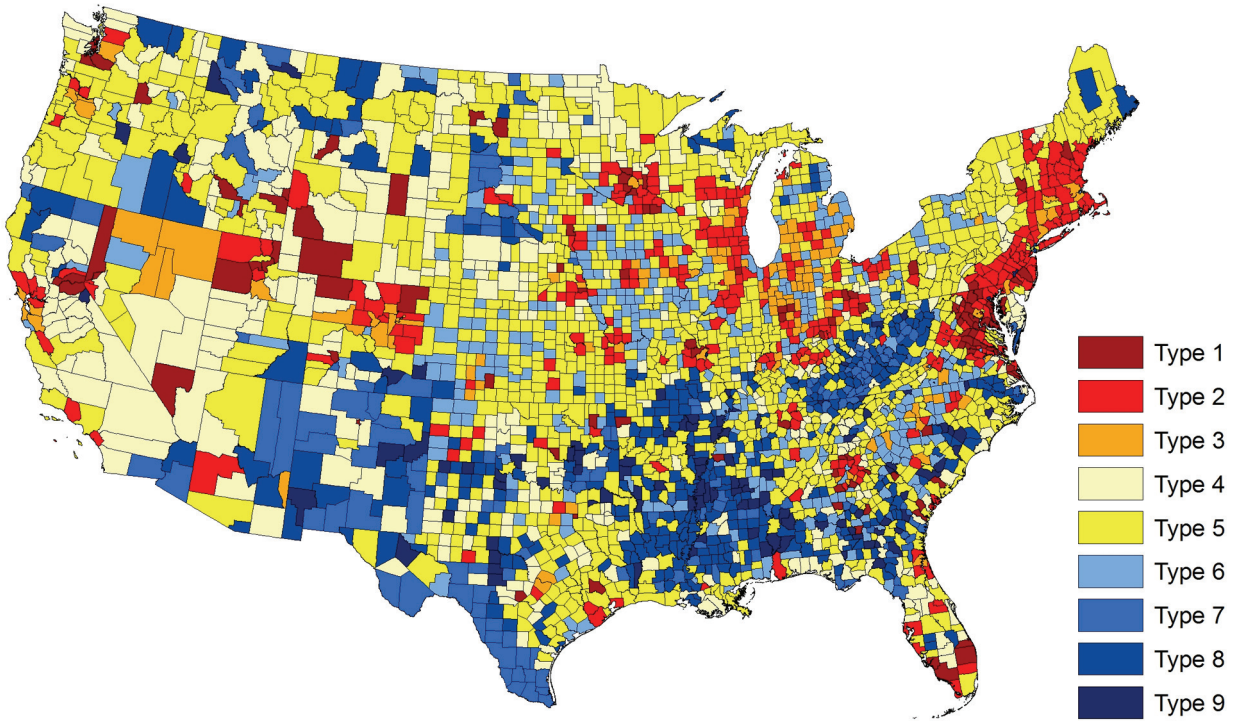
Table 7. Distribution of Counties across Nine Types of Economic Performance

		Relative Trend in Economic Performance (Change Variables, 2000–2003/4)			Totals
		Downward	Stable	Upward	
Baseline (levels in 2000)	Poor	Type 9: 109	Type 8: 339	Type 7: 171	619
	Medium	Type 6: 376	Type 5: 1,116	Type 4: 402	1,894
	Good	Type 3: 143	Type 2: 339	Type 1: 113	595
Totals		628	1,794	686	3,108

Source: Department of Agricultural Economics, Purdue University

As expected, more than a third of all counties are categorized as Type 5 counties, which represents average economic performance along both dimensions. The 452 Type 1 and Type 2 counties (14.5 percent of all counties) are those that are starting from a privileged base and are performing at average levels or even better. As shown in **Figure 7**, those counties are located along the East Coast, in the Chicago area, around Denver, to a lesser extent on the West Coast, as well as in some counties in the Rocky Mountains. The 619 counties that start at a poor initial level (i.e., Types 7, 8, and 9), account for 20 percent of all counties and are concentrated in the South.

Figure 7. Economic Performance Types, 2000



Source: Department of Agricultural Economics, Purdue University

3.3. Profile of U.S. Counties

U.S. counties[17] are quite diverse, varying widely in demographic and economic structure. **Table 8** summarizes the variation of some key characteristics across U.S. counties. Population ranges from 67 people (Loving County, TX) to more than 9 million (Los Angeles County, CA) using the 2004 Census Bureau estimates. About 35 percent of all counties belong to metropolitan areas; however, many of these counties are quite small. In fact, in the year 2000, about 70 percent of all U.S. counties had fewer than 50,000 inhabitants, and combined they housed only 15 percent of the U.S. population.

Overall, rurality declined slightly between 1990 and 2000. In 2000, the IRR averaged 0.497, compared to 0.514 ten years earlier. There is a wide variation in the distance to the closest metropolitan area.[18] On average, the distance is 45 miles. However, some counties are quite remote from a metropolitan area. At 241 miles from the closest metropolitan area, Daniels County, MT, leads the list of remote counties. For residents and firms of these remote counties, reaching a metropolitan area requires several hours of driving.

Among the economic indicators, wide variation in change over time is most noticeable. For example, on average, U.S. counties experienced a moderate increase in their labor force, amounting to 2.71 percent over the period from 2000 to 2004. In the extremes, however, Webster County, MS, lost more than a quarter of its labor force while Shannon County, SD, increased its labor force by

[17] Unless otherwise noted, the descriptive statistics refer to the set of 3,108 counties in the continental United States (see section 3.2).

[18] Distance measured from a county's midpoint to the midpoint of the county housing the primary city of the closest metropolitan area.

more than 36 percent. Similarly, during the first four years of the current decade, the unemployment rate in U.S. counties increased by 1.3 percentage points on average. Yet, the four-year change in the unemployment rate ranged from a 4.0 percentage point decline in Pendleton County, WV, to an increase of 7.5 percentage points in Union County, SC. The poverty rate increased for 61 percent of all counties during the early years of this decade, with the highest increase recorded for Dallas County, TX. In contrast, Ziebach County, SD, substantially reduced its very high poverty rate of 42 percent in 2000 to 33 percent in 2003. Finally, median household income increased on average by 1.2 percent between 2000 and 2003, ranging from a 14.6 percent decline in Hartley County, TX, to a 30.7 percent increase in Borden County, TX.

Table 8. Characteristics of U.S. Counties

Characteristic	Average	Std. Dev.	Minimum	Maximum
Population, 1990	79,514	264,840	107	8,863,052
Population, 2000	89,955	293,558	67	9,519,338
Population Density, 1990 [persons/sq mile]	224.4	1,589.8	0.2	64,675.5
Population Density, 2000 [persons/sq mile]	244.5	1,674.6	0.1	66,834.6
Index of Relative Rurality, 1990	0.514	0.17	0.00	1.00
Index of Relative Rurality, 2000	0.497	0.18	0.00	1.00
Distance to the Nearest Metropolitan Area [km]	73.5	57.5	0.0	388.1
Labor Force, percent change, 2000-2004	2.7	6.4	-26.1	36.7
Unemployment Rate, point change, 2000-2004	1.3	1.1	-4.0	7.5
Poverty Rate, point change, 2000-2003	0.1	1.3	-9.0	4.9
Median Household Income, percent change, 2000-2003	1.2	3.5	-14.6	30.7
Number of Clusters with LQ > 1.2, 2004	2.3	1.9	0	12
Dissimilarity Index, 2001	29.6	7.4	7.5	95
Dissimilarity Index, 2004	27.6	7.1	6.4	92.6

Source: Department of Agricultural Economics, Purdue University

The economic structure of U.S. counties is also varied. In fact, few counties have an economic structure that resembles the economic structure of the nation as a whole. Instead, relative to the U.S. economy, many counties specialize in one or more industry clusters. On average, U.S. counties specialize in 2.3 industry clusters, where specialization is defined as having an employment location quotient (LQ) of 1.2 or higher in that industry cluster.[19] That is, the cluster's share of employment in the county is at least 20 percent higher than the cluster's share of employment nationally.

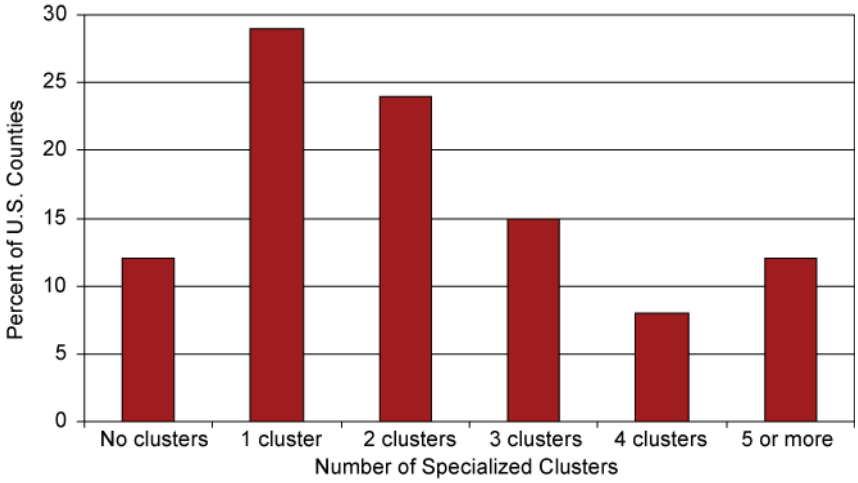
About 12 percent of U.S. counties do not specialize at all, and many of those counties are extremely rural, too small to have a specialization. In fact, on average, the counties without a specialization are significantly smaller than those counties with at least one specialization.[20] The counties without a specialization are also significantly further away from a metropolitan area than those counties with at least one specialization. Twenty-nine percent of all U.S. counties specialize in one cluster only, 24 percent specialize in two industry clusters, 15 percent specialize in three clusters, and 8

[19] While anything with an LQ higher than 1.0 is considered specialized, in practice, 1.2 is the standard cut-off.

[20] Part of that regularity is very likely due to data suppression. Small counties are less likely to pass the data disclosure thresholds than large counties.

percent specialize in four clusters. About 12 percent of U.S. counties specialize in five or more industry clusters (see **Figure 8**).

Figure 8. Frequency Distribution of U.S. Counties by Number of Specialized Clusters, 2004



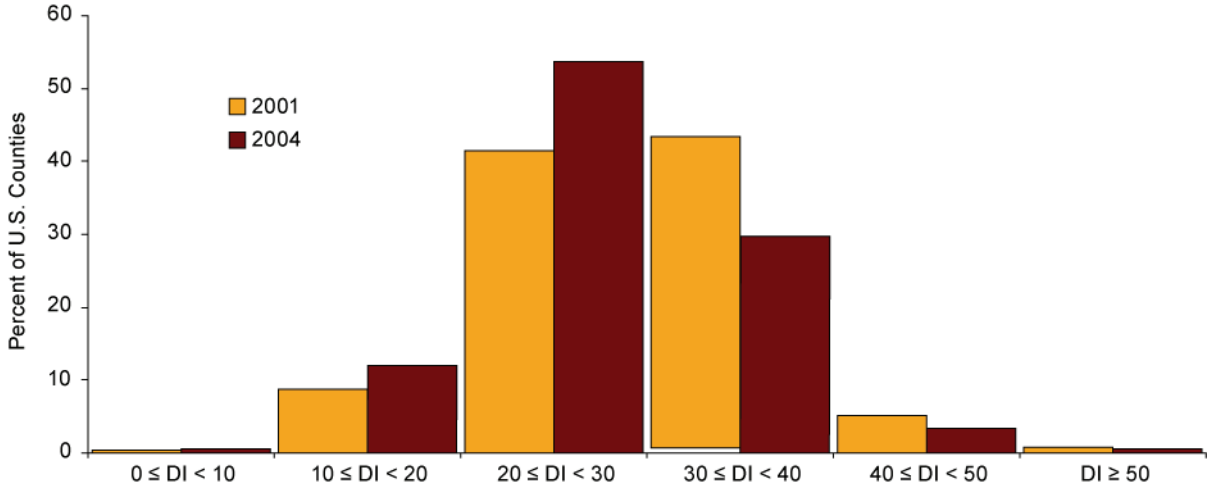
Source: IBRC, using data provided by the Purdue University Department of Agricultural Economics

The U.S. economy is quite diverse and can be used as a benchmark for diversity. An assessment of the extent to which a county's economy differs from the national economy involves comparing a county's employment shares for all clusters to the employment shares at the national level. Such a comparison produces the so-called dissimilarity index (DI), which ranges from 0 to 100. A dissimilarity index of 0 indicates that the county's industry mix is exactly the same as the nation's industry mix; a dissimilarity index of 100 suggests that the two economies are completely dissimilar. For example, a value of 25 implies that 25 percent of the county's employees would need to work in other industry clusters in order to reach complete similarity between the local and national economies.

As shown in **Table 8**, on average the dissimilarity between the local and national economies slightly declined from 29.6 in 2001 to 27.6 in 2004. For both years, the dissimilarity index varies between 20 and 40 for the vast majority of counties. Values outside that range are extremely rare (see **Figure 9**).[21] Among the eight Indiana counties that are more closely analyzed in the second portion of this research, Martin County's industry cluster composition was most dissimilar from the national economy. Its dissimilarity index reached 53 in 2001 and declined to 47 in 2004. Monroe County's industrial mix, on the other hand, was quite similar to that of the U.S. economy, with dissimilarity indices of 23 and 22 in 2001 and 2004, respectively.

[21] DI is defined in this context as ½ of the sum of cluster employment-share differences between a given county's economy and the national economy.

Figure 9. Frequency Distribution of U.S. Counties by Dissimilarity Index (DI)

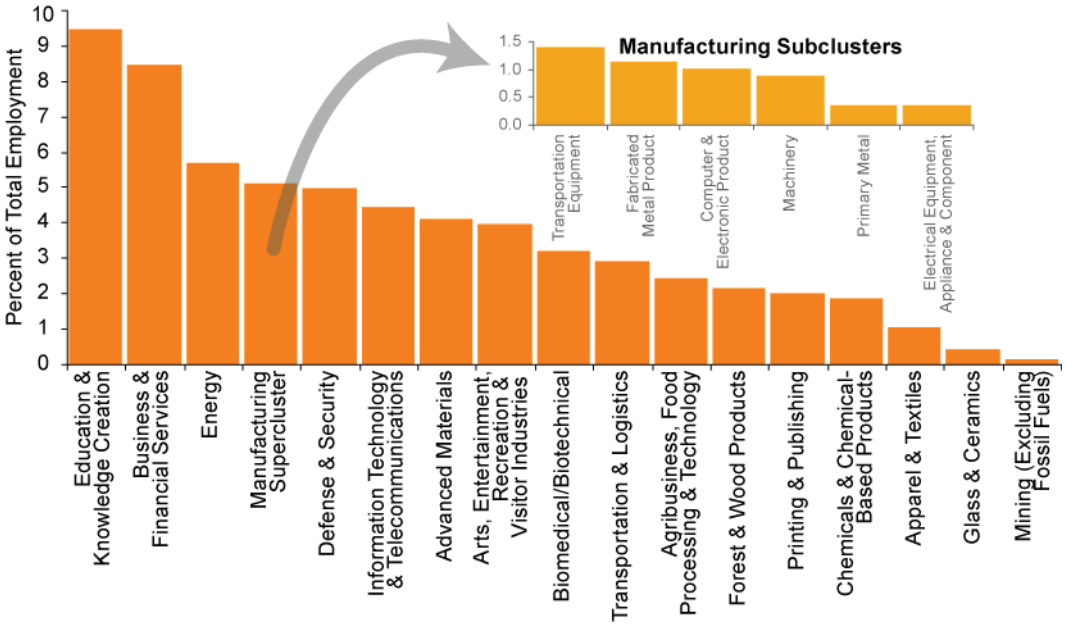


Source: Department of Agricultural Economics, Purdue University

3.4. Spatial Patterns of Industry Clusters across U.S. Counties

The previous section documents the wide variation among U.S. counties in terms of their industrial make-up, degree of rurality, and economic performance. In this section, the research team used the series of maps provided in **Appendix VII** to identify cluster-specific hot spots of concentration (i.e., areas where several counties in close proximity to each other specialize in the same industry cluster). The research team also took a more general look at the locational patterns of industry clusters. **Figure 10** illustrates the national employment share for each cluster.

Figure 10. U.S. Employment Share by Industry Cluster, 2004



Note: The clusters will not sum to 100 because some industries are not included in any cluster (e.g. retail and construction), while other industries are included in multiple clusters.
Source: Department of Agricultural Economics, Purdue University

3.4.1. A Brief Description of Cluster-Specific Location Patterns

- **Advanced Materials Cluster (n=99).**[22] Nationwide, the advanced materials cluster is an important cluster that accounts for about 4 percent of total employment in 2004. However, in most counties, the advanced materials cluster is weakly represented. Only 99 counties have a location quotient exceeding 1.2. These counties are highly concentrated in the upper Midwest, namely Minnesota, Wisconsin, Illinois, Indiana, Ohio, and Michigan. These six states include over 50 percent of the counties that are highly specialized in the advanced materials cluster. A secondary spatial concentration stretches from Pennsylvania to New England. The remaining counties with a strong specialization in advanced materials are scattered throughout the rest of the country (see **Maps C-1, D-1,** and **E-1**).

- **Agribusiness, Food Processing and Technology Cluster (n=904).** The locational pattern of the agribusiness cluster industries is quite distinct. About 53 percent of all counties have a low representation of industries associated with the agribusiness, food processing and technology cluster (LQ < 0.5), but about 29 percent of all U.S. counties have an above average concentration with a location quotient that exceeds 1.2. Strong spatial concentrations exist in many states, including the Corn Belt, the Prairie States, Florida and California. Concentrations of agribusiness, food processing and technology industries are noticeably absent (or at least underrepresented) in several states, including West Virginia and some of the New England states (see **Maps C-2, D-2,** and **E-1**).

- **Apparel and Textiles Cluster (n=134).** This cluster has a small and declining employment share, yet locally it is very important for a relatively small subset of counties. Less than 5 percent of the counties have a location quotient exceeding 1.2, and these counties are spatially very concentrated. The primary agglomeration of counties specialized in the apparel and textile industries is found in the South, including 57 counties in the Carolinas, 16 in Georgia, 11 in Tennessee, and eight in Alabama. A secondary agglomeration includes 16 counties located in a narrow corridor that stretches from eastern Pennsylvania through western New Jersey and into the New York metro area (see **Maps C-3, D-3,** and **E-2**).

- **Arts, Entertainment, Recreation and Visitor Industry Cluster (n=220).** The arts, entertainment, recreation and visitor industries cluster accounts for only 4 percent of total U.S. employment; however, these industries form dominant clusters in well-known vacation areas of the United States, including New England, the Rocky Mountains, and the East and West coasts. Also interesting is the spatial concentration of these industries in northern Michigan and along the Mississippi where the strength of the cluster may be due to the casino industry. The arts, entertainment, recreation and visitor industries do not have a strong presence in the central portion of the nation. In fact, Illinois, Iowa, and Oklahoma do not have a single county that specializes in this industry cluster (see **Maps C-4, D-4,** and **E-2**).

- **Biomedical/Biotechnical (Life Sciences) Cluster (n=795)**. Overall, the biomedical/biotechnical (life sciences) cluster accounts for 3.2 percent of employment. The location quotient exceeds 1.2 in about 25 percent of U.S. counties, many of them located in Texas, Kentucky, North Carolina, Pennsylvania, Virginia, Ohio, and Georgia. Most

[22] N refers to the number of counties that are specialized in the cluster (LQ > 1.2).

prominently, in 5 percent of those counties, the location quotient exceeds 2, including Olmsted County, MN, home to the Mayo Clinic, and Kosciusko County, IN, home to a concentration of manufacturers and suppliers of prosthetic devices (see **Maps C-5**, **D-5,** and **E-3**).

- **Business and Financial Services Cluster (n=99).** The business and financial services cluster is the second most important cluster in terms of employment share, accounting for over 8.5 percent of total employment in 2004. The industries that make up this cluster include only the more advanced and specialized services; for example, NAICS 522110, 522120 and 522130—Commercial Banking, Savings Institutions and Credit Unions—are excluded from this cluster (see **Appendix I** for cluster taxonomy). The vast majority of counties have a low representation of this cluster. In fact, about 83 percent of all counties have a location quotient of less than 0.5; however, extreme specialization with very high location quotients is also rare. In total, the location quotient of the business and financial services cluster exceeds 1.2 in 99 counties. These counties are primarily concentrated along the East Coast and in the San Francisco area, as well as in the metropolitan areas of the country's interior, such as in and around Chicago, Indianapolis, and Denver (see **Maps C-6, D-6,** and **E-3**).

- **Chemicals and Chemical-Based Products Cluster (n=457)**. The chemicals and chemical-based products cluster accounts for 1.9 percent of total employment and tends to be over-represented in the eastern United States, along the Great Lakes, as well as in the South along the Gulf Coast. The industries of this cluster tend to be absent from a large portion of U.S. counties (see **Maps C-7, D-7,** and **E-4**).

- **Defense and Security Cluster (n=183).** Defense and security industries account for about 5 percent of total employment. There is a strong spatial concentration of the defense and security cluster along the eastern seaboard, but it is often some idiosyncratic characteristic that shapes the locational patterns. For example, the defense and security industries are of major importance in counties that house a military base, such as the Crane Naval Surface Warfare Center in southern Indiana's rural Martin County, or Fort Huachuca in Cochise County, AZ. In addition, there are the more well-known agglomerations of the defense and security industries, such as around the District of Columbia, Texas, and California (see **Maps C-8, D-8,** and **E-4**).

- **Education and Knowledge Creation Cluster (n=301)**. Overall, the education and knowledge creation cluster accounts for about 9.5 percent of total employment (but please refer to the note about this cluster on page 29). In about two-thirds of the counties, the cluster is under-represented with location quotients less than 0.5. On the other hand, almost 10 percent of all counties have a location quotient for the education and knowledge cluster that exceeds 1.2; many of them are located in the Northeast, as well as in the more rural areas of the Midwest. In this cluster, data suppression problems are quite serious because large universities in small counties, such as Purdue University in Tippecanoe County, IN; Indiana University in Monroe County, IN; the University of Illinois in Champaign County, IL; Princeton University in Mercer County, NJ, are often the major employers for a NAICS category. As such their information is not included in the published employee and establishment data (see **Maps C-9, D-9,** and **E-5**).

- **Energy (Fossil and Renewable) Cluster (n=248).** The energy cluster accounts for 5.7 percent of total employment. Almost 8 percent of U.S. counties specialize in energy-related industries. Their spatial location is quite distinct, with concentrations in Texas and Oklahoma, along the Gulf Coast, the mid-Atlantic Coast, and in West Virginia (see **Maps C-10, D-10,** and **E-5**).

- **Forest and Wood Products Cluster (n=648).** The forest and wood products cluster accounts for 2.2 percent of total employment, and almost 21 percent of U.S. counties are specialized in this cluster. Spatial concentrations of the forest and wood products cluster are found in the Pacific Northwest and the rural areas of the Rocky Mountains. Not surprisingly, the industries of this cluster are almost completely absent from the Prairie States. In the eastern half of the United States, however, the industry cluster is very well represented. In some rural counties, it even reaches a notable dominance. For example, the cluster's strong representation in southern Indiana is remarkable, where its location quotients reach 13.1 in Dubois County, 7.9 in Orange County, and 5.4 in Washington County. These patterns suggest that the forest and wood products cluster is one of the few industry clusters expected to have a strong rural orientation (see **Maps C-11, D-11,** and **E-6**).

- **Glass and Ceramics Cluster (n=208).** Glass and ceramics industries account for less than half a percent of total employment. About 200 counties are specialized in these industries, with a few concentrations in the East and the Midwest. However, it is an important cluster because many of its component sectors overlap with the advanced materials cluster (see **Maps C-12, D-12,** and **E-6**).

- **Information Technology and Telecommunications Cluster (n=81).** In 2004, 81 counties specialized in the information technology and telecommunications cluster. Many of those counties are part of metropolitan areas. In particular, the data indicate an elongated hotspot stretching along the East Coast megalopolis from Boston to the District of Columbia, as well as strong concentrations in major metro areas of the West Coast and several other parts of the nation (see **Maps C-13, D-13,** and **E-7**).

- **Manufacturing Supercluster (n=484).** With over 5 percent of total employment, the manufacturing supercluster accounts for the third largest employment share in the U.S. economy. For 484 counties, the location quotients exceed 1.2, and those counties are heavily concentrated in the old Rustbelt states (see **Maps C-14, D-14,** and **E-7**).

  Taking a closer look inside the manufacturing supercluster reveals that different manufacturing subclusters have distinct spatial patterns. For example, 148 counties show a specialization with location quotients exceeding 1.2 for the computer and electronic product manufacturing subcluster (see **Maps C-14a, D-14a,** and **E-7a**). Its spatial distribution—with distinct concentration on the West Coast, in Minnesota, and the Northeast—is unique among the manufacturing subclusters. The locational pattern of the very traditional transportation equipment manufacturing subcluster is also interesting. Over 300 counties specialize in this subcluster (see **Maps C-14f** and **D-14f,** and **E-7c**). They form an axis of concentration from Michigan south to Indiana, Kentucky and Tennessee.

  For the remaining manufacturing subclusters, the counties with high specialization tend to

be scattered east of 100° western longitude with local concentrations primarily in the upper Midwest. This longitudinal line is a division often used to divide the eastern from the western United States. Cities and towns near 100° longitude include Bismarck, ND; Pierre, SD; North Platte, NE; Garden City, KS; and Amarillo, TX.

- **Mining (Excluding Fossil Fuels) Cluster (n=216).** The mining industry cluster accounts for a very small share (0.1 percent) of total employment and is completely absent from about 85 percent of U.S. counties (or it has been suppressed from the CEW data, which is the case in counties where a single dominant mining company employs many people). However, 215 counties are specialized in the mining-related industries and, for some counties, mining is the most dominant activity. For example, in Humboldt County, NV, the mining cluster accounts for about 20 percent of employment, yielding a location quotient of 144. Other counties with an extremely high location quotient for the mining cluster include Hardin County, IL (LQ = 99); Shoshone County, ID (LQ = 53); and Conejos County, CO (LQ = 33) (see **Maps C-15, D-15,** and **E-10**).

- **Printing and Publishing Cluster (n=114).** The industries of this cluster account for about 2 percent of total employment. Few counties are specialized in this industry cluster, and they are primarily located in the Eastern and Midwestern states. Counties with high LQs for printing and publishing are notably scarce in the Deep South, the Prairie States, Texas, and Mountain States (see **Maps C-16, D-16,** and **E-10**).

- **Transportation and Logistics Cluster (n=312).** In total, the transportation and logistics cluster accounts for almost 3 percent of total employment. The 312 counties specializing in this cluster are widely scattered through the eastern half of the country, with some discernable hot spots around New Orleans, in the Midwest in and around Indiana, and along the East Coast in eastern Virginia and Pennsylvania (see **Maps C-17, D-17,** and **E-11**).

3.4.2. Average Cluster Locations

The descriptions above and the maps in **Appendix VII** illustrate the distinct spatial patterns of cluster-specific specializations of U.S. counties. For each industry cluster, this section examines the "average" location and dispersion of the highly specialized counties. As such, it serves as a basis for comparisons between the industry clusters, but can also serve as a benchmark for future shifts in the locational patterns of industry clusters.

For each industry cluster, **Table 9** shows the average latitude and longitude for the counties with an LQ greater than 1.2 in 2004.[23] The average latitude indicates how far north the specialized cluster counties are located, while the average longitude indicates how far west the counties are located on average. Also shown is the standard distance, which indicates how far, on average, the specialized counties are from the average location. A small standard distance signals that the specialized counties are concentrated in close proximity around the average location. A large standard distance suggests that the specialized counties are, on average, far from the location.

The counties specializing in the advanced materials cluster had the most northern average location, just 100 miles south of Chicago. On average, the specialized counties are 507 miles away from this

[23] The results for 2001 are almost identical to those for the 2004 data. They are available upon request.

average location. Counties specialized in the manufacturing supercluster are located in close proximity, only about 170 miles south of Chicago. Five of the six manufacturing subclusters follow this pattern with their average location south of Chicago along the Indiana-Illinois border, and a relatively pronounced concentration around the average location. That is, on average, the specialized counties of the manufacturing subclusters are even less than 500 miles away from their average location. The exception is the computer and electronic product manufacturing subcluster which—in addition to the concentrations in the Midwest and along the East Coast—also has several highly specialized counties along the West Coast. As a result, this subcluster occupies the most western average location, placed in western Illinois close to the Missouri border. It has the longest standard distance of 771 miles.

The most southern and most eastern location is occupied by the apparel and textiles cluster with its average position in northeastern Tennessee. Moreover, the counties specialized in the apparel and textiles cluster are in close proximity to the mean location, being only 311 miles away on average. No other cluster shows such a spatially concentrated pattern.

The average location of counties specialized in the arts, entertainment, recreation and visitor industries cluster is the furthest to the west, located in northeast Kansas. On average, the counties specializing in the arts, entertainment, recreation and visitor industries cluster are a long distance of 941 miles away from the average location in Kansas. In fact, for this industry cluster, the average location is actually the least representative as it is an artifact of the strong specializations in the eastern part of the country (especially New England), the specializations in the westerns states, and the absence of counties specializing in the arts, entertainment, recreation and visitor industries cluster in close proximity to northeastern Kansas is remarkable. A high dispersion around the average location is also characteristic for the counties specializing in the information technology and communication cluster with their heavy concentration along the East Coast, and in Denver, Atlanta, and San Francisco. The average location for the counties specializing in the information technology and communication cluster is in the St. Louis, MO, area.

Counties specialized in the agribusiness, food processing and technology cluster occupy an average location in northeastern Kansas. Unlike the arts, entertainment, recreation and visitor industries cluster, northeastern Kansas is quite close to the vast majority of counties specialized in the agribusiness, food processing and technology cluster, many of which are located in the Corn Belt and Prairie States. On average, they are only 611 miles away from the mean location. However, that distance would most certainly be smaller if it were not for the agricultural concentrations along the West and East coasts.

The last column of **Table 9** shows the nearest neighbor statistic, *R*, for the spatial pattern of specialized counties in 2004. Values smaller than 1 indicate that the counties specialized in a cluster are spatially concentrated within the continental United States. Not surprisingly, with $R = 0.48$, the nearest neighbor statistic is smallest for the counties specializing in the apparel and textile cluster. As shown earlier, counties specializing in the apparel and textile cluster are heavily concentrated in the southeastern portion of United States. Similarly, counties specializing in the information technology and communication cluster—with their heavy concentration along the East Coast, Denver, Atlanta, and San Francisco—have a low nearest neighbor statistic. At the other end of the scale, the counties specialized in the more ubiquitous clusters (e.g., agribusiness, food processing and technology) have comparatively high nearest neighbor statistics.

Table 9. Average Location of Specializations by Industry Cluster, 2004

Industry Cluster	Number of Counties	Average Latitude [degrees N]	Average Longitude [degrees W]	Standard Distance [miles]	Nearest Neighbor Statistic, *R*
Advanced Materials	99	40.4	87.3	507	0.62
Agribusiness, Food Processing and Technology	904	39.0	95.0	611	0.98
Apparel and Textiles	134	36.2	82.6	311	0.48
Arts, Entertainment, Recreation and Visitor Industries	220	39.2	96.4	941	0.86
Biomedical/Biotechnical (Life Sciences)	795	37.5	89.1	624	0.94
Business and Financial Services	99	38.3	87.1	693	0.65
Chemicals and Chemical-Based Products	457	38.4	86.5	450	0.78
Defense and Security	183	36.8	90.2	731	0.77
Education and Knowledge Creation	301	38.7	92.2	579	0.88
Energy (Fossil and Renewable)	248	36.7	95.2	609	0.83
Forest and Wood Products	648	38.1	89.6	604	0.82
Glass and Ceramics	208	38.9	88.1	504	0.72
Information Technology and Telecommunications	81	38.4	90.0	831	0.52
Mining (Excluding Fossil Fuels)	216	38.8	94.4	696	0.89
Printing and Publishing	114	40.1	89.3	572	0.64
Transportation and Logistics	312	37.5	90.3	549	0.86
Manufacturing Supercluster	484	39.7	87.7	421	0.69
Computer and Electronic Product Mfg.	148	39.9	90.9	771	0.71
Electrical Equip., Appliance and Component Mfg.	139	39.0	84.6	455	0.73
Fabricated Metal Product Mfg.	707	39.0	87.5	441	0.84
Machinery Mfg.	546	39.7	88.5	443	0.78
Primary Metal Mfg.	197	39.4	86.4	430	0.68
Transportation Equipment Mfg.	329	38.6	87.6	426	0.68

Note: The average location refers only to those counties for which the location quotient exceeds 1.2. For a definition/description of the nearest neighbor statistic, see Section 3.1 and text immediately preceding Table 9.
Source: Department of Agricultural Economics, Purdue University

3.4.3. Co-Locations of Industry Clusters

This section looks at whether certain clusters co-locate. Are there pairs of clusters that tend to be highly represented in the same counties? Are there pairs of industry clusters where a high representation of one cluster is associated with a low representation of another cluster? To answer these questions, the research team examined each cluster's share of total county employment for each county in the national database. Correlating the cluster-specific employment shares shows that several pairs of clusters have a strong tendency to locate in the same county. The pairs with the strongest co-location tendency are shown in **Table 10**.

The correlation coefficients suggest several distinct groups of co-locating clusters. The first group of co-locating clusters includes the biomedical/biotechnical cluster, the business and financial services cluster, the advanced materials cluster, the defense and security cluster, the information technology and telecommunications cluster, and the printing and publishing cluster. Counties with a high

employment share in one of those clusters also tend to have a high employment share in one or more of the other clusters belonging to the group. Some of the correlations in this group of clusters are actually quite high. A strong reliance on a highly educated workforce may unite these clusters and contribute to their co-locating.

The second group of co-locating clusters is anchored around the manufacturing supercluster. It includes the manufacturing subclusters, as well as the advanced materials cluster and the chemical products cluster. These clusters depend on a similar set of manufacturing skills and capabilities. The advanced materials cluster is also connected to the information technology and telecommunications cluster and the printing and publishing cluster. These three clusters also belong to the first group of co-locating clusters, thus serving as a link between the two groups.

The third group reflects the association between the forest and wood product cluster and the apparel and textile cluster, a combination that is crucial in the furniture industry, for example.

Table 10. Correlation Coefficients for Employment Shares of Pairs of Industry Clusters, 2004

Group 1	Biomedical / Biotechnical	Business and Financial Services	Advanced Materials	Defense and Security	Information Technology and Telecommunications	Printing and Publishing
Biomedical/Biotechnical	1					
Business and Financial Services	0.28	1				
Advanced Materials	0.19	0.29	1			
Defense and Security	0.19	0.41	0.13	1		
Information Technology and Telecommunications	0.25	0.73	0.40	0.40	1	
Printing and Publishing	0.23	0.61	0.33	0.22	0.54	1

Group 2	Manufacturing Supercluster	Advanced Materials	Chemical Products	Information Technology and Telecommunication	Printing and Publishing
Manufacturing Supercluster	1				
Advanced Materials	0.46	1			
Chemicals and Chemical-Based Products	0.25	0.39	1		
Information Technology and Telecommunication	0.14	0.40	0.12	1	
Printing and Publishing	0.20	0.33	0.18	0.54	1

Group 3	Forestry and Wood Products	Apparel and Textiles
Forestry and Wood Products	1	
Apparel and Textiles	0.29	1

Source: Department of Agricultural Economics, Purdue University

Interestingly, a number of industry clusters show only weak co-location tendencies. For example, for the agribusiness, food processing and technology cluster, the correlation coefficients for the

employment shares hover around zero, but none of them is strong enough to identify either a co-locating tendency or a tendency to avoid co-location with other industry clusters. Similarly, no co-location or avoidance tendencies can be detected for the arts, entertainment, recreation and visitor industries cluster, the biomedical/biotechnical (life sciences) cluster, the energy (fossil and renewable) cluster, the glass and ceramics cluster, the mining cluster, the transportation and logistics cluster, and most of the manufacturing subclusters.

3.4.4. Spatial Concentrations of Highly Specialized Counties

Industry clusters are comprised of firms that share two characteristics: they are located in close geographic proximity to each other (i.e., within a region) and they engage in related economic activity (e.g., electronics industry). This section examines the spatial proximity of counties that are specialized in similar economic activities as defined by a given cluster. The argument is that close proximity of inter-related industries positively impacts productivity and economic growth in the region. Proximity is assessed by answering the question: how far away is a randomly selected county that specializes in the apparel and textile cluster from the closest county that also specializes in the apparel and textile cluster. Moreover, regional specialization in an industry cluster typically involves several counties in close proximity. Thus, to evaluate the regional scope of the specialization, the distance to the nearest neighbor with the same specialization is then complemented with information on the distance to the second, third, and fourth nearest neighbor with the same specialization.

Table 11 shows, for each cluster, the average distance from a highly specialized county (LQ > 1.2) to the first, second, third, and fourth nearest neighbor specialized in the same cluster. These average nearest-neighbor distances differ substantially across clusters. Two distinct groups of clusters emerge. The first group consists of clusters with a short distance of less than 40 miles to the first nearest neighbor. This group includes the forest and wood products cluster and the co-located apparel and textile cluster, the manufacturing supercluster and three of its subclusters, the agribusiness, food processing and technology cluster, the biomed/biotech cluster, and the chemical and chemical-based products cluster.

The second group includes industry clusters for which the nearest neighbor distances exceed 40 miles. This group includes industry clusters with a strong base in the West where counties are bigger and thus have midpoints that are further apart from each other. The arts, entertainment, recreation and visitor industries cluster and the mining cluster are examples. The longest nearest neighbor distances are observed for the co-locating business and financial services cluster and the advanced materials cluster. For these clusters, a tendency to locate in widely separated but highly urbanized locations may very well contribute to such long average distances.

Table 11. Higher-Order Nearest Neighbor Distances

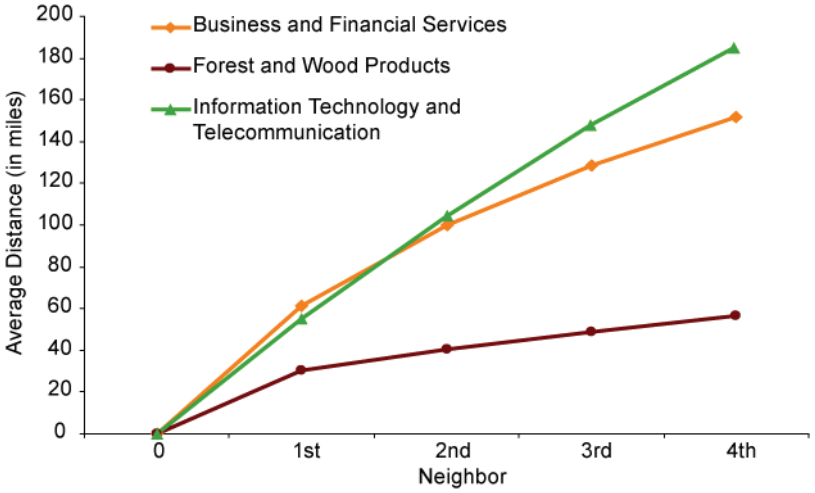
Industry Cluster	Average distance to xth order neighbor with the same specialization [miles]			
	1st	2nd	3rd	4th
Advanced Materials	58.7	107.3	135.0	157.2
Agribusiness, Food Processing and Technology	30.7	39.7	48.2	56.2
Apparel and Textiles	38.8	56.0	82.0	104.7
Arts, Entertainment, Recreation and Visitor Industries	54.8	84.6	104.9	125.2

Industry Cluster	Average distance to xth order neighbor with the same specialization [miles]			
	1st	2nd	3rd	4th
Biomedical/Biotechnical (Life Sciences)	31.4	42.2	52.1	61.8
Business and Financial Services	61.2	100.3	128.6	151.6
Chemicals and Chemical-Based Products	34.2	48.0	58.3	68.0
Defense and Security	53.8	81.0	114.7	134.2
Education and Knowledge Creation	47.5	70.9	91.0	105.2
Energy (Fossil and Renewable)	49.5	74.0	90.3	108.9
Forest and Wood Products	30.4	40.6	48.9	56.8
Glass and Ceramics	46.9	69.3	90.0	105.1
Information Technology and Telecommunications	54.1	104.1	147.9	183.3
Mining (Excluding Fossil Fuels)	57.0	84.6	106.6	126.6
Printing and Publishing	56.1	83.3	115.0	155.0
Transportation and Logistics	45.6	68.6	85.7	100.7
Manufacturing Supercluster	29.3	44.4	54.9	66.0
Computer and Electronic Product Mfg.	54.5	85.8	109.2	133.0
Electrical Equip., Appliance and Component Mfg.	58.4	90.5	109.3	127.8
Fabricated Metal Product Mfg.	29.8	40.9	49.3	56.7
Machinery Mfg.	31.6	42.6	51.9	61.7
Primary Metal Mfg.	45.7	65.5	81.9	98.1
Transportation Equipment Mfg.	35.0	53.0	70.3	85.0

Note: Refers only to the subsets of specialized counties (those with LQ > 1.2).
Source: Department of Agricultural Economics, Purdue University

The distances to the higher-order nearest neighbor provide a measure for the spatial extent of localized concentrations of industry cluster. To illustrate, **Figure 11** shows the average distances to the four closest neighbors for the forest and wood products cluster, the information technology and telecommunications cluster, and the business and financial services cluster in 2004. For a county specializing in the forest and wood products cluster, the nearest county with the same specialization is, on average, only 30.4 miles away. The second, third, and fourth nearest neighbors are 40.6 miles, 48.9 miles, and 56.8 miles away, respectively. Note, that even the fourth nearest neighbor for a county specializing in the forest and wood products industry is closer than the first nearest neighbor for counties specializing in business and financial services. Note also that the distance to the first nearest neighbor is not sufficient to assess the spatial extent of industry clusters. For example, although the first nearest neighbor for a county specializing in information technology and telecommunications is shorter than that for counties specializing in business and financial services, **Figure 11** shows that the spatial extent of regional specializations for the information technology and telecommunications industry tends to exceed that of the business and financial services cluster.

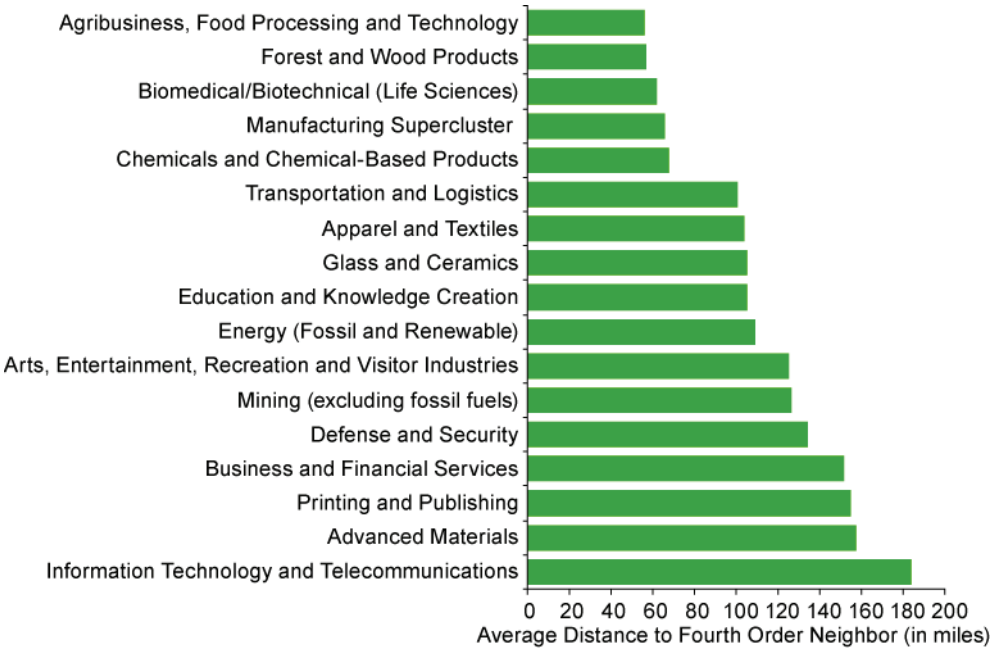
Figure 11. Average Distances to Four Nearest Neighbors for Selected Industry Clusters, 2004



Source: Department of Agricultural Economics, Purdue University

Figure 11 shows that the distance to the fourth nearest neighbor can serve as an estimate of the spatial extent of the regional specialization. In **Figure 12** the distances to the fourth nearest neighbor are plotted for each industry cluster. The variation in area is substantial. The most compact regions of specialization are typical for the agribusiness, food processing and technology cluster, the forest and wood products cluster, the biomedical/biotechnical cluster, the manufacturing supercluster and the chemicals and chemical-based products cluster. Such compact, small-scale regionalization can occur if specialization is very localized, with each specialized county being surrounded by several other similarly specialized counties. On the other hand, industrial clusters that locate in metropolitan core counties at the top of the urban hierarchy tend to have large spatial extents of specialization. Those core counties easily contain the critical mass necessary to support specialization and provide means of interaction between firms that are more difficult to achieve in smaller places with smaller-scale specialization. Looking at **Figure 12**, the information technology and communication cluster is the cluster with the largest spatial extent, followed closely by the advanced materials cluster, the printing and publishing cluster, and the business and financial services cluster.

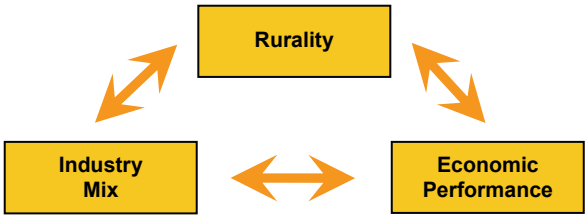
Figure 12. Estimated Spatial Extent of Regional Specialization, 2004



Source: Department of Agricultural Economics, Purdue University

3.5. The Triangle of Industry Mix, Rurality, and Economic Performance

The previous sections documented the distinct locational patterns for the industry clusters analyzed in this study. This section expands the focus by bringing rurality and economic performance into the analysis. The research team systematically analyzed the linkages between industry mix, rurality, and economic performance as the three essential constructs differentiating U.S. counties.



3.5.1. The Industry–Rurality Linkage: Identifying Rural-Oriented and Urban-Oriented Industry Clusters

Which industry clusters are more likely to be concentrated in rural environments, and which are more concentrated in urban environments? Phrased differently, is there a systematic relationship between the degree of cluster specialization and the degree of rurality? For each industry cluster,

Figure 13 shows the correlation coefficient[24] between the employment share and the index of relative rurality. A negative correlation coefficient suggests that the cluster tends to be stronger in an urban setting than in a rural setting. A positive correlation coefficient indicates that rural counties tend to be more specialized in the industry cluster compared to urban counties.

Figure 13. Correlation between 2004 Employment Share and 2000 Index of Relative Rurality

Source: Department of Agricultural Economics, Purdue University

The results suggest that for most clusters the correlation is negative and persistent over time.[25, 26] That is, the more rural the county, the lower the employment share and specialization for most clusters. The implied urban-orientation is particularly strong (correlation coefficient < -0.5) for the business and financial services cluster, the biomed/biotech cluster, the information technology and telecommunications cluster, and the printing and publishing cluster. These are the same clusters that earlier (Section 3.4.3) were identified as a group of co-locating clusters. For this group, co-location is synonymous with sharing the urban locations. **Figure 14** shows the negative relationships between the index of relative rurality and employment shares in a series of scatterplots. For some clusters—particularly the business and financial services cluster—

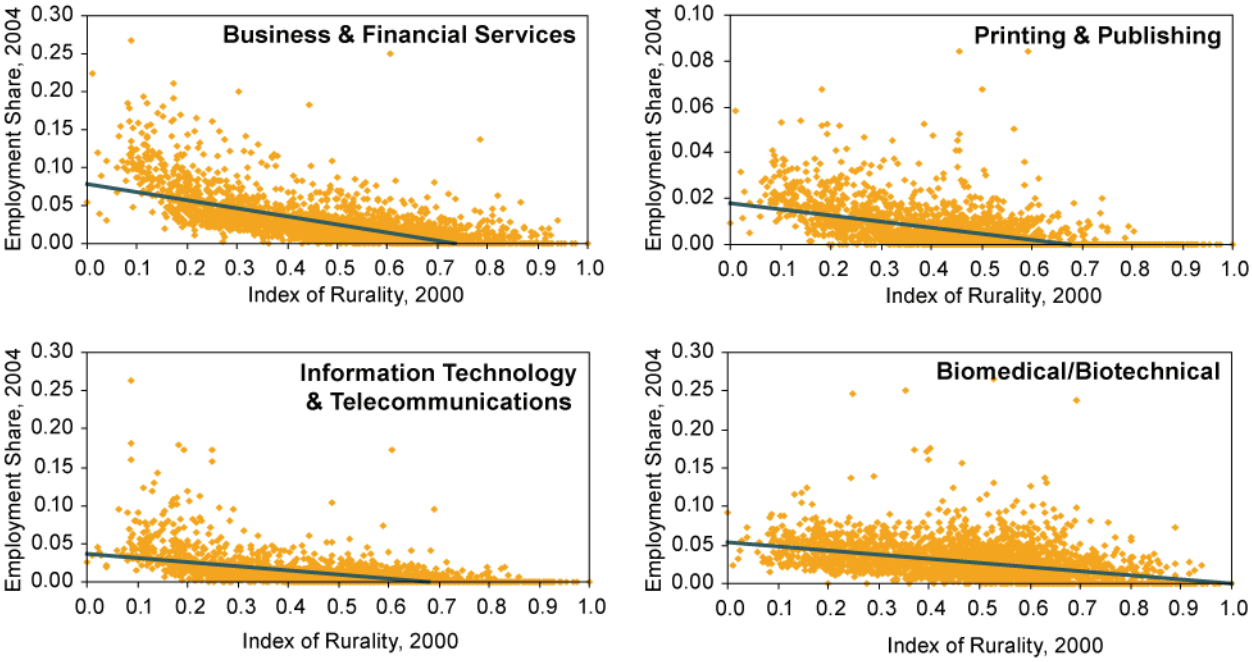
[24] This analysis includes all 3,108 counties. Given the large sample size, even correlation coefficients as close to zero as +/- 0.04 are significantly different from zero. Thus, the interpretation will focus on the direction and magnitude of the correlation coefficient.

[25] The results for 2001 and 2004 employment data are almost identical.

[26] Similar results are also obtained when—instead of the Index of Relative Rurality—one of its four underlying dimensions is used. The correlations with the employment share are particularly strong for the distance to the closest metropolitan area. The findings suggest that the urban orientation of an industry cluster is basically synonymous with metro-accessibility. Biomed/biotech industries, information technology and communications industries, and printing and publishing industries are all located in metro-accessible locations.

employment shares decline in a nonlinear fashion, that is, the drop in employment share is quite pronounced for low rurality scores and then becomes less pronounced as rurality increases.[27]

Figure 14. Scatterplots of the Index of Rurality and Employment Shares for the Most Urban-Oriented Industry Clusters

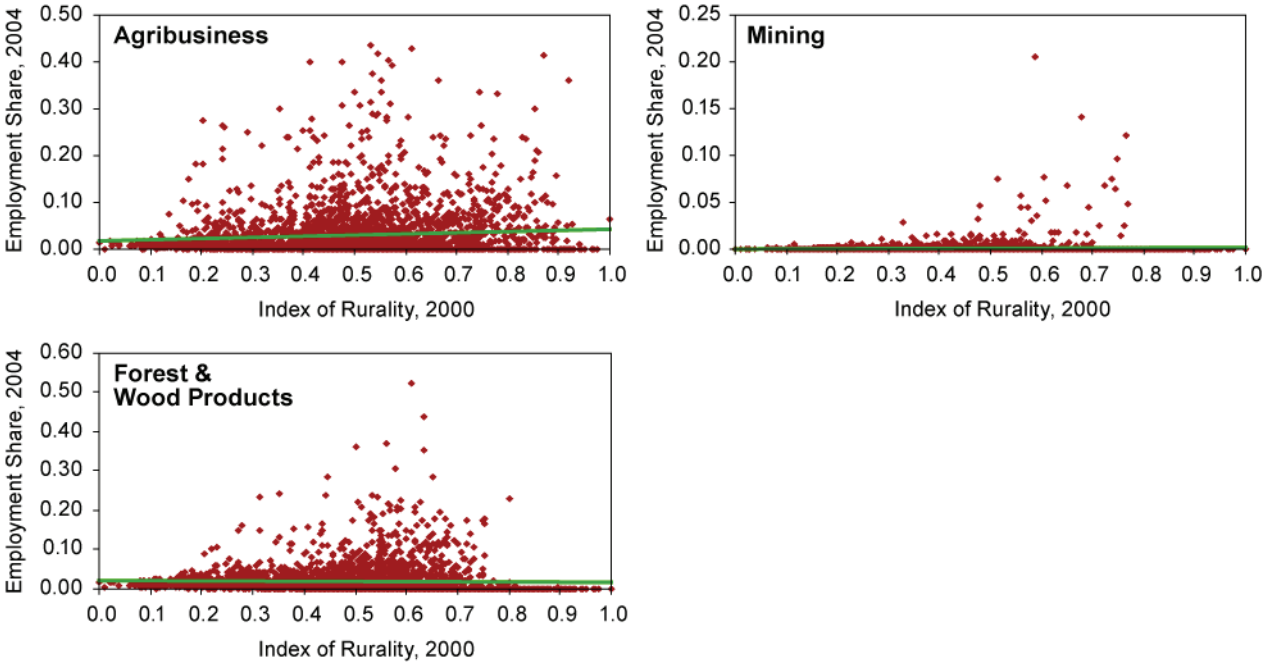


Note: The vertical axes on the charts above do not all have the same scaling.
Source: Department of Agricultural Economics, Purdue University

At the other end of the spectrum, three industry clusters—the agribusiness, food processing and technology cluster, the mining cluster, and the forest and wood products cluster—are likely to be found in both rural and urban settings. However, for all three clusters, the counties with a very strong specialization (i.e., a very high employment share) are completely absent from the very urban counties (those with IRR < 0.2). Instead, they are exclusively found in the more rural counties where they contribute to a huge variation in employment shares. Statistically, however, there are so few highly specialized rural counties that they appear as isolated outliers and do not have much influence on the overall trend. Thus, for the three clusters shown in **Figure 15**, rurality could not be used as a predictor for their strong presence, but high urbanization could be used as a predictor for their absence.

[27] For example, fitting higher order polynomials to the data significantly increases the amount of variation in the location quotients that can be accounted for by rurality.

Figure 15. Scatterplots of the Index of Rurality and Employment Shares for the Least Urban-Oriented Industry Clusters

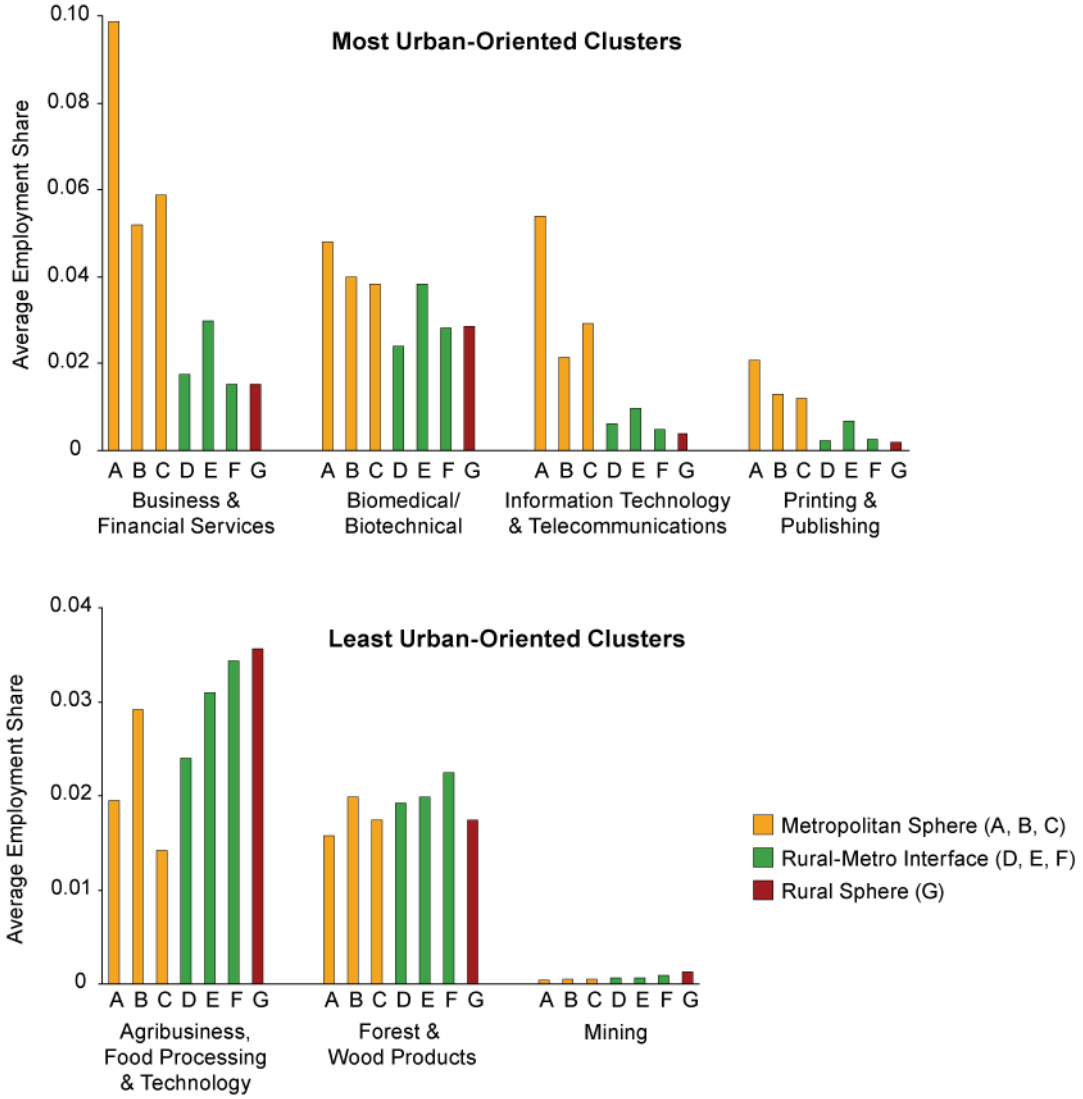


Note: The vertical axes on the charts above do not have the same scaling.
Source: Department of Agricultural Economics, Purdue University

The team gained additional insight into the linkage between industry specialization and rurality by taking a closer look at how average employment shares differ across the seven rural-metropolitan levels. **Figure 16** contrasts the distribution of employment shares across the seven levels for the four most urban-oriented clusters versus the three least urban-oriented clusters. Among the urban-oriented clusters, employment shares are substantially higher within the metropolitan sphere (levels A, B, and C) than outside it. Moreover, within the metropolitan sphere, there is a strong big-city bias for both the business and financial services cluster and the information technology and telecommunications cluster. The big cities are classified as level A counties, such as Cook County, IL, representing Chicago. In these level A counties, the employment share of the business and financial services cluster and the information technology and telecommunications cluster are excessively high.

For counties within the rural-metropolitan interface (levels D, E, and F), the highest employment shares for the urban-oriented clusters are observed for level E counties (i.e., counties that have an urban character (IRR < 0.4) but are outside, albeit adjacent to, a metropolitan area). This result is consistent with the long nearest neighbor distances that were found in Section 3.4.4. For the urban-oriented industry clusters, the highly specialized counties are often the central counties of metropolitan areas, which are often spaced relatively far from each other.

Figure 16. Average Employment Shares by Rural-Metro County Level for Most and Least Urban-Oriented Clusters, 2004



Note: The vertical axes on the charts above do not have the same scaling.
Source: Department of Agricultural Economics, Purdue University

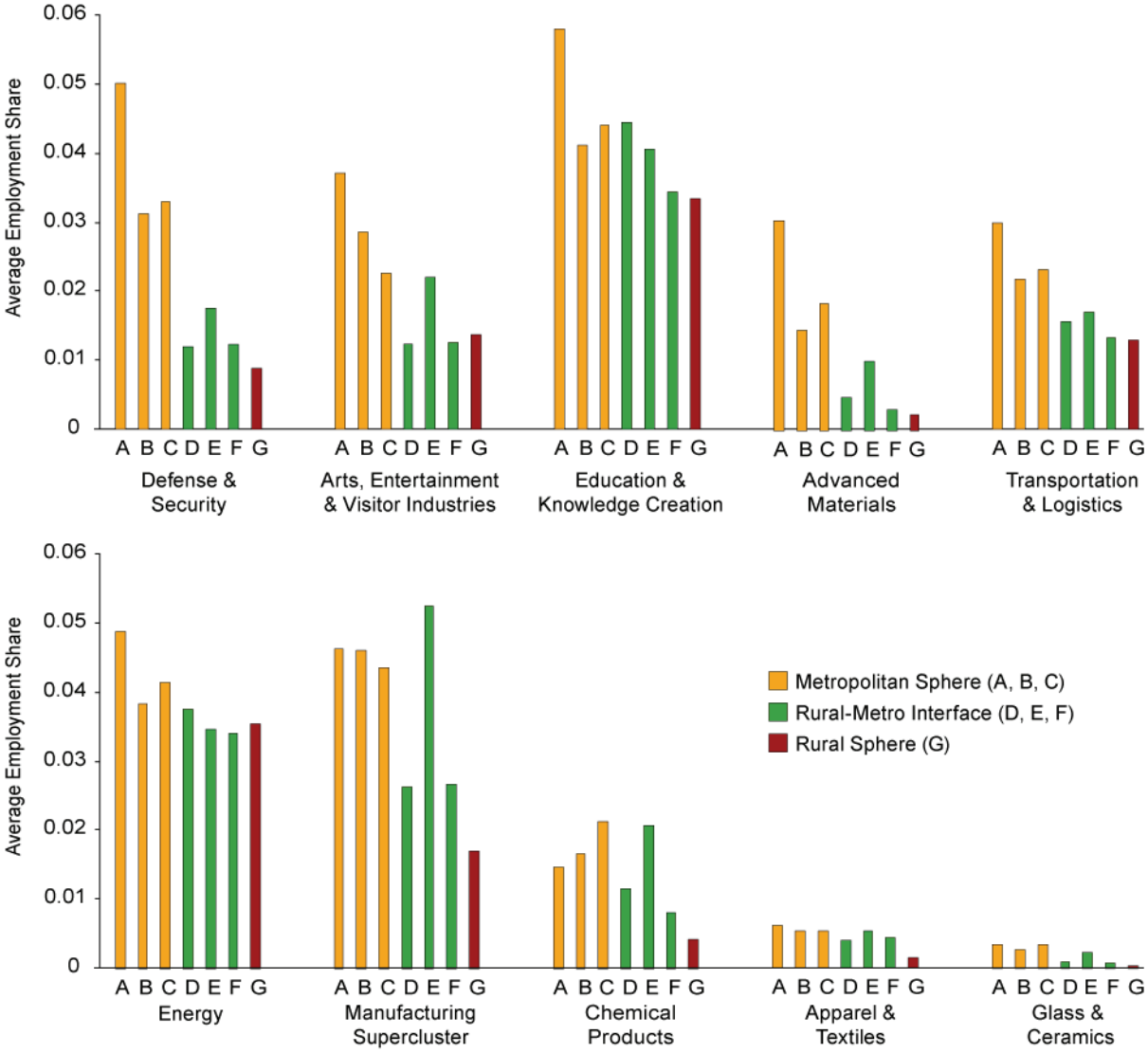
The similarity between level-D and level-F counties is also noticeable. Both types of counties are rural in character (IRR ≥ 0.4), yet level-D counties are within, whereas level-F counties are adjacent to, a metropolitan area. For all urban-oriented clusters shown in **Figure 16**, both types of counties have a low—and almost identical—employment share. This convincingly shows how the delimitation of metropolitan areas can artificially separate rural counties that are very similar in character.

For the least urban-oriented industry clusters, **Figure 16** shows that average employment shares are lower in the metropolitan sphere than in the rural-metro interface and the rural sphere. This trend is least pronounced for the forest and wood products cluster for which the employment share in the rural sphere is actually quite low. It is also interesting that for the forest and wood product cluster, as well as for the agribusiness, food processing and technology cluster, employment shares are

surprisingly high in the central counties of the smaller metropolitan areas (i.e., level-B counties). This explains why the correlation coefficients, which measure the strength of the *linear* relationship between rurality and employment shares, are only weakly positive for these two clusters. For the agribusiness, food processing and technology cluster, the employment share exceeds the national average of 0.029 for 78 of the 295 level-B counties. For some counties, the employment share is very high, reaching 0.275—almost 10 times the national average for Monterey County, CA. In fact, the level-B counties with the 10 highest employment shares in the agribusiness, food processing and technology cluster are all located on the West Coast—two in Washington and eight in California.

Figure 17 shows the average employment shares for the remaining industry clusters by rural-metro level. Most notably, the defense and security cluster; the arts, entertainment, recreation and visitor cluster; the education and knowledge creation cluster; and the advanced materials cluster all have a big-city orientation. Their average employment shares are substantially higher in level-A counties than in any other level. The education and knowledge creation cluster has a secondary peak in level-D counties—that is, metropolitan counties with a rural character.

Figure 17. Average Employment Shares by Rural-Metro County Level for Remaining Clusters, 2004



Source: Department of Agricultural Economics, Purdue University

Employment shares for the defense and security cluster; the arts, entertainment, recreation and visitor cluster; and the advanced materials cluster have secondary peaks in level-E counties (i.e., counties urban in character but just outside metropolitan areas). Level-E counties are also very important for the manufacturing supercluster, as well as for the chemicals and chemical-based products cluster. Especially for the manufacturing supercluster, the similarity of level-D and level-F counties in terms of their employment shares surfaces once again and questions the usefulness of a metro/non-metro distinction when exploring industry clusters.

3.5.2. The Linkage between Rurality and Economic Performance

This section addresses some basic questions concerning the association between rurality and economic performance. The research team began by estimating the relationship between the nine economic indicators and the Index of Relative Rurality (see **Table 12**). Rurality is negatively related to wages and income, and positively related to poverty rate, in the baseline year of 2000. The relationship between rurality and unemployment rate is also positive, but quite weak. Thus, looking at the status quo, increased rurality is associated with poor economic performance. However, looking at the relationship between rurality and changes in these economic indicators over time, a more promising picture emerges for rural areas. Rurality has inverse relationships with average annual changes in both unemployment and poverty, and weak positive relationships with average annual changes in wages and income. Combined, these results hint at possible economic convergence between rural and urban America.

Table 12. Correlation between Economic Indicators and the Index of Relative Rurality

Economic Indicator	Correlation with IRR 2000
Total Covered Employment	
Percent average annual change, 2000–2004	-0.066
Unemployment Rate	
2000	0.089
Percent average annual change, 2000–2004	-0.207
Poverty Rate	
2000	0.260
Percent average annual change, 2000–2003	-0.630
Average Wage	
2000	-0.642
Percent average annual change, 2000–2004	0.083
Median Household Income	
2000	-0.497
Percent average annual change, 2000–2003	0.036

Source: Department of Agricultural Economics, Purdue University

This finding is reinforced by differences in average rurality across the nine types of economic performance (see **Table 13**). The highest levels of rurality are associated with counties showing the poorest economic conditions in the baseline year, and average rurality in counties with moderate economic conditions is only slightly lower. In contrast, counties with good economic conditions in 2000 are, on average, much more urban. However, with a given baseline level, counties with an

upward trend in economic performance are, on average, more rural than those with stable or declining conditions.

Table 13. Average Index of Relative Rurality across Types of Economic Performance

(Standard Deviations in Parentheses)

		Relative Trend in Economic Performance Change Variables, 2000–2003/4		
		Downward	Stable	Upward
Baseline (levels in 2000)	Poor	**Type 9:** 0.543 (0.132)	**Type 8:** 0.587 (0.121)	**Type 7:** 0.592 (0.132)
	Medium	**Type 6:** 0.505 (0.187)	**Type 5:** 0.507 (0.164)	**Type 4:** 0.547 (0.174)
	Good	**Type 3:** 0.326 (0.186)	**Type 2:** 0.345 (0.156)	**Type 1:** 0.397 (0.158)

Source: Department of Agricultural Economics, Purdue University

For each level of the rural-metropolitan landscape, **Table 14** shows the percentage of counties belonging to a particular economic performance type. Overall, metropolitan counties (levels A, B, and C) and counties with low rurality are more strongly represented among the top economic performance types. Level-C counties (i.e., suburban counties inside metropolitan areas) have the highest share of top performers. Almost 15 percent of level-C counties have a good economic base and show an upward trend in economic performance. An additional 40 percent of level-C counties enjoy good economic conditions with a stable trend. Remarkably, only 2.1 percent of all level-C counties are assigned to one of the three categories of poor economic performance.

Level-A counties—that is, the central counties of large metropolitan areas—are second in economic performance. Over 50 percent of level-A counties enjoyed a good economic base in 2000, yet more than half of them did experience a downward trend. Level-B, level-D, and level-E counties are similar in that they have the largest share of counties in the medium performance categories. Finally, counties of levels F and G—both of which are rural, although level-6 counties are adjacent to a metro area—are very weakly represented in the good performance categories, and instead are strongly over-represented in the poor performance category. Interestingly, in terms of the distribution across economic performance types, there is barely a difference.

Table 14. Percentage of Rural-Metro Level Counties by Types of Economic Performance

Baseline	Trend	Metro Sphere			Rural Metro Interface			Rural Sphere	Total Counties
		Level A	Level B	Level C	Level D	Level E	Level F	Level G	
Good	Up	1.6	4.4	14.7	7.0	0.9	1.2	1.1	113
	Stable	20.3	19.4	40.1	15.8	13.9	4.0	2.3	339
	Down	31.3	9.2	10.1	3.8	8.3	2.4	1.7	143
Medium	Up	7.8	13.6	6.4	10.3	9.3	13.9	15.8	402
	Stable	18.8	39.8	18.7	43.3	38.9	37.9	36.4	1,116
	Down	14.1	10.5	8.0	7.3	18.5	12.8	14.5	376
Poor	Up	1.6	1.4	0.6	3.5	3.7	7.1	8.2	171
	Stable	3.1	1.4	0.9	8.5	2.8	15.2	15.4	339
	Down	1.6	0.3	0.6	0.8	3.7	5.5	4.8	109
Total Counties		64	294	327	400	108	947	968	3,108

Source: Department of Agricultural Economics, Purdue University

3.5.3. Linkages between Economic Performance and Industry Clusters

Are certain clusters associated with favorable economic performance? Can one identify clusters related to poor economic health? Do such systematic associations vary across the different levels of the rural-metropolitan landscape? **Table 15** shows the correlations between economic indicators and the employment share of 16 industry clusters plus the manufacturing supercluster and its subclusters. Compared to all other correlations, the correlations for the business and financial services, information technology and telecommunications, and the printing and publishing clusters are by far the strongest. The higher the employment share in the business and financial services cluster, the lower the unemployment rate and poverty rate—and the higher the wages and median household income. The same advantageous relations hold true for both the information technology and telecommunications cluster and the printing and publishing cluster. High employment shares in all of these clusters are, however, also associated with increases in the poverty rate.

Low poverty, higher wages, and higher median incomes are also associated with high employment shares in the manufacturing supercluster, a cluster traditionally possessing a strong unionized labor force. However, high employment shares in manufacturing also coincide with higher growth rates for both poverty rates and unemployment rates. A relatively strong positive relationship between wages and employment shares exists for the advanced materials cluster. The same positive, although weaker, relationship is observed for the transportation and logistics cluster, the biomed/biotech cluster, the chemicals and chemical-based products cluster, and the defense and security cluster. High employment shares in the latter two clusters are also associated with increased median household income.

Table 15. Correlations between 2004 Employment Shares and Economic Indicators by Industry, 2000 Baseline and Average Annual Percent Change

Industry Cluster	Unemployment Rate		Poverty		Average wage		Median Household Income	
	2000	% change 2000–04	2000	% change 2000–03	2000	% change 2000–04	2000	% change 2000–03
Advanced Materials	-0.096	0.169	**-0.240**	**0.344**	**0.435**	-0.096	**0.340**	-0.043
Agribusiness, Food Processing and Technology	0.016	-0.038	0.044	-0.120	-0.154	0.042	-0.057	-0.088
Apparel and Textiles	-0.014	0.094	-0.026	0.123	0.045	-0.029	0.012	-0.076
Arts, Entertainment, Recreation and Visitor Industries	-0.020	-0.035	-0.144	0.128	0.122	0.022	0.199	0.025
Biomedical/Biotechnical (Life Sciences)	0.156	-0.032	0.120	0.192	**0.214**	-0.025	0.056	0.039
Business and Financial Services	**-0.212**	0.150	**-0.326**	**0.532**	**0.647**	-0.004	**0.570**	0.005
Chemicals and Chemical-Based Products	-0.075	0.164	-0.199	**0.268**	**0.282**	-0.050	**0.224**	0.001
Defense and Security	-0.004	0.018	-0.022	0.184	**0.342**	0.053	**0.212**	0.056
Education and Knowledge Creation	-0.015	0.012	-0.061	0.065	0.036	-0.018	0.076	-0.029
Energy (Fossil and Renewable)	0.010	-0.085	0.010	0.064	0.141	0.066	0.081	0.190
Forest and Wood Products	0.141	-0.007	0.033	0.044	-0.007	-0.040	-0.051	-0.034
Glass and Ceramics	-0.083	0.123	-0.168	**0.210**	0.196	-0.039	**0.204**	0.009
Information Technology and Telecommunications	**-0.201**	0.151	**-0.304**	**0.506**	**0.636**	-0.066	**0.565**	-0.019

Industry Cluster	Unemployment Rate		Poverty		Average wage		Median Household Income	
	2000	% change 2000–04	2000	% change 2000–03	2000	% change 2000–04	2000	% change 2000–03
Mining (Excluding Fossil Fuels)	0.029	-0.045	-0.009	-0.014	0.011	-0.018	0.013	-0.012
Printing and Publishing	**-0.213**	0.198	**-0.339**	**0.496**	**0.514**	-0.036	**0.482**	-0.024
Transportation and Logistics	-0.040	0.057	-0.110	**0.234**	**0.219**	-0.033	0.139	0.029
Manufacturing Supercluster	-0.129	**0.253**	**-0.289**	**0.338**	**0.277**	-0.098	**0.254**	-0.036
Computer and Electronic Product Mfg.	-0.109	0.102	-0.175	**0.251**	**0.298**	-0.064	**0.263**	-0.049
Electrical Equip., Appliance and Component Mfg.	-0.041	0.068	-0.087	0.135	0.104	-0.018	0.102	-0.020
Fabricated Metal Product Mfg.	-0.067	0.171	-0.188	0.198	0.127	-0.067	0.139	-0.020
Machinery Mfg.	-0.102	0.151	-0.190	0.172	0.114	-0.038	0.137	-0.008
Primary Metal Mfg.	0.002	0.056	-0.066	0.101	0.117	-0.048	0.059	-0.008
Transportation Equipment Mfg.	-0.064	0.151	-0.137	0.179	0.146	-0.052	0.114	-0.020

Note: Correlations greater than 0.2 and smaller than -0.2 in bold.
Source: Department of Agricultural Economics, Purdue University

Table 16 addresses whether the systematic associations described above persist when zooming in on any one of the seven levels of the rural-metropolitan landscape. Most obviously, the relationships between cluster employment shares and economic indicators are more pronounced in more urban settings (i.e., low degrees of rurality). For some clusters at the most urban level, a high employment share almost seems synonymous with good economic performance. For level-A counties, for example, the correlation coefficient between median household income and employment share in the information technology and communication cluster is as high as 0.768.

Within the metropolitan sphere (levels A, B, and C), high employment shares in the business and financial services, information technology and telecommunications, and printing and publishing clusters lower the unemployment rate, whereas high employment shares in the agribusiness, food processing and technology cluster are associated with high unemployment. Somewhat surprisingly, for the more rural settings, the research team could not identify an industry cluster that is systematically associated with low unemployment. Instead, one finds that high employment shares in both biomed/biotech, as well as the forest and wood products cluster, are weakly linked to high unemployment rates. For the associations between employment shares and poverty rate, similar regularities surface. However, the relation between high poverty and high employment share in the agribusiness, food processing and technology cluster is only weak, and for the very rural counties (level G) there is a slight negative relationship between poverty and employment share in the business and financial services cluster.

In the central counties of the large metropolitan areas (level A), wages and median income are very responsive to employment shares. They increase with rising employment shares in the business and financial services, advanced material, information technology and communication, printing and publishing, defense and security, and energy clusters, as well as in the manufacturing supercluster and its computer and electronics subcluster, in particular. These same relationships show up again, albeit somewhat weaker, at levels B and C of the metropolitan sphere. However, not replicated at the higher levels are the slight negative relationships between wages and employment share in the agribusiness, food processing and technology cluster, the forest and wood products cluster, and the

glass and ceramics cluster that are observed for level-A counties. Outside the metropolitan sphere (levels D to G), the relationships between employment shares and wages/median income are much weaker, and high manufacturing employment shares generally have a positive impact on wages.

Table 16. Correlations between 2004 Employment Shares and Economic Indicators by Cluster and Rural-Metro Level, 2000 Baseline and Average Annual Percent Change

Industry Cluster	Unemployment Rate		Poverty		Average wage		Median Household Income	
	2000	% change 2000–04	2000	% change 2000–03	2000	% change 2000–04	2000	% change 2000–03
Metropolitan Sphere: Level A								
Advanced Materials	**-0.329**	**0.417**	**-0.413**	**0.280**	**0.581**	**-0.643**	**0.468**	**-0.237**
Agribusiness, Food Processing and Technology	**0.725**	**-0.355**	**0.393**	**-0.468**	**-0.289**	**0.321**	**-0.203**	**0.243**
Apparel and Textiles	0.154	-0.175	**0.280**	-0.113	0.014	-0.016	-0.184	0.008
Arts, Entertainment, Recreation and Visitor Industries	-0.048	**-0.216**	-0.078	0.055	-0.066	0.073	-0.024	-0.180
Biomedical/Biotechnical (Life Sciences)	0.121	-0.045	**0.257**	-0.055	-0.004	-0.073	-0.077	0.123
Business and Financial Services	**-0.595**	**0.398**	**-0.560**	**0.639**	**0.598**	**-0.166**	**0.658**	**-0.379**
Chemicals and Chemical-Based Products	-0.120	0.197	-0.185	-0.060	-0.053	-0.037	-0.010	**0.249**
Defense and Security	**-0.201**	0.139	**-0.221**	**0.202**	**0.428**	**-0.216**	**0.560**	-0.081
Education and Knowledge Creation	0.029	0.111	-0.116	-0.124	0.152	-0.113	0.029	0.158
Energy (Fossil and Renewable)	**-0.230**	**0.221**	**-0.281**	**0.388**	**0.363**	**-0.386**	**0.399**	-0.150
Forest and Wood Products	0.068	-0.027	-0.023	-0.106	**-0.234**	0.080	-0.085	0.199
Glass and Ceramics	0.139	-0.023	0.090	**-0.251**	**-0.218**	-0.042	**-0.238**	**0.281**
Information Technology and Telecommunications	**-0.439**	**0.391**	**-0.479**	**0.615**	**0.735**	**-0.646**	**0.779**	**-0.424**
Mining (Excluding Fossil Fuels)	**0.312**	**-0.206**	0.116	**-0.228**	-0.186	0.153	-0.139	**0.227**
Printing and Publishing	**-0.516**	**0.446**	**-0.528**	**0.580**	**0.615**	**-0.521**	**0.515**	**-0.481**
Transportation and Logistics	0.110	-0.043	**0.208**	0.018	-0.088	0.068	**-0.267**	-0.151
Manufacturing Supercluster	**-0.312**	**0.525**	**-0.387**	**0.238**	**0.508**	**-0.637**	**0.371**	**-0.262**
Computer and Electronic Product Mfg.	**-0.250**	**0.331**	**-0.324**	**0.390**	**0.652**	**-0.693**	**0.558**	**-0.372**
Electrical Equip., Appliance and Component Mfg.	-0.123	0.143	-0.071	-0.123	0.110	-0.091	0.056	0.034
Fabricated Metal Product Mfg.	-0.157	**0.332**	-0.182	-0.095	0.004	-0.088	-0.069	0.196
Machinery Mfg.	**-0.207**	**0.328**	**-0.260**	0.101	0.136	**-0.226**	0.101	-0.060
Primary Metal Mfg.	-0.022	0.020	-0.017	-0.132	-0.109	0.100	-0.177	0.149
Transportation Equipment Mfg.	-0.127	**0.333**	-0.157	0.022	0.135	**-0.275**	0.042	-0.163
Metropolitan Sphere: Level B								
Advanced Materials	**-0.205**	**0.339**	**-0.280**	**0.276**	**0.513**	**-0.250**	**0.346**	-0.160
Agribusiness, Food Processing and Technology	**0.434**	**-0.139**	**0.177**	**-0.243**	-0.127	0.111	0.043	0.016
Apparel and Textiles	-0.091	0.151	-0.087	0.156	0.030	-0.075	0.033	-0.101
Arts, Entertainment, Recreation and Visitor Industries	-0.007	-0.173	-0.054	-0.051	-0.047	0.130	0.085	0.068
Biomedical/Biotechnical (Life Sciences)	-0.025	-0.099	0.068	0.050	0.087	0.001	0.020	0.055
Business and Financial Services	**-0.305**	0.084	**-0.259**	**0.324**	**0.399**	0.152	**0.354**	0.082
Chemicals and Chemical-Based Products	-0.154	0.301	-0.112	0.160	0.114	**-0.202**	0.048	-0.134

Industry Cluster	Unemployment Rate		Poverty		Average wage		Median Household Income	
	2000	% change 2000–04	2000	% change 2000–03	2000	% change 2000–04	2000	% change 2000–03
Defense and Security	0.054	-0.120	0.066	0.003	0.096	0.135	0.108	0.123
Education and Knowledge Creation	-0.029	0.075	-0.054	0.124	0.086	-0.049	0.075	-0.150
Energy (Fossil and Renewable)	-0.041	-0.142	0.086	0.017	0.113	-0.004	-0.005	**0.204**
Forest and Wood Products	-0.078	0.155	-0.180	0.146	-0.018	-0.144	0.088	-0.045
Glass and Ceramics	-0.056	0.096	-0.110	0.050	0.087	-0.025	0.110	-0.053
Information Technology and Telecommunications	**-0.277**	0.123	**-0.249**	**0.320**	**0.520**	-0.096	**0.396**	-0.032
Mining (Excluding Fossil Fuels)	0.016	-0.059	0.010	-0.046	-0.003	0.005	-0.014	0.105
Printing and Publishing	**-0.365**	**0.210**	**-0.434**	**0.456**	**0.304**	-0.040	**0.412**	-0.051
Transportation and Logistics	-0.018	0.024	0.087	0.088	0.021	-0.159	-0.062	-0.046
Manufacturing Supercluster	**-0.212**	**0.459**	**-0.298**	**0.264**	**0.369**	**-0.254**	**0.260**	**-0.210**
Computer and Electronic Product Mfg.	-0.176	0.126	**-0.228**	**0.254**	**0.444**	**-0.203**	**0.309**	-0.044
Electrical Equip., Appliance and Component Mfg.	-0.108	0.135	-0.099	0.144	0.062	-0.042	0.047	-0.073
Fabricated Metal Product Mfg.	-0.142	**0.310**	-0.170	0.112	0.045	-0.170	0.082	-0.152
Machinery Mfg.	-0.132	**0.277**	-0.190	0.127	0.130	-0.150	0.128	-0.133
Primary Metal Mfg.	-0.031	0.178	-0.105	0.056	0.054	-0.106	0.048	-0.097
Transportation Equipment Mfg.	-0.096	0.321	-0.154	0.147	**0.276**	-0.128	0.152	-0.140
Metropolitan Sphere: Level C								
Advanced Materials	0.062	0.007	**-0.230**	**0.244**	**0.382**	-0.146	**0.236**	-0.118
Agribusiness, Food Processing and Technology	**0.204**	-0.088	0.103	-0.162	-0.121	0.011	-0.087	0.060
Apparel and Textiles	0.023	0.045	0.064	0.070	0.005	-0.041	-0.102	-0.104
Arts, Entertainment, Recreation and Visitor Industries	-0.035	-0.038	-0.089	0.088	0.149	0.027	0.111	0.067
Biomedical/Biotechnical (Life Sciences)	0.084	-0.094	0.060	0.057	**0.200**	0.002	0.054	-0.096
Business and Financial Services	**-0.263**	0.070	**-0.246**	**0.324**	**0.700**	0.084	**0.467**	-0.117
Chemicals and Chemical-Based Products	0.139	-0.040	-0.006	-0.004	0.062	-0.173	-0.036	-0.027
Defense and Security	-0.061	0.028	0.017	0.083	**0.328**	0.182	0.132	-0.024
Education and Knowledge Creation	0.082	0.008	-0.085	0.078	0.014	0.012	0.079	-0.029
Energy (Fossil and Renewable)	-0.095	-0.038	**-0.221**	**0.223**	**0.210**	-0.032	**0.302**	0.156
Forest and Wood Products	-0.059	0.186	-0.131	0.132	-0.134	0.004	0.024	-0.020
Glass and Ceramics	0.022	0.042	-0.097	0.006	-0.070	-0.103	-0.009	0.077
Information Technology and Telecommunications	-0.073	0.132	0.084	-0.076	-0.066	-0.012	-0.084	-0.094
Mining (Excluding Fossil Fuels)	0.103	-0.006	0.008	-0.072	-0.085	-0.080	-0.029	0.049
Printing and Publishing	**-0.254**	0.090	**-0.318**	**0.387**	**0.604**	-0.028	**0.449**	-0.173
Transportation and Logistics	0.043	-0.012	0.064	0.051	0.097	-0.032	-0.050	0.074
Manufacturing Supercluster	0.016	0.059	-0.166	0.101	-0.045	-0.139	0.009	-0.014
Computer and Electronic Product Mfg.	-0.067	0.041	**-0.265**	**0.246**	**0.259**	-0.120	0.277	-0.082
Electrical Equip., Appliance and Component Mfg.	-0.012	0.032	-0.094	0.069	0.043	-0.067	0.048	-0.049
Fabricated Metal Product Mfg.	0.078	0.066	-0.110	0.014	-0.124	-0.120	-0.044	-0.003
Machinery Mfg.	-0.077	0.046	**-0.216**	0.109	-0.099	-0.134	0.076	0.104

Industry Cluster	Unemployment Rate		Poverty		Average wage		Median Household Income	
	2000	% change 2000–04	2000	% change 2000–03	2000	% change 2000–04	2000	% change 2000–03
Primary Metal Mfg.	0.085	0.005	0.006	-0.032	-0.056	-0.020	-0.100	-0.036
Transportation Equipment Mfg.	0.014	0.014	0.032	-0.002	-0.053	-0.022	-0.089	-0.015
Rural-Metro Interface: Level D								
Advanced Materials	0.069	-0.009	-0.076	0.114	**0.288**	-0.058	0.087	0.015
Agribusiness, Food Processing and Technology	-0.029	-0.029	0.067	-0.098	-0.137	0.009	-0.064	-0.121
Apparel and Textiles	-0.036	0.050	-0.032	0.169	0.009	-0.036	-0.014	-0.146
Arts, Entertainment, Recreation and Visitor Industries	0.027	0.048	-0.021	0.022	-0.030	0.012	0.072	0.074
Biomedical/Biotechnical (Life Sciences)	0.192	-0.046	0.149	0.019	-0.086	0.013	-0.140	0.046
Business and Financial Services	-0.186	0.152	**-0.284**	0.180	0.069	0.042	**0.379**	0.162
Chemicals and Chemical-Based Products	0.025	0.075	-0.121	0.169	0.312	0.028	0.119	0.076
Defense and Security	-0.028	0.075	0.044	0.073	0.079	0.066	0.070	-0.021
Education and Knowledge Creation	-0.005	-0.108	0.016	-0.053	-0.095	0.026	0.001	-0.028
Energy (Fossil and Renewable)	0.058	-0.076	0.022	-0.016	0.014	-0.011	0.027	**0.245**
Forest and Wood Products	-0.072	0.089	-0.028	0.110	-0.036	0.060	0.006	-0.029
Glass and Ceramics	-0.008	0.046	-0.072	0.077	0.075	0.016	0.073	0.074
Information Technology and Telecommunications	-0.069	0.101	-0.090	0.069	0.141	0.037	0.052	0.133
Mining (Excluding Fossil Fuels)	-0.019	0.015	-0.041	0.056	0.003	-0.038	0.006	0.005
Printing and Publishing	-0.163	0.156	**-0.241**	**0.251**	0.040	0.007	**0.213**	0.056
Transportation and Logistics	-0.048	0.068	-0.073	0.092	0.064	0.025	0.030	0.053
Manufacturing Supercluster	-0.090	0.167	**-0.212**	**0.305**	**0.275**	-0.054	0.171	0.019
Computer and Electronic Product Mfg.	-0.021	0.020	-0.049	0.070	0.136	-0.021	0.037	-0.050
Electrical Equip., Appliance and Component Mfg.	-0.066	0.054	-0.064	0.066	0.043	0.013	0.064	0.019
Fabricated Metal Product Mfg.	-0.089	0.160	-0.184	**0.222**	0.073	-0.022	0.147	0.029
Machinery Mfg.	-0.138	0.178	-0.190	**0.228**	0.124	-0.016	0.165	0.043
Primary Metal Mfg.	0.053	-0.033	-0.032	0.065	**0.203**	-0.067	0.018	0.028
Transportation Equipment Mfg.	-0.062	0.140	-0.114	**0.219**	0.140	-0.010	0.093	-0.011
Rural-Metro Interface: Level E								
Advanced Materials	-0.149	**0.230**	**-0.328**	**0.270**	**0.250**	-0.149	**0.338**	0.002
Agribusiness, Food Processing and Technology	-0.032	-0.039	-0.100	0.044	-0.071	0.070	0.037	-0.028
Apparel and Textiles	-0.041	0.017	-0.019	0.167	0.065	-0.139	-0.033	-0.150
Arts, Entertainment, Recreation and Visitor Industries	-0.026	**-0.220**	**-0.201**	0.049	-0.046	0.106	**0.288**	0.006
Biomedical/Biotechnical (Life Sciences)	**0.529**	**-0.202**	**0.547**	**-0.388**	**-0.208**	0.140	**-0.296**	**0.273**
Business and Financial Services	-0.090	**-0.249**	**-0.202**	0.086	**0.212**	**0.206**	**0.403**	**0.383**
Chemicals and Chemical-Based Products	-0.049	**0.251**	**-0.255**	0.183	**0.215**	-0.126	0.159	-0.101
Defense and Security	0.136	**-0.262**	0.099	-0.052	0.019	0.050	0.005	**0.227**
Education and Knowledge Creation	-0.039	0.109	-0.171	0.093	**0.201**	-0.061	0.096	-0.047
Energy (Fossil and Renewable)	0.071	**-0.235**	0.131	-0.075	0.146	**0.269**	0.080	**0.452**
Forest and Wood Products	-0.065	0.187	-0.079	0.090	0.017	-0.124	0.012	-0.135

Industry Cluster	Unemployment Rate		Poverty		Average wage		Median Household Income	
	2000	% change 2000–04	2000	% change 2000–03	2000	% change 2000–04	2000	% change 2000–03
Glass and Ceramics	-0.037	0.086	-0.168	0.071	0.053	-0.069	0.093	-0.045
Information Technology and Telecommunications	-0.074	-0.107	-0.183	0.156	0.216	0.116	**0.272**	**0.257**
Mining (Excluding Fossil Fuels)	0.059	-0.073	0.139	-0.136	-0.058	0.141	-0.085	**0.215**
Printing and Publishing	-0.165	0.138	**-0.349**	0.194	0.178	0.038	**0.261**	0.025
Transportation and Logistics	0.058	0.062	-0.057	0.100	0.165	0.005	0.000	0.145
Manufacturing Supercluster	-0.141	**0.401**	**-0.343**	**0.464**	**0.266**	**-0.269**	**0.231**	-0.081
Computer and Electronic Product Mfg.	-0.149	0.008	**-0.224**	0.175	0.055	0.014	0.270	-0.018
Electrical Equip., Appliance and Component Mfg.	-0.044	0.163	-0.101	0.132	0.096	-0.187	0.102	-0.176
Fabricated Metal Product Mfg.	-0.150	**0.395**	**-0.315**	**0.434**	0.192	**-0.242**	**0.212**	-0.089
Machinery Mfg.	-0.091	0.184	**-0.254**	**0.299**	0.125	-0.184	0.144	-0.015
Primary Metal Mfg.	0.086	0.154	-0.051	**0.227**	0.151	-0.025	0.022	-0.076
Transportation Equipment Mfg.	-0.147	**0.326**	-0.217	**0.244**	**0.229**	**-0.233**	0.133	0.000
Rural-Metro Interface: Level F								
Advanced Materials	-0.094	0.135	-0.168	0.175	0.181	-0.024	**0.201**	-0.011
Agribusiness, Food Processing and Technology	-0.004	-0.017	-0.013	-0.043	-0.099	0.032	0.058	-0.035
Apparel and Textiles	-0.015	0.179	-0.010	0.147	0.026	-0.034	-0.011	-0.126
Arts, Entertainment, Recreation and Visitor Industries	-0.012	-0.082	-0.141	0.024	-0.029	0.066	0.162	0.086
Biomedical/Biotechnical (Life Sciences)	0.161	-0.102	**0.200**	0.060	0.009	-0.021	-0.147	0.009
Business and Financial Services	-0.103	-0.019	-0.187	0.176	**0.262**	0.082	**0.283**	0.106
Chemicals and Chemical-Based Products	-0.067	0.145	-0.151	**0.210**	0.198	-0.015	0.163	-0.040
Defense and Security	-0.001	-0.033	0.040	-0.030	**0.259**	0.080	0.071	0.095
Education and Knowledge Creation	0.013	0.003	-0.078	0.065	-0.014	-0.090	0.071	-0.056
Energy (Fossil and Renewable)	0.049	-0.110	0.047	-0.069	0.113	0.053	-0.022	0.202
Forest and Wood Products	0.184	-0.074	0.053	0.009	-0.016	-0.035	-0.101	-0.090
Glass and Ceramics	-0.096	0.137	-0.115	0.126	0.120	-0.006	0.136	-0.034
Information Technology and Telecommunications	-0.113	-0.015	-0.159	0.149	0.251	0.057	**0.254**	0.121
Mining (Excluding Fossil Fuels)	0.004	-0.007	-0.021	-0.018	-0.020	-0.054	0.019	-0.037
Printing and Publishing	-0.133	0.134	**-0.233**	**0.208**	0.072	0.042	**0.233**	0.039
Transportation and Logistics	-0.009	0.027	-0.100	0.160	0.115	-0.033	0.080	0.002
Manufacturing Supercluster	-0.181	**0.271**	**-0.330**	**0.372**	**0.236**	-0.042	0.341	-0.017
Computer and Electronic Product Mfg.	-0.079	0.059	-0.139	0.138	0.076	0.031	0.186	-0.022
Electrical Equip., Appliance and Component Mfg.	-0.049	0.113	-0.082	0.133	0.071	-0.001	0.116	-0.018
Fabricated Metal Product Mfg.	-0.136	**0.221**	**-0.245**	**0.248**	0.160	-0.058	**0.245**	-0.017
Machinery Mfg.	-0.152	0.163	**-0.247**	**0.237**	0.113	-0.002	0.234	0.016
Primary Metal Mfg.	-0.020	0.100	-0.066	0.115	0.123	-0.014	0.070	-0.028
Transportation Equipment Mfg.	-0.086	0.142	-0.169	**0.224**	0.152	-0.030	0.180	-0.010
Rural Sphere: Level G								
Advanced Materials	0.012	0.104	-0.119	0.167	0.147	-0.046	0.116	-0.022

Industry Cluster	Unemployment Rate		Poverty		Average wage		Median Household Income	
	2000	% change 2000–04	2000	% change 2000–03	2000	% change 2000–04	2000	% change 2000–03
Agribusiness, Food Processing and Technology	-0.167	0.065	-0.056	-0.013	-0.133	0.033	0.098	-0.162
Apparel and Textiles	0.028	-0.011	-0.002	0.072	0.011	0.011	-0.015	-0.002
Arts, Entertainment, Recreation and Visitor Industries	0.021	-0.049	-0.140	0.078	0.108	-0.001	**0.293**	-0.014
Biomedical/Biotechnical (Life Sciences)	**0.296**	-0.071	**0.287**	0.076	0.086	-0.027	**-0.209**	0.091
Business and Financial Services	-0.081	0.060	**-0.215**	**0.364**	**0.274**	-0.016	**0.352**	0.024
Chemicals and Chemical-Based Products	-0.030	0.106	-0.119	0.188	**0.211**	0.003	0.133	0.027
Defense and Security	0.189	-0.112	0.199	-0.023	0.094	0.059	-0.091	0.092
Education and Knowledge Creation	-0.003	-0.015	0.011	-0.023	-0.065	0.022	-0.021	-0.011
Energy (Fossil and Renewable)	0.034	-0.116	0.062	0.059	0.145	0.120	0.015	0.172
Forest and Wood Products	**0.207**	-0.042	0.065	0.084	0.070	-0.061	-0.096	0.005
Glass and Ceramics	-0.026	0.042	-0.090	0.112	0.114	-0.024	0.100	0.004
Information Technology and Telecommunications	-0.041	0.024	-0.159	**0.261**	**0.251**	-0.036	**0.261**	0.027
Mining (Excluding Fossil Fuels)	0.037	-0.072	-0.032	0.031	0.126	-0.013	0.108	-0.014
Printing and Publishing	-0.080	0.083	-0.183	**0.232**	**0.223**	-0.011	**0.280**	0.041
Transportation and Logistics	0.000	-0.013	-0.060	0.190	0.168	-0.016	0.076	0.036
Manufacturing Supercluster	-0.029	0.124	-0.189	**0.244**	**0.232**	-0.057	0.171	-0.028
Computer and Electronic Product Mfg.	-0.057	0.049	-0.070	0.097	0.043	-0.029	0.079	-0.023
Electrical Equip., Appliance and Component Mfg.	0.039	-0.007	-0.046	0.129	0.096	-0.015	0.058	-0.021
Fabricated Metal Product Mfg.	0.019	0.054	-0.103	0.167	0.161	-0.036	0.085	-0.026
Machinery Mfg.	-0.062	0.120	-0.141	0.133	0.163	-0.016	0.130	-0.023
Primary Metal Mfg.	0.028	0.024	-0.044	0.099	0.075	-0.067	0.045	-0.002
Transportation Equipment Mfg.	-0.012	0.048	-0.085	0.102	0.075	-0.038	0.076	0.008

Note: Correlations greater than 0.2 and smaller than -0.2 in bold.
Source: Department of Agricultural Economics, Purdue University

3.6. Economic Growth Trajectories

Understanding the underlying causes of regional disparities is very important. Even small differences in growth rates may, if persistent over long periods of time, lead to ever-increasing inequalities across the country. For example, if growth rates in rural areas are consistently below their urban counterparts, one may see an increasing divide between rural and urban regions, with rural populations experiencing a lower standard of living than people in urban areas. Thus, in this last section of the nationwide analysis, the research team pulled together several strands discussed separately in the previous sections to get a better sense of the future economic growth of U.S. counties. Specifically, the research team addressed whether economic growth is influenced by the dominance of different industry clusters and by the degree of rurality. In addition, the team also controlled for the impact of human capital on economic growth, which serves as a broad proxy for innovation potential.

The research team operationalized economic growth by the ratio of per capita income in 2003 over per capita income in 2000, [28] and related it to the initial per capita income in 2000, the Index of Relative Rurality, industry mix, and human capital. Industry mix is measured by employment shares of four industry clusters: the business and financial services cluster, the information technology and telecommunications cluster, the agribusiness, food processing and technology cluster, and the manufacturing supercluster.[29] Human capital is measured with two variables capturing the extremes of the educational attainment scale, that is, the percent of the adult population (age 25 and older) that holds at least a bachelor's degree and the percent of the adult population without a high school diploma. [30] The models are estimated for 3,054 counties[31] and the estimation results are summarized in **Table 17**.[32]

Table 17. Estimates for Models of Per Capita Income Growth, U.S. Counties, 2000-2003

Variables	Model 1		Model 2		Model 3		Model 4	
	Parameter	*t*	Parameter	*t*	Parameter	*t*	Parameter	*t*
Intercept	**1.1056**	24.443	**1.0919**	20.689	**1.0746**	17.892	**1.5890**	22.035
Per Capita Income	**-0.1023**	-22.667	**-0.1008**	-18.767	**-0.1000**	-17.553	**-0.1542**	-21.943
Index of Relative Rurality			0.0013	0.504	-0.0048	-1.379	**-0.0072**	-2.024
Employment Share in Business and Financial Services					0.0027	1.570	-0.0003	-0.192
Employment Share in Information Technology and Telecommunications					0.0003	-0.526	**-0.0013**	-2.117
Employment Share in Agribusiness, Food Processing and Technology					**0.0030**	3.838	**0.0031**	3.971
Employment Share in Manufacturing Supercluster					**-0.0060**	-7.128	**-0.0041**	-4.839
% Adults with Bachelor's Degree							**0.0029**	8.498
% Adults without High School Degree							**-0.0007**	-3.859
df	3,052		3,051		3,047		3,045	
Adj. R^2	0.144		0.144		0.161		0.203	
λ	3.598		3.543		3.512		5.582	

Note: Significant (α = .05) parameter estimates in bold.
Source: Department of Agricultural Economics, Purdue University

[28] In convergence models, both the dependent and independent variables are expressed as logarithms.

[29] Since several clusters are co-locating, controlling for the employment shares of all (but one) industry cluster causes excessive multicollinearity. Two main reasons guided the selection of industry clusters for the estimated regressions models. First, the industry clusters selected here make up a good deal of total employment. Second, they represent the urban-oriented clusters (business and financial services and information technology and telecommunications), the group of co-locating clusters including manufacturing, advanced materials, and chemicals and chemical-based products, and the group of less-urban oriented industry clusters dominated by the agribusiness, food processing and technology cluster.

[30] Operationalizing innovation potential is a challenge. Our avenue of approaching it via human capital is but one approach. The research team experimented with alternative measures of educational attainment levels, such as the percentage of the adult population with at least a master's degree and the percentage of the population with at least some college education. However, these alternative operationalizations did not affect the results. More refined measures of educational attainment, such as degrees awarded in sciences and engineering, could be explored. However, these data are not available for workers by county, and data on degrees awarded by school do not reveal where those graduates are working. Further research on effective county-level measures of innovation and human capital is suggested in Section 5.4.

[31] Because of some missing data, the regressions use only n = 3,054 instead of the full set of 3,108 counties used in the rest of the nationwide analysis.

[32] Due to data suppression problems, the estimation results for Models 3 and 4 are tentative.

The unconditional growth model (Model 1) suggests overall convergence of per capita income across U.S. counties, at a convergence rate of about 3.6 percent per year. That is, counties that have a low per capita income grow at a faster rate than counties that have a high per capita income. In the end, if these trends continue, per capita income differences across U.S. counties will disappear. Adding information about counties' rurality (Model 2) does not change this conclusion.

In Model 3, the research team also added the industry mix as a possible source for variations in growth rates. The estimation suggests that employment shares in the two urban industry clusters—business and financial services and information technology and communication—do not influence growth rate. However, high employment shares in the agribusiness, food processing and technology cluster significantly increase the per capita growth rate, while high employment shares in the manufacturing supercluster significantly decrease the growth rate.

Model 4 conditions growth rates on information about human capital. The results indicate that human capital is a primary factor influencing income growth. Other things equal, a county with a high percent of adults with at least a bachelor's degree will have a higher growth rate than a county with a low percent of college graduates. The opposite holds true for the percent of adults not having completed high school. Note that, once human capital is taken into account, the degree of rurality also plays a role: the higher the degree of rurality, the lower the growth of per capita income.

Model 4 can account for 20 percent of the variance in the per capita income growth. Thus, other variables may also play a role in explaining per capita income growth, or the included explanatory variables play out differently in different settings. For example, the previous sections showed that economic performance, rurality, and industry mix may play out differently at different levels of the rural-metropolitan landscape. To account for these different nuances, Model 4 was re-estimated for each of the seven rural-metropolitan levels. The results are shown in **Table 18**.

Table 18. Estimates for Models of Per Capita Income Growth by Rural-Metropolitan Level, 2000-2003

Variables	*Metropolitan Sphere*					
	Level A		Level B		Level C	
	Parameter	*t*	Parameter	*t*	Parameter	*t*
Intercept	**0.8674**	2.017	**1.2594**	6.617	**1.4058**	7.144
Per Capita Income	**-0.0818**	-2.086	**-0.1173**	-6.504	**-0.1253**	-6.572
Index of Relative Rurality	-0.0037	-0.340	-0.0121	-1.010	**-0.0233**	-2.852
Employment Share in Business and Financial Services	**0.0457**	2.347	0.0071	0.974	**0.0295**	4.344
Employment Share in Information Technology and Telecommunications	**-0.0505**	-3.930	-0.0006	0.185	-0.0056	-1.772
Employment Share in Agribusiness, Food Processing and Technology	-0.0057	-0.670	-0.0007	-0.337	-0.0048	-1.599
Employment Share in Manufacturing Supercluster	-0.0049	-0.599	**-0.0092**	-3.896	**-0.0056**	-2.023
% Adults with Bachelor's Degree	-0.0009	-0.496	0.0003	-0.325	**-0.0028**	-3.073
% Adults without High School Degree	-0.0016	-1.411	-0.0007	-1.382	**-0.0015**	-2.338
df	54		278		295	
Adj. R^2	0.416		0.209		0.330	
λ	2.844		4.159		4.462	

Variables	*Rural-Metropolitan Interface*						*Rural Sphere*	
	Level D		Level E		Level F		Level G	
	Parameter	*t*	Parameter	*t*	Parameter	*t*	Parameter	*t*
Intercept	**1.2269**	6.111	**0.7807**	2.677	**1.3265**	8.732	**1.8275**	13.326
Per Capita Income	**-0.1240**	-6.363	**-0.0702**	-2.410	**-0.1333**	-9.150	**-0.1700**	-12.947
Index of Relative Rurality	-0.0362	-1.837	-0.0413	-0.627	-0.0007	-0.058	**0.0508**	3.519
Employment Share in Business and Financial Services	-0.0043	-1.141	0.0108	1.132	-0.0012	-0.407	0.0006	0.176
Employment Share in Information Technology and Telecommunications	0.0001	0.112	0.0050	1.289	**-0.0020**	-2.094	0.0019	1.471
Employment Share in Agribusiness, Food Processing and Technology	0.0022	1.211	0.0029	0.858	**0.0032**	2.577	**0.0038**	2.515
Employment Share in Manufacturing Supercluster	-0.0021	-1.081	-0.0053	-1.607	0.0007	0.485	**-0.0048**	-2.477
% Adults with Bachelor's Degree	**0.0027**	2.699	-0.0001	-0.091	**0.0060**	8.368	**0.0025**	3.665
% Adults without High School Degree	0.0006	1.363	0.0008	1.130	**0.0009**	3.169	**-0.0013**	-3.911
df	386		90		931		957	
Adj. R^2	0.153		0.175		0.163		0.202	
λ	4.413		2.426		4.768		6.211	

Note: Significant (α = .05) parameter estimates in bold.
Source: Department of Agricultural Economics, Purdue University

Our findings suggest that, at each rural-metropolitan level, economic convergence persists. That is, counties with low per capita income grow at a faster rate than counties with a high per capita income. However, the speed of convergence differs across the seven levels and is fastest within the rural sphere (level G), followed by the most rural counties of the rural-metropolitan interface (level F). The estimated convergence speed is slowest among the non-metropolitan counties that are neighboring a metro area (level E).

Additionally, the explanatory variables operate differently at each rural-metropolitan level. The degree of rurality has a significant impact at only two levels. Among level-C counties (i.e., those with suburban character located within a metropolitan area), increased degrees of rurality are associated with lower growth rates of per capita income. In contrast, among the rural level-G counties, increased rurality has an advantageous effect on the per capita income growth rate.

For level-A and level-C counties of the metropolitan sphere, the effects of the employment share variables are interesting in that they suggest opposite effects on income growth for the co-locating business and financial services cluster and the information technology and communication cluster. Increasing the employment share of the business and financial services cluster has a positive impact on income growth. The opposite is true for the (co-locating) information technology and communication cluster. Moreover, the employment share in business and financial services does not have an impact on per capita income growth in the counties of the rural-metropolitan interface or the rural sphere. For the co-locating information technology and telecommunication cluster, we observe an adversarial impact on per capita income growth in the level-F counties of the rural-metropolitan interface.

Employment shares in the agribusiness, food processing and technology cluster are only influential for the most rural counties (levels F and G) where high shares positively influence income growth. Manufacturing employment shares negatively influence per capita income growth, but the effect is

only significant for level-B and level-C counties in metropolitan sphere, as well as in level-G counties in the rural sphere.

The effects of the human capital variables on income growth are puzzling. For rural counties—whether within (level D), adjacent to (level F), or remotely located (level G) from a metropolitan area—the percentage of college graduates has a strong and positive effect on income growth. Surprisingly, however, it has no effect or even a negative effect in counties with low degrees of rurality. The percentage of poorly educated residents (no high school degree) has the expected negative effect on per capita income growth among level-C and level-G counties. Somewhat counterintuitive, however, the percentage of adults without a high school degree positively influences per capita income growth in rural counties neighboring metropolitan areas (level-F counties).

3.7. Summary and Conclusions

A focus on industrial clusters, marked by their constituent industries being located in close geographic proximity to each other and engaging in similar or related economic activities, increasingly dominates the discussion on regional development and economic specialization (Porter 1990, 2001, 2003; Sweeney and Feser 1998; Feser 2004, Cortright 2006). Not surprisingly, regional development strategies are increasingly geared toward capitalizing on the competitive advantages of their strongest industry clusters. Providing a nationwide analysis of industry clusters shifts away from the more idiosyncratic exploration of particular clusters in particular regions toward a comparison of industry clusters across space.

The nationwide analysis conducted as part of this research project provides a detailed exploration of the locational patterns of industry clusters across the continental United States, the linkages among the key constructs of rurality, industry clusters, and economic performance, and the contribution of rurality and industry clusters to the future growth trajectory of U.S. counties. The exploration is based on a set of cluster definitions consistent with previous research (in particular, Porter and Feser) and Indiana experience, as well as a new approach to assessing rurality and delineating the rural-metropolitan interface. The results of the nationwide analysis can be summarized in the following key points:

- Locational patterns of the 17 industry clusters are quite distinct. By and large, the patterns follow our broad understanding of regional variations in economic activity, such as the manufacturing specialization in the Midwest, the concentration of the textile industry in the southeast, or the agglomeration of business and financial services in urban centers. Over the three-year period from 2001 to 2004, the locational patterns of the industry clusters barely changed.

- Labeling U.S. regions by a single economic activity[33] is too simplistic and does not do justice to the frequently encountered co-location of economic activities. This co-location creates what could be labeled "diversified specialization."

[33] Labeling counties by a single economic activity (dependence) is, for example, at the core of the 2004 county typology of USDA's Economic Research Service (http://www.ers.usda.gov/Briefing/Rurality/Typology/).

- The locational patterns of industry clusters vary in the degree to which they concentrate throughout the continental United States. They also differ in the degree to which they seek proximity at a regional scale. For a range of industry clusters, the distances between counties of the same specialization are short, indicating that specialization is quite localized. In fact, the most compact areas of specialization are found for the forest and wood products cluster, whereas a large spatial extent of specialization is typical for industrial clusters that locate in metropolitan core counties at the top of the urban hierarchy, such as the business and financial services cluster. Large spatial extents of specialization are made possible by a combination of (a) the metropolitan core counties providing the critical mass necessary to specialize and (b) the type of economic activity is not obstructed by physical distance.

- Variations in the spatial extent of industry clusters suggest that regional development policies need to be flexible. A rigid definition of a region may be ill-suited for some of the region's industry clusters, as their economic activities can extend well beyond the region's boundaries. Thus, regional development needs a flexible approach that fosters alliance with different sets of counties determined by the spatial extent of its industry clusters.

- The industry clusters differ in the degree to which they are biased toward urban locations. Four of the 17 industry clusters, namely the business and financial services cluster, the biomed/biotech cluster, the information technology and telecommunications cluster, and the printing and publishing cluster, are urban-oriented. Three industry clusters—the agribusiness, food processing and technology cluster, the mining cluster, and the forest and wood products cluster—are likely to be found in both rural and urban settings but are absent from the very urban counties.

- The linkage between industry specialization and economic performance is quite intricate and varies by degree of rurality. For example, within the metropolitan sphere, specialization in the business and financial services, information technology and telecommunications, and printing and publishing clusters lowers the unemployment rate, whereas specialization in the agribusiness, food processing and technology cluster is associated with high unemployment. In the more rural settings, specialization in the biomed/biotech cluster, as well as the forest and wood products cluster, are linked to high unemployment. The research team also found that outside the metropolitan sphere, relationships between industry specialization and wages are weak.

- The future growth trajectory of U.S. counties will be marked by declining disparities. In general, lagging counties will grow at a faster rate than counties already enjoying a higher economic standard. The impact of industry mix, rurality, and human capital on economic growth differs across the rural-metropolitan landscape.

    - Within the rural sphere, counties with the most extreme rurality tend to grow slower, and so do counties specializing in manufacturing. It is important to note that economic growth in rural counties is positively influenced by human capital.

    - Within the metropolitan sphere, industry mix has an important impact on growth rates, with specialization in business and financial services increasing growth rates,

and specialization in information technology and communication decreasing growth rates.

- At the rural-metropolitan interface—defined as the rural counties of metropolitan areas and the non-metropolitan counties adjacent to metropolitan areas—neither the industry mix nor the degree of rurality play a pivotal role for economic growth. However, just as in the rural sphere, economic growth in the rural counties of the rural-metropolitan interface is heavily influenced by human capital, reinforcing once again the need for rural counties to invest in the education of its population.

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4. Project 2: Applying Cluster Insights in a Rural Region

4.1. Introduction: Indiana's Economic Growth Region 8

This chapter reviews Project 2, which aimed to develop a regional economic growth strategy based on business and industry clusters to be overseen by a group of regional representatives.

For this pilot strategy, the research team chose Indiana's Economic Growth Region 8 (EGR 8), which is made up of Brown, Daviess, Greene, Lawrence, Martin, Monroe, Orange, and Owen counties (see **Figure 18**).

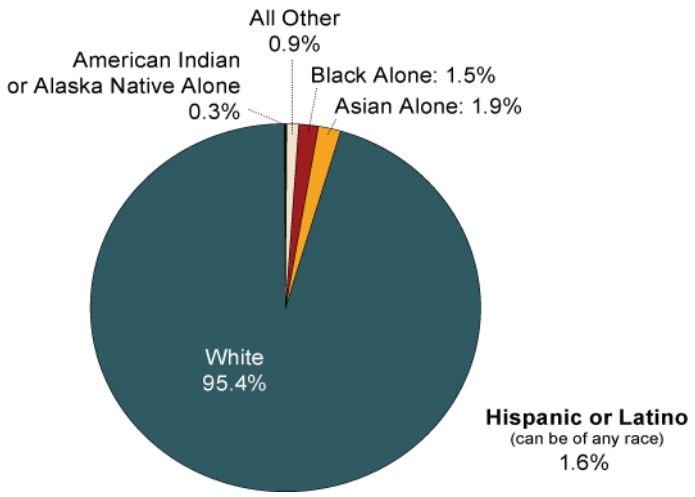
Figure 18. Counties in Economic Growth Region 8

Source: Indiana Business Research Center

Indiana Economic Growth Region 8 is a primarily rural region, although Indiana's 10th most populous city, Bloomington, is located in Monroe County. Aside from Monroe County, with a population of 121,407, most of the region's counties have relatively small populations, ranging from Martin County, with a population of 10,386, to Lawrence County, with a population of 46,403 in 2005.

Indeed, despite the fact that four of the counties are classified as part of a metropolitan statistical area, all of the counties except Monroe have a high degree of rurality. Using the rural-metropolitan levels discussed in Section 3.2.3, Monroe County alone falls into the metro sphere, while only Daviess County is within the rural sphere. The remaining six counties are part of the rural-metro interface, meaning they have high degrees of rurality, but are either within (Brown, Greene, and Owen) or adjacent to (Lawrence, Orange, and Martin) a metropolitan statistical area.

Figure 19. Ethnic Composition of EGR 8, 2004



Source: IBRC, using Census Bureau population estimates

The regional population is not particularly heterogeneous (see **Figure 19**), and would be even less so were it not for the presence of Indiana University's Bloomington campus. However, a lack of racial/ethnic diversity is characteristic of many of Indiana's regions and counties.

The rate of population increase in EGR 8 has been slow but steady, although population in the more rural counties of the region is projected to grow very little between 2005 and 2010 (see **Table 19**). In fact, four rural counties (Martin, Daviess, Greene and Lawrence) are projected to decline by 0.4 percent to 1.3 percent between 2005 and 2010.

Table 19. Population Change in Indiana, EGR 8, and its High and Low Rurality Index Counties

Population Over Time	EGR 8 Total	1 Low Rurality Index County	Percent of Total	7 High Rurality Index Counties	Percent of Total	Indiana
1990	269,896	108,978	40%	160,918	60%	5,544,156
2005 (Estimated)	299,888	121,407	40%	178,481	60%	6,271,973
2010 (Projected)	313,637	132,940	42%	180,697	58%	6,417,198
Percent Change 1990 to 2000	9.6%	10.6%	n/a	8.9%	n/a	9.7%
Percent Change 2005 to 2010	4.6%	9.5%	n/a	1.2%	n/a	2.3%

Counties with a Low Rurality Index: Monroe
Counties with a High Rurality Index: Brown, Greene, Owen, Daviess, Lawrence, Martin, Orange
Source: PCRD, using Census Bureau data provided by the IBRC

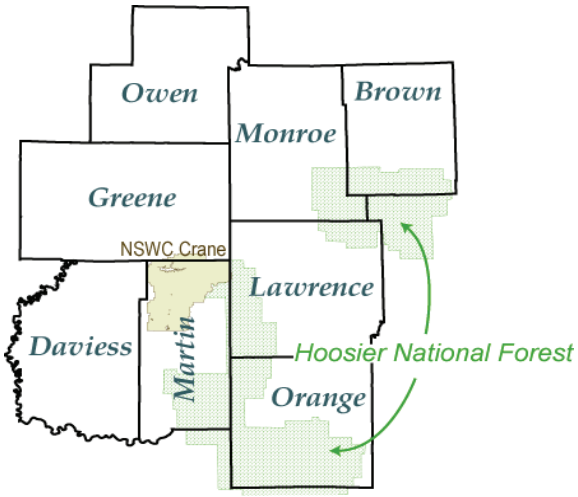
Much of the EGR 8 region has a hilly, rolling topography. A large portion of the area is heavily forested and has considerable state park and federal forest land. The western side of the region has large sections of broad, rich farmland. In Monroe and Lawrence counties, there are considerable

deposits of Oolitic limestone, which, since the 1920s, have served as building and decorative material for some of the nation's most prestigious structures, including the Empire State Building and the National Cathedral. Lawrence County bills itself as the "Limestone Capital of the World," and has a little town named Oolitic. Daviess County has significant deposits of natural gas, which is marketed commercially. Martin County has substantial amounts of natural gypsum, and there are two large gypsum mining and processing companies located there.

The forests and hills of the region have given rise to an historic arts colony. In the late 19th century, American painters found the forests, hills, and mists of Monroe and Brown counties ideal subjects for their landscape art works. The town of Nashville in Brown County developed into a significant artists' enclave, and today it remains the home of a wide variety of nationally known artists and craftspeople. Nashville and nearby Brown County State Park draw tourists from across the country.

Bloomington is home to Indiana University's largest campus. With more than 38,000 students, the university has many schools and programs with international reputations. Among these are the Jacobs School of Music, the Kelley School of Business, and the Kinsey Institute for Research in Sex, Gender, and Reproduction. Monroe County is also a tourism draw for the Hoosier National Forest and Lake Monroe, an artificial lake that is the largest in the state. The Hoosier National Forest ranges through several of EGR 8's counties (see **Figure 20**).

Figure 20. Hoosier National Forest in EGR 8



Source: Indiana Business Research Center

Orange County served as a major tourism destination in the late 19th and early 20th centuries. Historically, the towns of West Baden and French Lick with their mineral springs have served as a Midwestern resort destination. Major recent development in Springs Valley, as the area is known, has restored the past grandeur of two resort hotels and built a new destination casino that opened in late 2006.

Martin County is home of Indiana's naval base, NSWC Crane. Covering nearly 100 square miles, this hub of high-tech military systems development is the second largest employer in EGR 8. Crane's wealth of technology has prompted three EGR 8 counties to partner in creating a technology park that will serve businesses that are working with Crane technology.

There is a large Amish population in EGR 8, centered in Daviess County. In addition to providing farm goods, the Amish serve as a tourism draw and provide a workforce for many small and midsize businesses.

EGR 8 has a number of large employers. In some of the smaller counties the local hospital or school system may be the largest employer locally. The region's best-known employers include:

- Baxter (Pharmaceuticals)
- Bloomington Hospital
- Boston Scientific (Medical Devices)
- Cook, Inc. (Medical Devices)
- Cook Urological (Medical Devices)
- Internal Medicine Associates (Healthcare)
- Cook Pharmica (Pharmaceuticals)
- French Lick Springs Resort
- General Electric (Consumer Appliances)
- General Motors (Automotive Supplier)
- GPC (Corn-Based Products)
- Indiana University–Bloomington
- Lehigh Cement
- National Gypsum
- NSWC Crane (U.S. Naval Base)
- Visteon (Automotive Supplier)

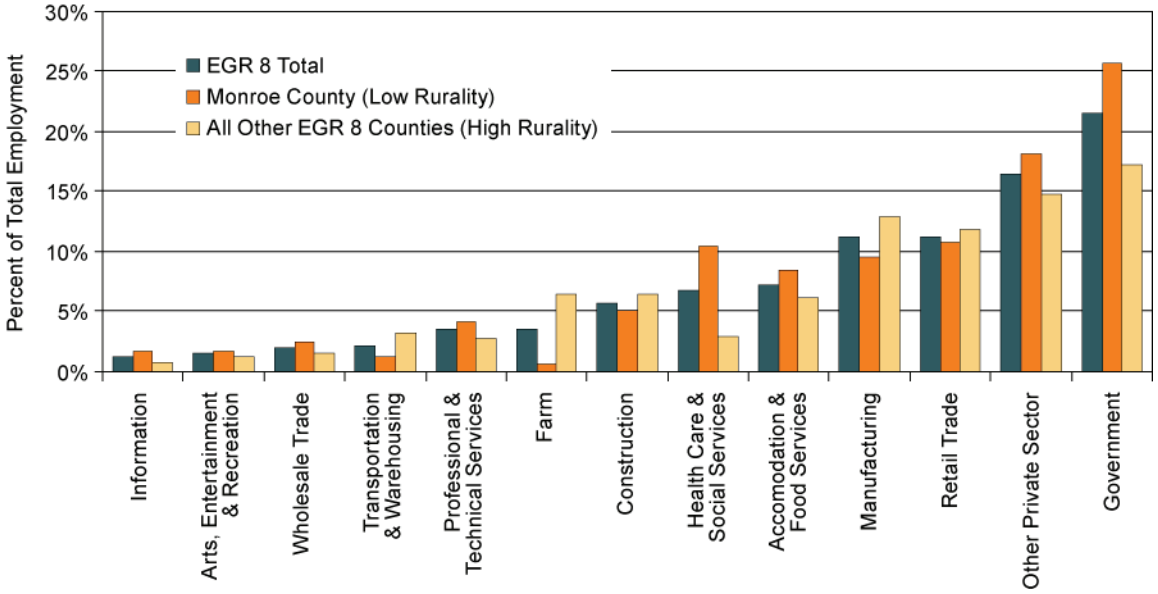
The area has a wealth of tourism attractions, some of which have already been listed. Following are some of the many visitor destinations in EGR 8:

- Brown County State Park
- McCormick's Creek State Park
- Shakamak State Park
- Spring Mill State Park
- Hoosier National Forest
- Martin State Forest
- Morgan-Monroe State Forest
- Pioneer Mothers' Memorial Forest
- Goose Pond
- Lake Monroe
- Patoka Lake
- Extensive system of caves
- French Lick Resort
- Nashville Artist Colony
- Amish Culture
- Springs Valley Casino (opened in November 2006)
- Indiana University cultural, entertainment, and sporting events

One of the hypotheses being tested in this research project is that rural counties differ in their cluster structure from more urban counties. Intuitively, the answer would seem to be yes. Data analysis for the pilot region seems to confirm this assumption.

Before addressing the cluster approach, **Figure 21** and **Figure 22** provide a snapshot of the overall economy of EGR 8 using traditional economic sectors. This comparison shows quite a marked difference between Monroe County and the seven rural counties. **Figure 21** shows that the more rural counties of EGR 8 have a greater share of their jobs in farm employment, transportation and warehousing, construction and manufacturing than does Monroe County.

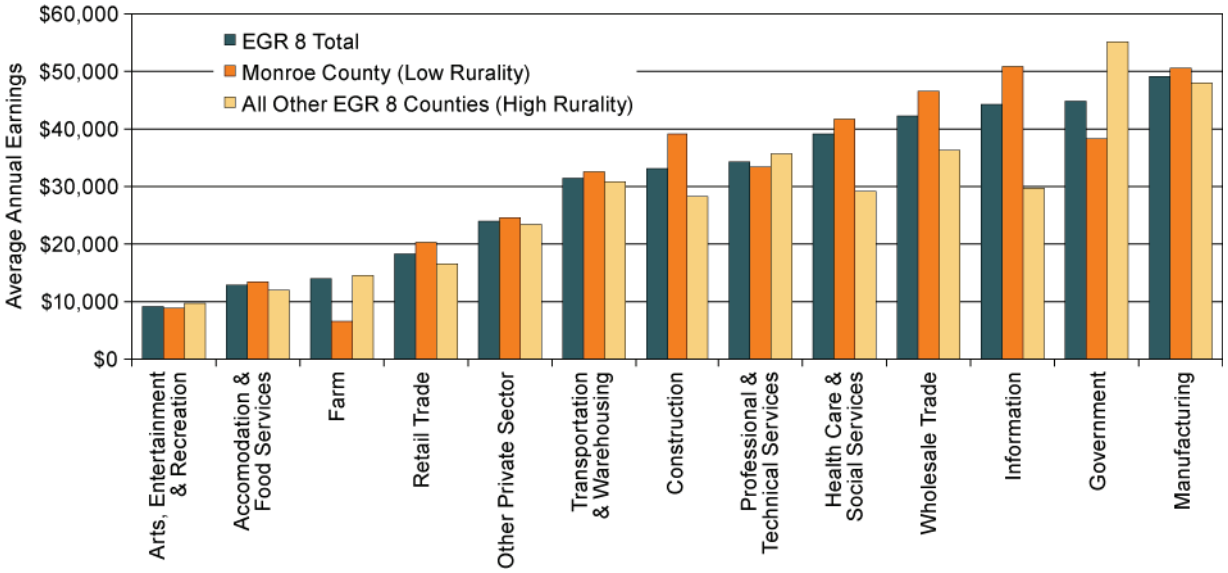
Figure 21. Economic Sector Structure of EGR 8, 2004



Source: PCRD, using BEA data provided by the IBRC

It is also commonly assumed that counties that are more rural provide lower-paying jobs than more urbanized counties. **Figure 22** shows the distribution of average earnings per job for the entire EGR 8 area, plus Monroe and the seven rural counties. In EGR 8, the seven rural counties have lower pay per job overall; however, they enjoy higher average wages in arts, farming, professional and technical services, and government.

Figure 22. Distribution of Average Earnings per Job by Major Sector and Category in EGR 8, 2004



Source: PCRD, using BEA data provided by the IBRC

4.1.1. Methodology

The goals of Project 2 were:

1. To apply the database and findings developed in Project 1 to a particular pilot region in Indiana
2. To supplement these secondary data with additional local knowledge
3. To mobilize local stakeholders in a planning process that is grounded in both secondary data analysis and localized primary data.

The research team designed Project 2 to create and document a process that could serve as a prototype for rural regional development planning and action throughout the country.

The team brought a combination of regional planning strategies and business cluster-based concepts to this project. The methodology was one that should be replicable throughout the United States. The main elements of this approach were:

- Assembling a subset of the research team to provide ongoing analysis, facilitation, and communication with local stakeholders and an advisory group. This group is the "planning team."

- Identifying and establishing a geographically balanced group of regional representatives to oversee the new strategy and serve as the steering committee for the plan. This group is the Regional Advisory Committee (RAC).

- Educating and enabling the RAC to use the data that had emerged from Project 1 to help create a realistic strategy.

- Generating awareness of the planning process and its goals.

- Meeting with local stakeholders, including local elected officials.
- Ensuring awareness, buy-in and support for the project, the planning process, and its goals by key regional elected officials and the community at large through media releases, flyers, and meetings.
- Creating a planning process that was inclusive and transparent.
- Providing multiple points of input to the planning process from regional workers and residents.
- Providing complete meeting logistics services for all participants.
- Providing written agendas, written meeting summaries, and other information to the regional representative group.
- Gathering additional data via individual interviews, focus group discussions, an online business executive survey, a Web-based input site, and public meetings.
- Preparing the necessary information for the RAC.
- Facilitating RAC planning sessions.
- Preparing written planning session summaries.
- Prioritizing an initial set of business clusters to activate.

The Planning Team

In order to fully test the results of cluster analysis resulting from Project 1, the research team created a subset of facilitators and analysts to shepherd the planning process. The Project 2 planning team included:

- Christine Nolan (PCRD)
- Jerry Conover (IBRC)
- Carol Rogers (IBRC)
- Indraneel Kumar (PCRD)
- Thayr Richey (SDG)
- Brian O'Neill (SDG)
- Joe Pearson (PCRD)
- Matt Kinghorn (SDG)
- January Jones (SDG)
- Margaret Lee (SDG)

The Purdue Center for Regional Development's senior planner served as team leader for Project 2. Various members of the research team worked on this project, with the IBRC contributing data, overseeing a survey of regional businesses, and assisting with meetings. PCRD analyzed data and prepared charts and maps. Strategic Development Group, Inc. handled meeting logistics, facilitation and regional communications, and led the planning process. The project also received

significant support and leadership from the offices of Indiana Governor Mitch Daniels and Lt. Governor Becky Skillman.

The planning team understood from the beginning that the planning process would have a tight time frame. Because Project 2 could not begin until much of the work from Project 1 was completed, the specific regional planning aspect had only three months within which to complete an initial strategy. This was a particularly short time for a process that would require the regional steering committee to use new data concepts and tools for creating the first economic development strategy for this set of counties.

The Regional Advisory Committee

The planning team assembled the RAC to oversee the planning process for Project 2. The RAC had 25 members from across EGR 8 identified through interviews with local elected officials, economic development professionals, and other community leaders. The goal was to have a committee that broadly represented EGR 8.

Each county's lead economic development official served on the committee, as well as eight members of the Purdue Cooperative Extension Service from counties in the region. In addition, representatives from business, government, regional planning organizations, and the nonprofit sector fleshed out the RAC. A list of RAC members and other local leaders from EGR 8 is listed in **Appendix II**.

Additional Data Collection and Analysis

Before the commencement of the RAC meetings, the planning team collected and analyzed primary and secondary data from the region. These data helped provide a context in which to understand more fully the results of the growth business cluster research. The team used several approaches to collect the data: interviews, focus group discussions, and review of published data sources.

The team collected and analyzed local economic development plans, county cooperative extension service plans, and regional plans from the two regional plan commissions that cover parts of EGR 8. In addition, the team reviewed regional economic assets and prepared a list of those assets for the RAC to use. An unusual asset was the naval base, NSWC Crane, which is located entirely within EGR 8. This base employs approximately 4,000 military personnel, federal civilian employees and contractors and handles a wide range of operations. A partial list of Crane's extensive departments and programs appears in **Appendix II**.

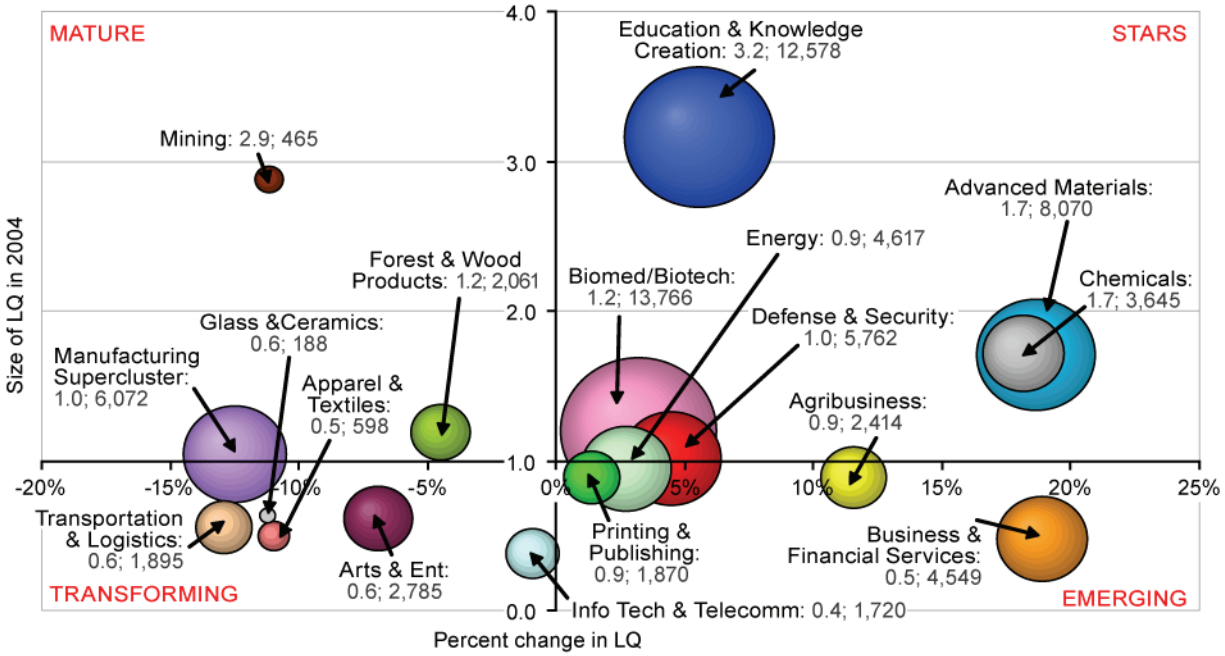
4.2. EGR 8 Cluster Analysis

The research team identified 17 business clusters for study in Project 1 and then looked for their presence in EGR 8 in Project 2. The clusters were evaluated initially in the following manner:

- Number of employees
- Number of establishments
- Location quotient in 2004
- Change in location quotient, 2001-2004

Figure 23 illustrates the 17 clusters' employment size, LQ and change in LQ.

Figure 23. EGR 8 Cluster Size, Location Quotients and Percent Change in LQ, 2001-2004



Note: The first value under or next to the cluster name is the value of the LQ for that particular cluster; the second number is the number of employees in the cluster in 2004.
Source: PCRD, using BLS-CEW data provided by the IBRC

The EGR 8 cluster with the highest location quotient (LQ) in 2004 was education and knowledge creation at 3.2. Note that the cluster does not contain elementary schools in this part of the analysis (please refer to page 29). Additional clusters with high LQs in the region include advanced materials (1.7), chemicals (1.7), and biomedical/biotechnical (1.2). All four of these clusters also had positive location quotient changes indicating increased specialization from 2001 through 2004.

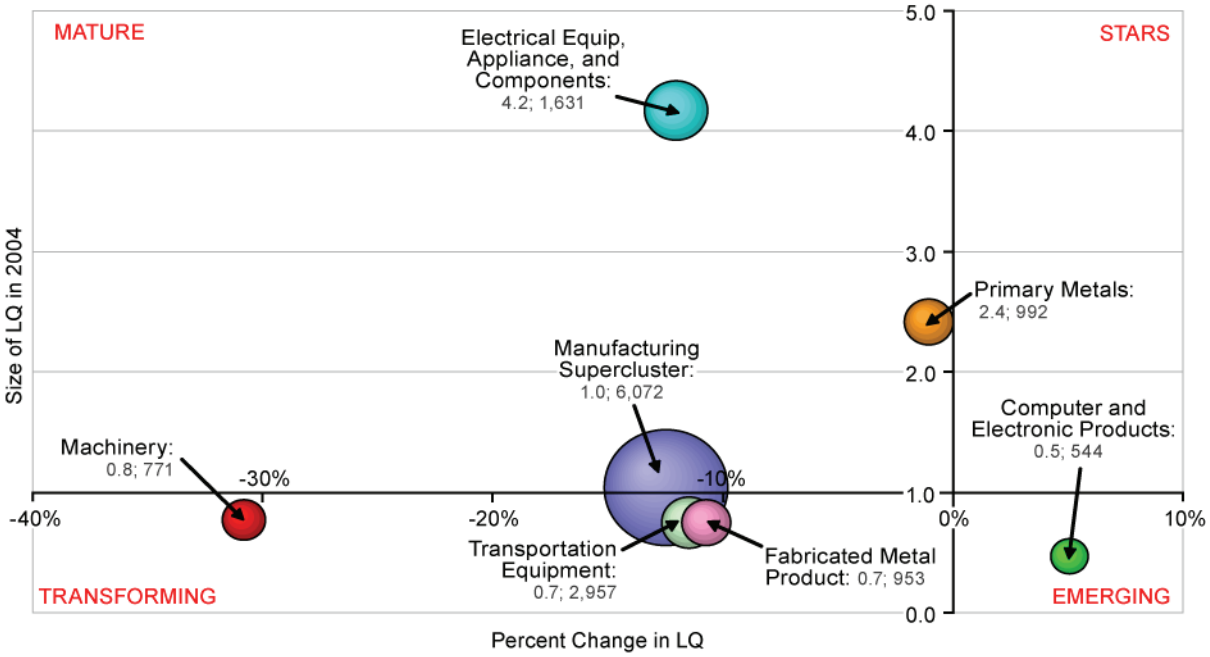
Other clusters also had LQs with increasing specialization from 2001 to 2004. However, these clusters had an LQ below 1.2. These included defense and security (1.0), energy (0.9), agribusiness, food processing and technology (0.9), printing and publishing (0.9), and business and financial services (0.5).

Two clusters had a relatively high LQ but a decrease in specialization during the period. These clusters included forest and wood products (1.2) and mining (2.9).

A number of clusters had relatively low LQs and also showed a decrease in specialization. These clusters included arts and entertainment (0.6), apparel and textiles (0.5), transportation and logistics (0.6), glass and ceramics (0.6), the manufacturing supercluster (1.0), and information technology and telecommunications (0.4).

The position of the manufacturing supercluster (declining specialization relative to the nation) in EGR 8 may come as a surprise to some. Indiana is often thought of as a manufacturing state (although, as this research has shown, the economy of Indiana is fast approaching the diversity to be found at the national level). Location quotient analysis of the six major subclusters in the manufacturing supercluster gives a better insight into what is really happening in terms of manufacturing in the EGR 8 area.

Figure 24. Subclusters in EGR 8's Manufacturing Supercluster: Size, Location Quotients and Percent Change in LQ, 2001-2004

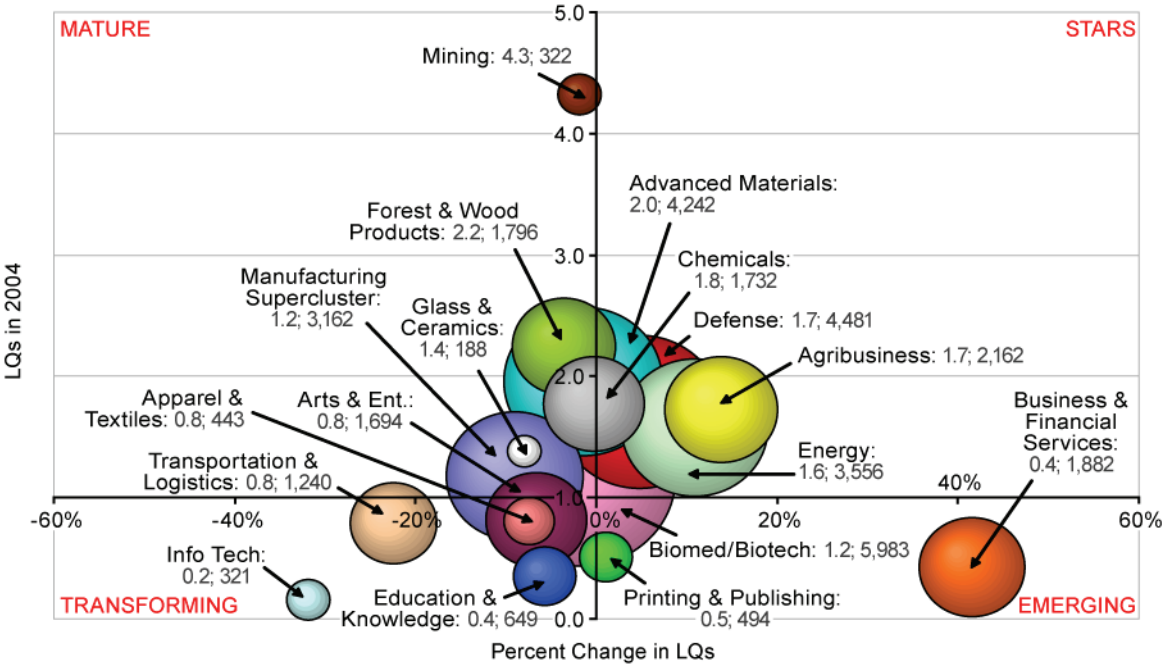


Note: The supercluster represents the sum of all six subclusters. The first value under or next to the cluster name is the value of the LQ for that particular cluster; the second number is the number of employees in the cluster in 2004.
Source: PCRD, using BLS-CEW data provided by the IBRC

Among the six subclusters in the EGR 8 manufacturing supercluster, only two have location quotients higher than 1.2—primary metals manufacturing and electrical equipment, appliance and components manufacturing. Both of these subclusters have declined in degree of specialization in the region over the past four years.

EGR 8 is a diverse region. It includes a metropolitan area (Bloomington/Monroe County) and areas that are extremely rural; thus, business cluster assets are not evenly distributed throughout the eight counties. In fact, several—although not all—of the more significant economic assets are located in Monroe County. **Figure 25** shows the LQ of business clusters in the region without Monroe County; comparing this chart with **Figure 23** illustrates the uneven allocation of clusters.

Figure 25. EGR 8 minus Monroe County: Cluster Size, Location Quotients and Percent Change in LQ, 2001-2004

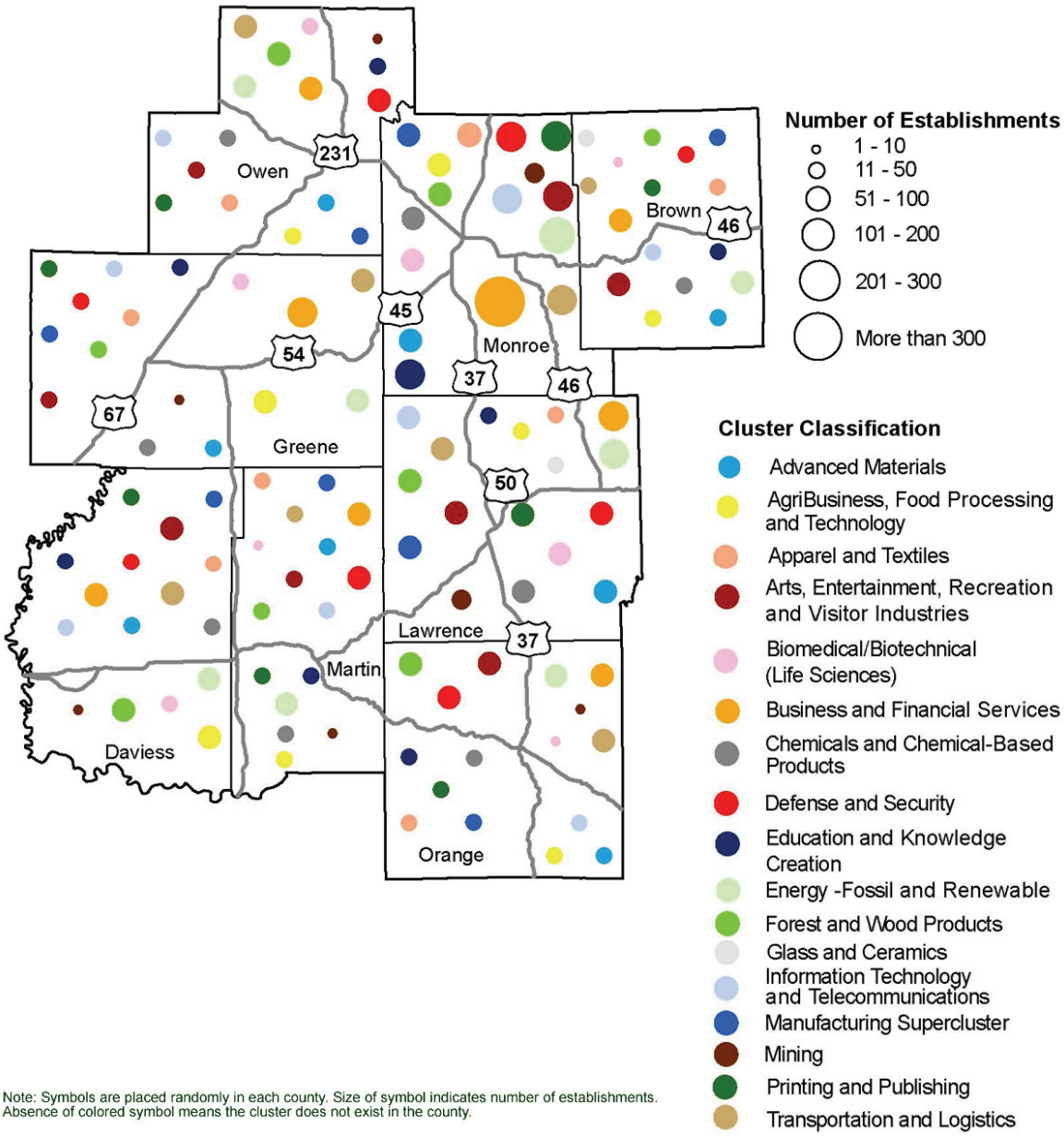


Note: The first value under or next to the cluster name is the value of the LQ for that particular cluster; the second number is the number of employees in the cluster in 2004.
Source: PCRD, using BLS-CEW data provided by the IBRC

In **Figure 25**, the cluster strengths that were shown in the eight-county region in advanced materials, chemicals, and especially education and knowledge creation are significantly diminished. The strongest clusters in the seven-county region (without Monroe County) are advanced materials; defense and security; agribusiness, food processing and technology; chemicals and chemical-based products; and energy. However, most of those clusters have seen relatively little increase between 2001 and 2004. The agribusiness, food processing and technology cluster and the energy cluster have increased their location quotients by 10 to 15 percent.

Figure 26 and **Figure 27** show the distribution of cluster industries and jobs by county within the eight-county region. This snapshot reinforces the picture of uneven distribution of economic assets throughout the region—cluster assets in particular. Such a distribution of cluster assets suggests a two-pronged approach to a strategy for EGR 8. On one hand, the strategy should attempt to take advantage of existing cluster strengths in the more rural areas of the region. On the other hand, the strategy should consider creating stronger connections between the lesser developed areas and the more developed metro area of Monroe County. This latter approach might look at a variety of tactics: workforce development, vendor relationships, and entrepreneurship, among others.

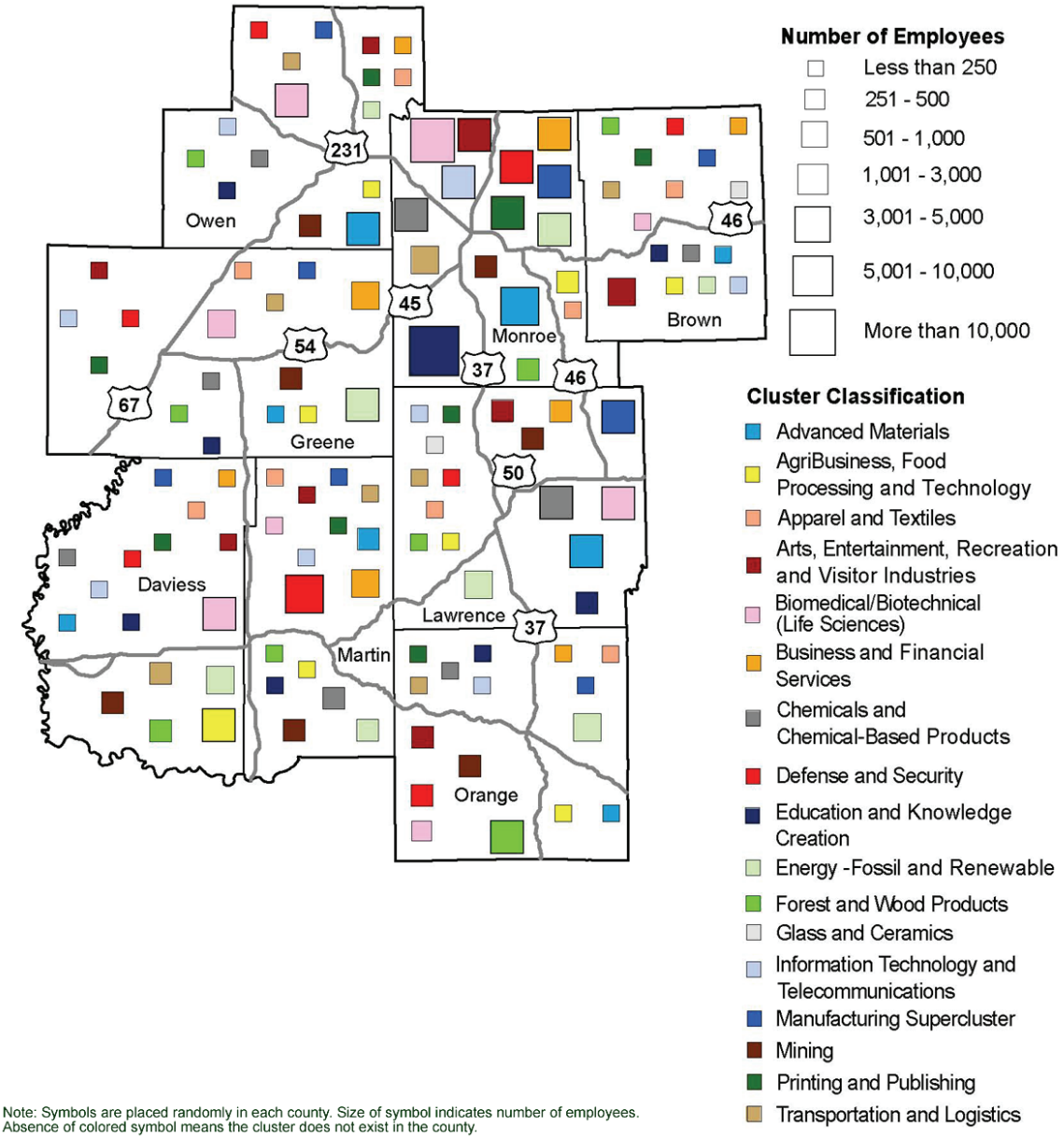
Figure 26. Industry Cluster Establishments by County in EGR 8, 2004



Note: Symbols are placed randomly in each county. Size of symbol indicates number of establishments. Absence of colored symbol means the cluster does not exist in the county.

Source: Purdue Center for Regional Development

Figure 27. Industry Cluster Employment by County in EGR 8, 2004



Note: Symbols are placed randomly in each county. Size of symbol indicates number of employees. Absence of colored symbol means the cluster does not exist in the county.

Source: Purdue Center for Regional Development

The finding from the national-level analysis that local economies may be specialized in very different ways from each other is further supported by the findings of the EGR 8 analysis. **Table 20** shows each county in the region and its clusters with location quotients greater than 1.2. No two counties are exactly alike and, in fact, they are all quite different with respect to the local concentration of their cluster industries.

Table 20. Clusters with Location Quotients 1.2 or More in Counties of Economic Growth Region 8

Clusters	METRO SPHERE	RURAL-METRO INTERFACE						RURAL SPHERE
	Monroe	Greene	Brown	Owen	Lawrence	Martin	Orange	Daviess
Advanced Materials	1.5			6.6	4.1	1.3		
Agribusiness, Food Processing and Technology		1.4						6.3
Apparel and Textiles			4.1				1.4	1.6
Arts, Entertainment, Recreation and Visitor Industries			4.5				1.8	
Biomedical/Biotechnical (Life Sciences)	1.3			2.7				1.2
Business and Financial Services								
Chemicals and Chemical-Based Products	1.7				3.8	2.6		
Defense and Security						10.8		
Education and Knowledge Creation	5.6							
Energy (Fossil and Renewable)		3.5				1.5	2.7	1.3
Forest and Wood Products				2.3			11.4	2.2
Glass and Ceramics			1.9		4.7			
Information Technology and Telecommunications								
Manufacturing Supercluster					3.6			
Computer and Electronic Product Mfg								
Electrical Equip, Appliance and Component Mfg	7.1					5.4		
Fabricated Metal Product Mfg					2.6			
Machinery Mfg					2.4			
Primary Metal Mfg					18.1		3.3	
Transportation Equipment Mfg					4.9			
Mining	1.6			3.0	9.8	2.7	7.6	
Printing and Publishing	1.2			1.4				
Transportation and Logistics								1.5

Source: PCRD, using 2004 BLS-CEW data provided by the IBRC

Taking a slightly different tack, and examined from the viewpoint of employment size in clusters (those with 500 jobs and up), the counties of EGR 8 again differ significantly. Brown County, for example, has only one cluster with employment totaling over 500—the arts, entertainment, recreation and visitor industries cluster. Clusters that may be related to the arts cluster in Brown County (given the number of artisans and artists in the county) include apparel and textiles, as well as glass and ceramics. These two clusters are currently very small, but are growing in employment. However, total employment in Brown County's arts and entertainment cluster has declined between 2001 and 2004.

Martin and Owen counties each have two clusters with employment over 500. In the case of Martin County, the biggest cluster is defense and security with almost 4,000 employees, and a concentration of employment in national security and ammunition manufacturing; followed by business and financial services with a total 510 employees, and a concentration in engineering

services. In Owen County, the largest cluster employment comes from the biomedical/biotechnical cluster (1,490 employees), closely followed by advanced materials. In the case of Owen County, these two clusters should most likely be counted as one, since the major manufacture common to both clusters is surgical and medical instruments (NAICS 339112). These two clusters grew from 2001 to 2004.

Orange County also has two clusters with employment of 500 or more. Forest and wood products ranks as its largest cluster (1,079), reflecting Orange County's proximity to the great hardwood forests that cover much of southern Indiana. In Orange County, wood office furniture manufacturing (NAICS 337211) is the largest employer in the cluster. The size and concentration of this cluster are declining, however, in Indiana and in Orange County. The county's employment strengths in the energy cluster are largely in energy systems-related construction. However, it must be noted that Orange County is poised to regain a historic strength in the arts and entertainment cluster, with the opening of a new casino in November 2006, along with related hotels and restaurants. This can be expected to strengthen the arts and entertainment cluster throughout the entire region and beyond.

Daviess and Greene counties each have three clusters with employment over 500. In each case, two of the top three clusters are the biomedical/biotechnical and energy clusters. In both counties, coal mining forms an important part of the energy cluster employment. In both counties, too, strengths in various types of patient care dominate biomed/biotech cluster employment. Daviess County's largest cluster is the agribusiness, food processing and technology cluster (1,577), with most employment occurring in the poultry processing industry. Greene County's third largest cluster in terms of employment is business and financial services. Greene County's biggest cluster employer is the energy cluster (1,083 in 2004).

In the EGR 8 region, only Monroe and Lawrence counties have more than three clusters that employ more than 500 people. In Lawrence County, the largest cluster is the manufacturing supercluster, with 2,607 employees—18.5 percent of total employment in the county. Within the supercluster, the two largest subclusters are primary metals manufacturing (mainly, aluminum die-casting) and transportation equipment manufacturing (motor vehicle electrical equipment). Both subclusters lost employment between 2001 and 2004. The second, third and fourth largest cluster employment in Lawrence County are found in the advanced materials, biomedical/biotechnical, and chemicals and chemical-based products clusters. The biomedical cluster in Lawrence County is dominated by various types of patient services, while the chemicals cluster's strongest employment is in plastics, cement and stone products.

Monroe County has the largest population and largest employment in the entire eight-county region. It has the most diverse economy and the largest number of clusters (12) with employment over 500 (see **Table 21**), reinforcing the potential of one of the strategies suggested at the beginning of this section: to create stronger connections between the less developed areas and the more developed metro area of Monroe County. In the more rural counties, armed with information about their strongest clusters and their growth clusters, it is possible that a match can be made between complementary sets of cluster industries in both the rural and the metropolitan counties that will result in mutual strengthening.

Table 21. Monroe County Clusters with 2004 Employment over 500

Cluster Name	Total Employment	Location Quotient	Change in Employment 2001-2004	Avg. Annual Wage per Job	Avg. Annual Wage per Job as a % of U.S. Total	Total Establishments	Change in Establishments 2001-2004
All Industries	61,372	1.0	2,858	29,730	75.5%	2,982	71
Education & Knowledge Creation	11,929	5.6	1,388	34,985	89.4%	56	8
Biomedical/Biotech	9,483	1.3	1,357	37,291	88.6%	269	26
Advanced Materials	3,828	1.5	1,213	35,481	62.4%	30	-2
Manufacturing Supercluster	2,910	0.9	-962	42,731	78.3%	22	-6
Business & Financial Services	2,667	0.5	240	37,456	54.3%	390	12
Chemicals & Chemical-Based Products	1,913	1.7	534	41,508	79.8%	43	2
Information Technology & Telecommunications	1,399	0.6	-104	38,745	52.8%	97	1
Printing & Publishing	1,376	1.2	-75	32,704	68.6%	67	-6
Defense and Security	1,281	0.4	200	30,763	54.2%	87	13
Arts, Entertainment, Recreation & Visitor Industries	1,091	0.4	2	18,269	60.7%	91	14
Energy (Fossil & Renewable)	1,061	0.4	-164	37,901	65.4%	118	-14
Transportation & Logistics	655	0.4	129	30,471	73.9%	64	10

Source: PCRD, using BLS-CEW data provided by the IBRC

In conclusion, while EGR 8 as a whole has a diverse and reasonably robust cluster array, it can be seen that each county in the region (with the exception of Monroe, and to some extent Lawrence) has a relatively small number of cluster strengths when taken individually. One viable strategy is to build up individual cluster industries in each separate location, but this strategy is likely to be greatly enhanced by searching for complementarities between cluster industries in the entire region, and working in collaboration to strengthen regional clusters.

4.3. The Planning Process

The Planning Timetable

The specific planning process consisted of the following components:

1. The Regional Advisory Committee (RAC) held eight planning sessions to identify clusters and cluster groups to activate in the first phase of strategy implementation.
2. The planning team gathered and analyzed additional data.
3. The RAC used location quotient analysis to understand the region's economy.
4. The planning team promoted the planning process through several vehicles in order to engage regional stakeholders.
5. The RAC identified several clusters and infrastructure issues on which to work.
6. The RAC chose several cluster-based projects to pursue.

7. The RAC has developed, in conjunction with the Southern Indiana Rural Development Project, a grant application for project funding.

In January 2006, the planning team interviewed community leaders to collect local and regional plans and to obtain nominations for the RAC. In addition, the team began to inventory EGR 8 economic development assets.

In March, the planning team began promoting the planning effort. The team developed and distributed a media release announcing the EGR 8 planning process. The Governor's office sent a letter from Governor Daniels supporting the project and encouraging every elected official in the region to participate. A previous media release had been issued in the fall of 2005 announcing the EDA grant and the overall project. The later release focused primarily on the regional effort and encouraged anyone interested to respond to Purdue's Center for Regional Development (PCRD), the Indiana Business Research Center (IBRC), or Strategic Development Group, Inc. (SDG) for more information. The IBRC developed an online survey for businesses in EGR 8. SDG also created an interactive Web page (www.sdg.us/EGR8) to which people could respond.

The team contacted local elected officials throughout the region to inform them of planning efforts that were just beginning. The information included a two-page, four-color flyer that described the planning process and gave details on ways in which both elected officials and the general public could participate.

4.3.1. Survey on the Business Climate in EGR 8

To supplement information gathered from Economic Growth Region 8 stakeholders via personal interviews and group meetings, the research team surveyed executives of businesses and other organizations in the region. This survey, which was conducted both online and via mail, asked a number of questions about the region's business climate, its assets and liabilities as a place to do business, expectations for their firm's growth, and their views about industries or clusters worth targeting for economic development. The survey also collected information for classifying respondent organizations. The survey instrument is contained in **Appendix III**.

Three sets of prospective respondents were compiled from three different sources. The research team had contact information for more than 50 local officials throughout EGR 8, including mayors and county executives, utility executives, directors of local economic development organizations and chambers of commerce, school district administrators, and selected other organizations knowledgeable about the region's economic development. These individuals received a mailed invitation to take part in the survey.

In addition, 602 business executives were invited to participate in the survey through the services of an e-mail list company. The business-database firm infoUSA generated this sample from its master list of millions of U.S. businesses to include public and private-sector establishments in EGR 8 that had at least five employees and for which e-mail addresses for senior executives were available. E-mail was chosen for this solicitation since a key project deadline did not allow sufficient time to complete a strong mail survey effort. However, only 34 percent of those on the list opened the e-mail invitation, and only 6 percent clicked on its link to the online survey.

This e-mail solicitation, coupled with the earlier physical mailing to local officials, yielded a disappointing response rate, generating only 31 completed interviews. A follow-up e-mailing was

considered, but the infoUSA service does not provide the e-mail addresses to the client, and the cost of a second e-mail was prohibitive. To increase survey response further, then, a third wave of invitations was sent by mail to senior executives of 150 organizations listed in Dun & Bradstreet's Million Dollar Directory. These EGR 8 firms represented a wide range of sizes and industries. From these three solicitations combined (two by mail and one by e-mail), 69 responses were received.

Though this third wave more than doubled the completion rate, additional responses were desired before the survey data could be considered a reliable basis for generalizing about the views of the region's executives. A final effort to elicit participation from nonrespondents in the Dun & Bradstreet list was mounted following the mixed-mode procedures recommended by Dillman (2007).

This began with a preview letter announcing that a survey invitation would soon follow. The questionnaire was mailed the following week with a cover letter explaining the purpose of the survey and why the recipients' involvement was needed. Options were available for answering the questions: respondents could complete the survey online or they could mail or fax it to the IBRC. One week later, a follow-up mailing reminded all of the recipients to complete the survey if they had not yet done so and encouraged them to contact the IBRC for a replacement copy if needed. Finally, two weeks after the original questionnaire mailing a second follow-up was sent to those who had not yet replied, along with a second cover letter stressing the need for participation. The first and last survey mailings included a dollar bill in each envelope as a token of appreciation for taking part, and they also included a stamped reply envelope for returning the completed questionnaire. Throughout this wave of the survey process, members of the EGR 8 Regional Advisory Committee personally contacted the executives on the mailing list to encourage them to respond to the survey.

In response to all four waves of the survey effort, a total of 112 completed questionnaires were received (including the 69 mentioned previously). This represents more than half of the region's organizations on the Dun & Bradstreet list and provides a substantial basis for understanding the views of region executives. A summary of their responses is presented in the following section; note that percentage totals may not add to 100 due to rounding. Verbatim responses to open-ended questions are shown in **Appendix III**.

Survey Results Summary

Respondent Characteristics. The 112 organizations responding to the survey were generally long-term residents of the region, with 95 percent having operated in the region more than 10 years and 81 percent for more than 20 years. The region has seen substantial economic change during that period, so these organizations should have some useful perspective to share.

Only 17 percent of the organizations were headquartered outside of EGR 8. Forty-six percent of the organizations in this sample were located in Monroe County (the largest county in the region and the core of its one metropolitan area). Greene, Lawrence, Daviess and Orange counties represented 13, 13, 12 and 12 percent of respondents, respectively, with the remaining counties each accounting for three or four percent of respondents.

Respondent organizations represented a broad range of industries covering all but two of the major NAICS sectors. Four sectors together accounted for 51 percent of all respondents; these were

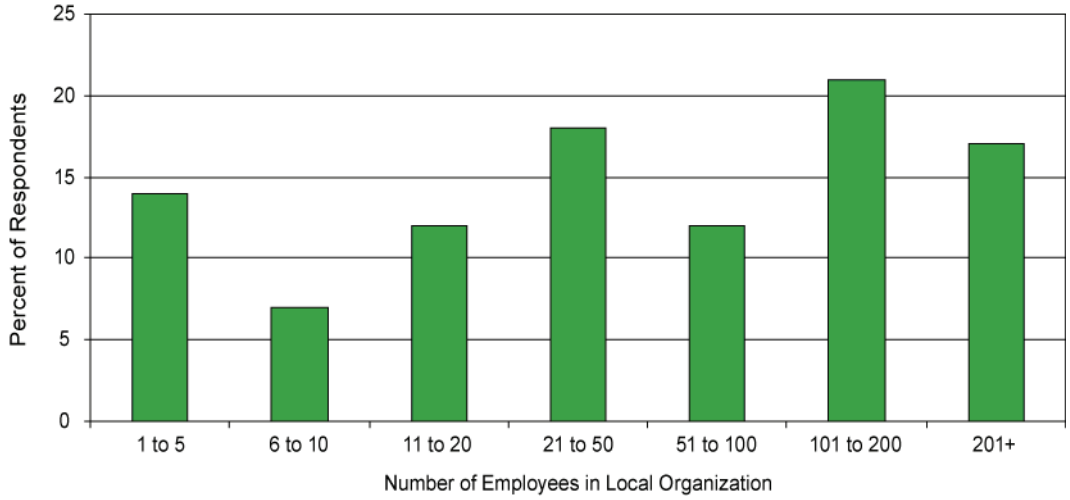
educational services (19 percent), health care/social services (13 percent), manufacturing (11 percent) and retail trade (8 percent).

The markets served by respondent operations in EGR 8 were close to home, with 49 percent of their customers on average coming from their own county, another 21 percent from elsewhere in Indiana, 25 percent from other parts of the nation, and 5 percent from other countries.

When asked why their organization is located in this region, respondents offered a variety of reasons. Several indicated factors not directly related to the business itself, such as starting the company where they had grown up or lived; many of these, however, noted that they remained where they enjoyed a good quality of life. Others referred to choices beyond their direct control, such as serving a territory assigned by another organization or a unit of government. Many commented on market forces determining their organization's location, such as where their customers are located, past mergers or acquisitions, and proximity to raw materials or talent needed for the business.

These organizations ranged widely in size, as shown in **Figure 28**. About one-third of respondents were in organizations with 20 or fewer employees locally, while 30 percent were from establishments with 21 to 100 local employees. Thirty-eight percent had local operations with more than 100 employees.

Figure 28. Survey Respondents by Size of Organization



Source: Indiana Business Research Center, using survey results

More than three-fifths (62 percent) of respondents expected their workforce locally to stay about the same in the year ahead, while only 7 percent expected any shrinkage. The rest anticipated various amounts of workforce growth, with 23 percent predicting employment growing by less than 10 percent, one-in-10 expecting growth in the 10 percent to 20 percent range, and only one respondent expecting growth of more than 20 percent over the next 12 months.

Local Business Climate. Respondents were asked to rate the importance of a number of local factors to the success of their businesses in the local area; results are shown in **Table 22**, sorted by the combined percentage of responses of "very important" plus "moderately important."

Table 22. Rated Importance of Local Factors to Local Business Success

Local Factor	Percent of Respondents Indicating:				
	Very Important	Moderately Important	Slightly Important	Not Important	Unsure or Not Applicable
Quality of workforce	65	15	9	3	8
Responsive local government officials	53	21	11	4	11
Availability of labor in the region	46	26	15	3	11
Being close to customers	58	12	9	10	12
Citizens' support for economic growth	42	26	13	6	12
Low labor costs	27	29	20	10	13
Low business property taxes	30	24	16	11	19
Affordable housing	22	32	27	7	12
Cultural amenities & recreational activities	24	29	24	12	12
Low cost of utilities	30	22	25	8	15
Access to capital	31	20	19	17	13
Low cost of transportation	25	19	25	12	19
Availability of land for expansion	24	12	13	33	18
Concerns about environmental problems	13	22	35	16	13
Availability of freight transportation	12	21	17	27	23
Being close to suppliers	11	19	19	36	15
Being close to distribution facilities	10	15	18	38	19

Source: IBRC, using survey results

Four local factors stood above the rest in importance, rated as very or moderately important by more than 70 percent of those responding:

- Workforce quality
- Responsive local government officials
- Labor availability
- Being close to customers

Citizens' support for economic growth was considered very or moderately important by two-thirds of respondents. Several costs of doing business (labor, utilities, taxes) were considered moderately or very important by a majority of the organizations. Interestingly, proximity to suppliers and/or distribution facilities was not rated as particularly important.

Responding organizations rated the availability and quality of labor in the region for their businesses. As shown in **Table 23**, nearly half the respondents considered availability to be excellent or good for management and administrative salaried workers. More than 40 percent viewed the supply of semi-skilled and unskilled hourly workers to be good or excellent. The supply of professional and technical workers was not as strong, with half the respondents rating it fair or poor. Sales and marketing workers were deemed even less available (although that category was not relevant for a sizable percentage of respondents. Overall, the labor supply was best for unskilled workers.

Table 23. Ratings of Labor Availability in the Region

Type of Labor	Percent of Respondents Indicating:				
	Excellent	Good	Fair	Poor	N/A
Hourly - Skilled	1	35	32	19	13
Hourly - Semi-Skilled	4	37	35	7	16
Hourly - Unskilled	15	28	22	12	22
Salaried - Management/Administrative	8	40	30	12	11
Salaried - Professional/Technical	9	29	31	19	12
Salaried - Sales/Marketing	4	27	25	15	29

Source: IBRC, using survey results

Perhaps not surprisingly, the unskilled workers that were viewed as relatively plentiful were also rated as lower in quality than the other categories of labor (see **Table 24**). Management and administrative workers, on the other hand, had the strongest quality ratings with 65 percent rating them either excellent or good. Half or more of survey respondents rated quality as good or excellent for professional and technical, skilled hourly, and semi-skilled hourly labor categories. It is worth noting that no more than 6 percent of respondents gave excellent ratings to the quality of any of the hourly labor categories or the sales and marketing category of workers.

Table 24. Ratings of Labor Quality in the Region

Type of Labor	Percent of Respondents Indicating:				
	Excellent	Good	Fair	Poor	N/A
Hourly - Skilled	6	50	27	6	12
Hourly - Semi-Skilled	4	45	30	7	14
Hourly - Unskilled	4	28	32	16	19
Salaried - Management/Administrative	16	49	20	4	11
Salaried - Professional/Technical	13	46	20	9	12
Salaried - Sales/Marketing	4	38	26	3	29

Source: IBRC, using survey results

The survey next asked respondents how well various local services meet the needs of businesses. The service most often rated as excellent in this regard (by 38 percent of respondents) was access to higher education. This is not overly surprising, since 46 percent of respondents were from Monroe County, the home of Indiana University, which is within an hour drive of most of EGR 8. The region also contains a strong and growing campus of Ivy Tech Community College, with some branch activities at other locations in the region.

As shown in **Table 25**, public safety and utilities were rated quite highly. Other services rated excellent or good by more than 60 percent of respondents were K-12 schools, high-speed Internet service, construction services, and health care quality. The ratings then drop off noticeably, with good or excellent ratings awarded to fewer than half of the remaining local services. Notable among the less highly ranked services were various aspects of transportation infrastructure, including express and rail cargo services, local roads and highway access to other areas, access to major airports (with the Indianapolis airport an hour to more than two hours from various parts of EGR 8) and nearby airport facilities. It should be noted that 46 percent of respondents indicated that they

had no experience with rail cargo service; of those who did, however, 54 percent rated cargo rail service as poor.

Table 25. Ratings of Local Services for Meeting Business Needs

Local Service	Percent of Respondents Indicating:				
	Excellent	Good	Fair	Poor	N/A
Access to higher education	38	38	11	5	8
Electrical service	30	50	14	2	4
Fire protection	28	54	12	2	4
Police protection	27	49	17	4	3
Water service	25	56	8	5	6
Natural gas or propane service	24	55	12	1	8
Basic telephone service	24	55	12	7	3
Schools (kindergarten - high school)	22	45	18	3	12
Sewer service	21	49	15	8	7
Solid waste disposal	19	45	24	6	6
High-speed Internet service	19	41	22	15	3
Construction services	12	55	20	3	11
Quality of health care services	9	51	29	4	6
Highway access to other areas	9	27	28	31	5
Business financing	8	33	30	5	24
Lodging for business visitors	6	40	33	13	8
Rail cargo service	6	7	12	29	46
Air cargo/express service	5	19	27	19	29
Professional & business services	4	42	37	6	10
Facilities for business meetings	4	34	36	17	9
Affordability of healthcare services	4	32	43	15	6
Local roads	4	29	46	18	4
Availability of affordable child care	3	27	41	10	19
Access to major airports	2	30	34	28	6
Nearby airport facilities	2	23	37	28	10
Process for obtaining local permits & licenses	1	30	31	18	20

Source: IBRC, using survey results

The final closed-end question in the survey asked how the business climate in this region is doing. Opinions were rather evenly divided, with 28 percent saying the climate is improving, 47 percent saying it was stable, and 27 percent feeling that the business climate was getting worse.

EGR 8 Assets, Liabilities and Prospects. The final substantive questions, which were open-ended, focused on the region's assets, liabilities and prospects for the future. Verbatim responses to these questions are contained in **Appendix III**.

The first question asked respondents to name the main **assets of EGR 8** when it comes to doing business there. The most frequent observations concerned the good quality of life in the region, shaped by a variety of factors such as recreational and cultural opportunities, beautiful natural environment, high quality healthcare, low crime, affordability, and the relaxed pace of life compared to urban areas.

Some of the region's more prominent economic assets were also mentioned frequently, including its higher education institutions, the strong life sciences cluster, and the Crane Naval Surface Warfare Center. The region's location was often viewed as a strength, reasonably close to many larger cities and markets and centrally located within the United States. The good quality of the workforce was mentioned by several respondents, along with its affordability. Finally, several participants noted the region's access to natural resources, such as agricultural products, forests, and limestone.

Opinions were more varied with regard to **the region's drawbacks** for doing business. The most common sentiment concerned the poor transportation infrastructure and the impact this has, together with long distances to larger cities, on access to markets and services. As one observer noted, "Many freight companies from [the] north will only come here when they get a full load. Freight is held for days or we have to make a trip to Indy to pick-up at freight terminal." Limited air service was also noted.

Contrasting with the advantage cited earlier of having access to strong higher education institutions is the relatively low educational attainment of the workforce and the general population. Many residents don't pursue post-secondary education, which makes it difficult to find qualified candidates locally for higher-level jobs. The seasonal demand and labor-market swings that a college-town schedule causes were vexing to some Monroe County respondents. And one respondent from that county bemoaned a two-class society that has many highly-educated, well-paid citizens paying little attention to the existence and needs of the lower-income, poorly educated citizens in their area. This leads to other problems, such as shortage of affordable housing for the latter group.

Another social characteristic of concern was the homogeneous population with very few racial or ethnic minority residents, which can make it difficult to recruit culturally diverse talent to the area. Several respondents commented on an anti-growth sentiment among local governments and often among the population generally.

Additional drawbacks included the region's generally sluggish economy (which limits the market for locally focused businesses) and its historical dependence on manufacturing, a shrinking industry. One comment noted that frequent bank acquisitions have led to sudden changes in bank lending policies, often with the result that the credit extended to small businesses is suddenly curtailed.

The last substantive question asked respondents to share "any other **comments or suggestions** you may have about the advantages or disadvantages of doing business in this region or the prospects for the area's economic future. Feel free to share your views on which **industries the region should target** for economic growth, and why." The reader is referred to **Appendix III** to review the diverse responses to this question. However, some observations bear mention here.

A common concern is the slow growth of the region's economy and the impact this has on opportunities to invest to build a stronger region. The more rural counties, especially, have limited tax bases, so their residents may feel more need for support from state and federal sources to enhance their prospects for growth.

Finally, several observed that the region has had a good lesson in the risks of depending too heavily on one industry (manufacturing) for its economic vitality, and they encouraged efforts to help small businesses prosper. On the other hand, several respondents thought that a few of the region's most prominent economic assets—such as Indiana University, the Crane naval facility, and the strong life sciences cluster—should be the targets of economic development efforts. The recent development of a new certified technology park (with business incubator) near the Crane facility may be a good example of a way to address both of these points of view.

4.3.2. The RAC Planning Process

The RAC held eight meetings over the course of the project. By the beginning of March 2006, the members of the RAC were identified, and the initial committee meeting was scheduled. Each meeting was held in Bedford, which was relatively easy to reach for everyone in EGR 8. Each of the meetings lasted between 90 minutes and two hours, and each was held from mid-morning until noon. All of the meetings except for one were held at the Bedford Area Chamber of Commerce's new meeting facility. The Chamber of Commerce and other RAC members helped provide coffee and refreshments for each meeting.

The RAC first met on March 28, 2006. Agendas for all of the meetings can be found in **Appendix II**. At this initial meeting, the group had a brief introduction to business cluster analysis and the concept of location quotients. PCRD's senior planner presented the initial EGR 8 business cluster analysis.

Also at the meeting, SDG staff introduced the planning process and time frame to the RAC members. Each member was invited to discuss key assets from his or her county and the group discussed some general directions in which the region should develop.

The second meeting of the RAC took place on April 11. At this meeting, the group reviewed business clusters and began to look at more specific cluster data for the region. The group discussed SDG's report on local and regional plans. This analysis led to some consideration by committee members of how a regional plan might be implemented.

At the third RAC meeting on April 26, the group again reviewed business cluster analysis and location quotients. These were new concepts for many of the committee members, and some people required more time than others to fully digest these new ideas. At this meeting, the committee also discussed important regional tools that would enable EGR 8 to act on the clusters that would be chosen for initial activation. Topics such as infrastructure and workforce development were analyzed in terms of the region's strengths and weaknesses.

The group also reviewed plans for upcoming interviews and focus group meetings and made suggestions on who should be interviewed and how the focus groups should be established. The RAC reviewed the recent regional workforce development plan (Strategic Skills Initiative, executed

by the Indiana Department of Workforce Development) and considered how those findings could be used to complement the current planning efforts.

Following that committee meeting, the planning team undertook another round of data collection, in the form of individual interviews and focus group discussions. The team met with five of the six mayors in the region for in-depth interviews. The interviews with the mayors were highly productive. EGR 8 is fortunate to have six mayors who are fully engaged in economic development and who have already begun to think regionally. The mayors as a whole were extremely supportive of the planning effort and offered to participate in the implementation of the new strategy.

The Regional Advisory Committee identified combinations of clusters that made sense within the region for four focus groups to explore:

1. Arts, Entertainment, Recreation and Visitor Industries
2. Biomed/Biotech & Advanced Materials
3. Defense & Information Technology
4. Agribusiness, Forest & Wood Products, and Natural Resources

Arts, entertainment and recreation made sense as a stand alone cluster. The biomed/biotech and advanced materials focus group was created to look at two particular issues: how to help regional hospitals and health care organizations and how to expand the biotech supply chain to EGR 8 manufacturers outside of Monroe County. The defense and information technology group tried to bring engineers, small info-tech start-ups, and other service businesses together to discuss how to grow the defense cluster through info-tech suppliers. The agribusiness group included key businesses already present in the region that related to the forest and wood products and mining sectors.

Each focus group had differing levels of participation. Arts, entertainment and recreation was the largest, in part because the region already had a professional support group at the county level in most of EGR 8. Defense and information technology had the smallest number of participants, and the planning team fleshed this out with individual interviews. The agribusiness focus group included several RAC members. The biomed/biotech and advanced materials group was relatively small, and the team again followed it up with individual interviews.

At the focus group meetings, the research team presented a series of questions to each focus group (listed in **Appendix II**). The focus group discussions resulted in a number of ideas for specific cluster-based projects that could be undertaken in EGR 8. The research team brought these ideas back to the RAC at its next meeting. The focus groups and targeted cluster interviews helped the RAC identify the specific clusters that it wanted to initiate in its strategic plan.

The fourth RAC meeting on May 23, 2006, was focused on identifying which business clusters should be activated initially. It was generally agreed that, while most of the 17 business clusters had potential, the region did not have enough resources to work on all 17 simultaneously. There was also a great deal of interest in the ideas from the mayors and the focus groups. By the end of the meeting, the RAC members decided that they needed another analytical tool to help them decide among competing cluster possibilities—an evaluative cluster matrix to help determine which cluster to activate first. That matrix was created and sent to committee members before their next meeting (see **Table 26**).

Table 26. EGR 8 Cluster Matrix

Cluster Name	Employment 2004	Establish. 2004	Establishment Chg. 2001-2004	LQ 2004	Percent Chg. in LQ 2001-2004	Avg. Annual Wages 2004	Reg. Advantage (Shift-Share) 2004	State or Regional Support	Macro-Economic Factors
Advanced Materials	8,070	83	-5	1.7	18.7%	$42,320	6.6%	Yes	Biotech needs
Agribusiness, Food Processing & Technology	2,414	116	8	0.9	11.6%	$24,653	10.0%	Yes, in subsectors	Wood Product competition
Apparel and Textiles	598	34	-2	0.5	-11.0%	$27,247	-26.4%	No	Declining due to global competition
Arts, Entertainment, Recreation & Visitor Industries	2,785	208	12	0.6	-6.9%	$15,437	-5.1%	Gaming	Orange County casino
Biomedical/Biotechnical (Life Sciences)	16,119	514	23	1.1	1.5%	$34,038	9.1%	Yes	Growing presence in Monroe and Owen counties
Business & Financial Services	4,549	708	25	0.5	18.9%	$38,637	20.0%	No	Area underserved
Chemicals & Chemical-Based Products	3645	88	2	1.7	18.1%	$38,875	10.2%	No	
Defense & Security	5,762	171	17	1.0	4.5%	$52,301	4.7%	Yes	For the next few years great growth opportunities
Education & Knowledge Creation	12,578	100	11	3.2	5.6%	$34,316	12.0%	No	Underrepresented in 7 counties
Energy (Fossil & Renewable)	4,617	306	-28	0.9	2.7%	$40,646	-1.5%	Maybe	The State is beginning to pursue an alternative energy policy
Forest & Wood Products	2,061	126	6	1.2	-4.5%	$28,312	-11.4%	Yes	Declining due to global competition, but a strong cluster in Indiana
Glass & Ceramics	188	4	0	0.6	-11.2%	$52,508	-22.9%	No	
Information Technology & Telecommunications	1,720	152	-1	0.4	-0.9%	$40,219	-16.8%	Yes	Support is not yet very apparent
Manufacturing Supercluster	6,072	78	-23	1.0	-12.5%	$46,036	-23.7%	Yes	Declining employment due to global competition
Mining	465	40	-2	2.9	-11.2%	$37,659	-13.9%	No	New coal mines will open in 2007
Printing & Publishing	1,870	114	-6	0.9	1.4%	$30,384	-6.4%	No	
Transportation & Logistics	1,895	222	32	0.6	-12.9%	$30,907	-14.1%	Yes, in workforce development	Energy costs

Source: Purdue Center for Regional Development

Cluster Strategy

At the RAC's May 31 meeting, the group used the bubble charts, the ideas from the focus group discussions, and the new evaluative cluster matrix to identify the regional clusters that would be the focus of the first phase of the strategy. The RAC identified two groups of clusters and four individual clusters for further exploration:

- Energy; Agribusiness, Food Processing and Technology; Forest and Wood Products
- Biomedical/Biotech; Advanced Materials
- Arts, Entertainment, Recreation and Visitor Industries
- Transportation and Logistics
- Defense and Security
- Business and Financial Services

Given the strength of the agribusiness, food processing and technology cluster and the opportunities for alternative energy— especially in biomass—the RAC saw potential for significant growth in this area. In life sciences, the committee looked at two potential projects. The first was activating a hospital/healthcare roundtable to help small local healthcare groups survive and thrive in a difficult rural environment. The second project was to explore helping small advanced materials and manufacturing firms retool to supply the growing biotech sector in Monroe and Owen counties.

Arts, entertainment, recreation and visitor industries had a number of possibilities, ranging from a series of regional festivals to year-around exhibits of the work of regional artists and craftspeople. The RAC noted that EGR 8 is close to two Interstate highways, I-65 and I-64, and that in a few years, the region should have a long stretch of the newly expanded I-69 (see **Figure 29)**. Therefore, the committee not only saw the transportation and logistics cluster as a major future area for activation but also as a major enabling and supporting cluster for expanding cultural tourism, as well as many other business areas.

Figure 29. Current and Future Roadways around EGR 8

Source: Indiana Business Research Center

Because EGR 8's NSWC Crane is the second largest employer in southwest Indiana, the defense and security cluster was seen as critical to the region's economic future. Three counties in the region have already pioneered a new tech park on the west side of Crane. At least one county is planning a similar park on the east side. Enabling all eight counties to gain from Crane's economic engine was an important choice for the RAC.

Business and financial services, which increased its share of LQ from 2001 to 2004, was seen as a cluster that had great potential. The RAC felt that the region was underserved in this cluster and wanted to develop it.

In addition, the committee recognized the need to focus on two key infrastructure items that were also allied to business clusters:

- Highway corridors
- Broadband telecommunications

In general, the RAC developed the theme of "Connectivity" for EGR 8. Whether it is in improving inter-county highways to connect to near-by interstates; developing trails that connect people within counties to improve quality of life; or ensuring that businesses throughout the region have broadband to connect businesses and residents to all parts of the region and the global market, the RAC was clear in promoting connectivity.

At its May 31 meeting, the RAC also agreed to stay together to provide oversight and guidance for implementing the strategy. The RAC agreed to ask the Southern Indiana Rural Development

Project (SIRDP) to serve as host for implementation. On June 14, SIRDP agreed to host the EGR 8 RAC and to serve as financial agent, grant writer, and project manager for implementation.

The RAC continued its planning process through September, October and November. At the October 25 meeting, the group agreed to examine entrepreneurial issues in the two cluster groups and four clusters previously identified. These clusters will serve as the foundation for a project that will inventory entrepreneurs and entrepreneurial resources in the eight-county region.

4.4. Next Steps

The planning team has begun to talk with potential funders about the possibility of providing resources to enable implementation. If funding can be found, implementation could begin in early 2007. The members of the RAC have committed to continuing with this cluster-based approach to regional development through 2007.

SIRDP has submitted a grant application to the Indiana Office of Community and Rural Affairs for implementing the EGR 8 strategy. If the grant application is approved, the RAC will serve as the project oversight team.

4.5. References

Dillman, Don A. *Mail and Internet surveys: The tailored design method – 2007 update with new Internet, visual, and mixed-mode guide*. New York: Wiley, 2007.

5. Summary, Conclusions, and Lessons Learned

5.1. General Background

The economic performance and potential of rural America is of considerable interest and concern to a broad range of stakeholders, including the U.S. Economic Development Administration (EDA). In 2004, the EDA released a major report titled *Competitiveness in Rural U.S. Regions: Learning and Research Agenda* produced by Professor Michael Porter and the Institute for Strategy and Competitiveness at Harvard Business School. This initial report suggested the need for further work and analysis. Consequently, in 2005, EDA funded the present follow-up study, which involved a partnership among Purdue University, Indiana University, and the State of Indiana.

The study's overall purpose was to develop a database and methodology to help rural areas in the United States assess their regional economic competitiveness to support growth and development strategies. To accomplish this broad goal, the research team organized its efforts into two major projects.

The goals of Project 1 were to (a) build a comprehensive national database suitable for cluster studies and (b) analyze several selected issues using this database. Specifically, the research team examined three broad research issues:

- The linkages between cluster structure, degree of rurality, and economic performance
- The spatial clustering of industrial clusters and the interface between rural and metropolitan regions in emerging agglomeration economies
- Growth trajectories for counties that are differentiated by cluster makeup, degree of rurality and distance to metropolitan areas

The goals of Project 2 were to (a) use the database developed in Project 1 to analyze the cluster structure of a selected region, (b) supplement these secondary data with additional local knowledge, and (c) mobilize the regional constituency in a planning process that was grounded in both secondary data and localized primary data. In essence, Project 2 was a pilot study designed to create and document a prototype process for rural regional development planning and action—one that can be replicated in other rural regions of the country.

Research Project 1 relied exclusively on secondary data and included two distinct components. The first component involved the development of a comprehensive database suitable for cluster studies and the analysis of regional development issues for the state of Indiana, its counties and its regions. Unsuppressed data at the six-digit NAICS level were available for Indiana. The second component involved the development of a database and analytical approaches for use by regions elsewhere in

the nation to help in their evaluation of economic clusters and to support economic development strategies. Unfortunately, unsuppressed county-level data for the rest of the nation were unavailable. Because of this, the research team revised cluster definitions to use three-digit NAICS sectors wherever possible when operationalizing cluster definitions at the county-level for the national analysis. As noted (on page 29), there were particular difficulties with the education cluster in relation to suppression issues.

Major data components and sources were:

(a) Quarterly Census of Employment and Wages from the Bureau of Labor Statistics

(b) Longitudinal Employment and Household Dynamics from the U.S. Census Bureau

(c) Demographics, educational attainment, occupation, housing, and income data from the decennial U.S. Census Bureau

(d) Rural-Urban Continuum Codes and Urban Influence Codes from the USDA's Economic Research Service

Exploring the various research questions and relationships associated with Project 1 required operational definitions for some important constructs: rurality, cluster, and economic performance.

- **Rurality.** An Index of Relative Rurality (IRR) was constructed to provide a continuous measure of rurality for all U.S. counties. The rurality dimension indexes U.S. counties along a rural-urban continuum with values ranging from 0 to 1; higher values indicate greater rurality. Values on the IRR were also used to classify counties into seven different categories with three of the categories representing the "metropolitan sphere" of influence; three categories representing the "rural-metropolitan interface;" and the seventh category labeled as the "rural sphere" of influence:

  Metropolitan Sphere
  A. Central counties with a population of at least 500,000
  B. Central counties with a population of less than 500,000
  C. Outlying metropolitan counties with an IRR < 0.4

  Rural-Metropolitan Interface
  D. Outlying metropolitan counties with an IRR ≥ 0.4
  E. Non-metropolitan counties adjacent to metropolitan area with an IRR < 0.4
  F. Non-metropolitan counties adjacent to a metropolitan area with an IRR ≥ 0.4

  Rural Sphere
  G. Non-metropolitan counties not adjacent to a metropolitan area

- **Cluster.** The research team used unsuppressed county-level data for Indiana to define 17 clusters at the six-digit NAICS code level. One of these clusters, manufacturing, was disaggregated into six more specialized subclusters.

- **Economic Performance.** Composite measures of economic performance were constructed from five foundation variables: median household income, average wage, unemployment rate, poverty rate, and average annual change in employment.

Because of data suppression issues, rigorous hypothesis testing was not practical. The research team, however, gained several important insights using various research techniques, including (a) location quotients, (b) nearest neighbor analysis, (c) analyses involving correlations and comparisons of means, (d) multivariate regression analysis, and (e) extensive mapping techniques, which facilitated visual observations and insights.

Research Project 2 targeted Indiana's Economic Growth Region 8. This eight-county region in southern Indiana includes four metropolitan and four non-metropolitan counties. Six of the counties are classified within the rural-metro interface level. As the research team engaged the local stakeholders in this eight-county region, they made extensive use of the secondary data compiled for Project 1. The research team also gathered primary data through surveys, focus groups, and interviews with key informants, including existing businesses, local economic development organizations, local and regional plan commissions, and other knowledgeable stakeholders in the eight counties. These data provided insights into the quality of the region's business environment and generated an inventory of regional assets and liabilities. The process for constructing an economic development strategic plan in Economic Growth Region 8 followed the normal steps used for any strategic planning exercise—taking account of other plans in and around the region; gathering and analyzing pertinent data; communicating implications; developing a set of goals and strategies leading to an implementation plan; and establishing a benchmarking system for monitoring and evaluation of results.

5.2. National Analysis and Database (Project 1)

5.2.1. Findings from National Analysis

1. **Different clusters are distributed in very different ways across the nation's geography.** For example, very few counties have a significant concentration in the business and financial services cluster. In contrast, 38 percent of the nation's counties have significant specialization in the agribusiness, food processing and technology cluster.

2. **Location patterns of the 17 clusters support common perceptions of regional variation in economic activity**, such as the manufacturing specialization in the Midwest and the concentration of the textile industry in the Southeast. As expected, over the three-year period analyzed, locational patterns were quite stable.

3. **For some clusters, specialization within an individual county level may reflect a larger regional specialization pattern; but in the case of other clusters this may not be so.** For example, nearest neighbor analysis indicates a regional clustering that transcends individual counties in the cases of the forest and wood products cluster, the agribusiness, food processing and technology cluster, and the apparel and textile cluster. In contrast, clusters that are confined to one county and/or operate across long distances include the following: information technology and telecommunications; business and financial services; printing and publishing; and advanced materials.

4. **There is considerable "co-location" of clusters that are significant within many regions.** Hence, the idea of considering certain regions in terms having a singular competitive advantage and labeling them by a single cluster or type of economic activity is both simplistic and misleading. In effect, what often appears is a pattern of "diversified specialization."

5. **Most of the 17 clusters analyzed tend to be concentrated in urban counties.** Four of the 17 industry clusters are very strongly oriented toward urban locations: business and financial services; biomedical/biotechnology; information technology and telecommunications; and printing and publishing. Central metropolitan counties with a population of at least 500,000 are the type of urban county most likely to specialize in these four clusters. Four other clusters follow this same pattern to a slightly less pronounced degree: defense and security; arts, entertainment, recreation and visitor industries; advanced materials; and transportation and logistics. The glass and ceramics cluster also has an urban orientation that is not necessarily linked to the large metropolitan central counties. The manufacturing supercluster generally has an urban orientation, although non-metropolitan counties adjacent to a metropolitan county are the most specialized in the manufacturing supercluster. The chemicals and chemical-based products cluster has a similar orientation. The education and knowledge creation cluster was particularly strong in large metropolitan central counties; but beyond that particular type of county, other counties—rural and urban alike—were not easily differentiated in terms of this cluster. The apparel and textiles cluster and the energy cluster did not show any clear bias toward either rural or urban locations.

   The three clusters with the strongest rural orientations were agribusiness, food processing and technology; forest and wood products; and mining. Finally, remote rural counties (i.e., non-metropolitan counties not adjacent to a metropolitan county) were generally the most disadvantaged county type with respect to all 17 clusters. The agribusiness, food processing and technology cluster and mining cluster were the two exceptions to this general tendency.

6. In our baseline year (2000), **the higher the level of rurality the poorer the economic conditions**. However, when looking at the relationship between changes in economic indicators and rurality (from 2000-2004), a more promising picture emerges. For example, there is an inverse relationship between rurality and average annual changes in both unemployment and poverty. This suggests a possible narrowing of the gap between rural and urban economic performance.

7. **The clusters most strongly associated with higher levels of economic performance—particularly in the baseline year—are business and financial services; information technology and telecommunications; and printing and publishing**. A less robust but still relatively strong relationship exists with the following clusters: advanced materials; biomedical/biotechnology; chemicals and chemical-based products; defense and security; transportation and logistics; and manufacturing. These relationships were much stronger in the more urban counties than in the more rural counties.

8. Multiple regression analysis suggests **a future reduction in economic disparities among counties**. In other words, counties that are currently lagging economically will grow at a faster rate than counties already enjoying a higher economic standard. Results indicate **human capital (as measured by educational attainment) is the primary cause of differences in income growth among counties.** The regression model provided additional insights when estimated for each of the seven different categories of counties:

(a) **Reduction in economic disparity is projected to occur most quickly in those counties comprising the rural sphere and in the most rural counties that are part of the rural-metropolitan interface** (levels E and G). Income growth in these two county types is very heavily influenced by human capital, reinforcing once again the need for rural counties to invest in their citizens' education.

(b) **Within the rural sphere counties** (level G), income growth increases with increasing rurality. The results also suggest that within the rural sphere income growth is dampened by manufacturing employment but fostered by employment in the agribusiness, food processing and technology cluster.

(c) **Industry mix has an important impact on growth rates within the metropolitan sphere (levels A and C)**: specialization in business and financial services is related to increased income growth rates, while specialization in information technology and telecommunications is related to decreased income growth rates in level-F counties of the rural-metropolitan interface (perhaps partly explained by sectoral differences in the economic downturn during the 2001 to 2004 period).

(d) **At the other two levels of rural-metropolitan interface (D and E), neither the industry mix nor the degree of rurality plays a pivotal role in income growth**.

5.2.2. Interactive Database for Public Use to Foster Cluster Analysis and Strategy Development

The research team incorporated a wide variety of economic and demographic variables in this analysis. Two additional sets of information were created: the 17 industry clusters and the Index of Relative Rurality. An online interactive database, located at www.ibrc.indiana.edu/innovation/data.html, provides these data for all counties in the United States (although it must be noted again that the cluster data are affected by the suppression imposed on the federal data).

The database's reporting capability gives users instant access to well-formatted data, while its exporting capability provides users with the flexibility needed to conduct further analysis. The IBRC will maintain and update the system as new data become available from federal sources, including the U.S. Census Bureau, U.S. Bureau of Labor Statistics, U.S. Bureau of Economic Analysis and the U.S. Department of Agriculture Economic and Research Statistics. In addition, the 17 clusters will continue to be updated with each new release of the quarterly census of employment and wages, providing an important measure of change. A guide to the database is available in **Appendix VI**.

5.3. Application in Indiana's Economic Growth Region 8 (Project 2)

Although local and regional stakeholders ultimately drove Project 2, the research team wanted to begin the process of engaging these stakeholders by using the data and analysis from Project 1. Consequently, stakeholder involvement was not systematically initiated until the spring of 2006. A very intense process of stakeholder engagement was then launched.

5.3.1. The Analysis of Clusters in EGR 8

The concentrations and changes in concentration of EGR 8 clusters may be grasped most readily by grouping clusters with similar characteristics:

- The highest location quotients in EGR 8 were associated with six clusters: education and knowledge creation (LQ = 3.2); mining (LQ = 2.9); advanced materials (LQ = 1.7); biomedical/biotechnical (LQ = 1.2); chemicals and chemical-based products (LQ = 1.7); and forest and wood products (LQ = 1.2). Additionally, four of these clusters experienced an increase in their LQs from 2001 through 2004, with the LQs for the advanced materials and chemicals clusters increasing quite dramatically. On the other hand, the mining and forest and wood products clusters experienced a decline in their LQs.

- Five additional clusters showed increased specialization during this period but had relatively modest 2004 LQs: defense and security (LQ = 1.0); agribusiness, food processing and technology (LQ = 0.9); energy (LQ = 0.9); printing and publishing (LQ = 1.0); and business and financial services (LQ = 0.5). The increase in the LQ for the latter cluster was very significant, increasing by nearly 20 percent.

- Six clusters had relatively low LQs and had also seen their LQs decrease from 2000 through 2004: manufacturing supercluster (LQ = 1.0); arts, entertainment, recreation and visitor industries (LQ = 0.6); glass and ceramics (LQ = 0.6); transportation and logistics (LQ = 0.6); apparel and textiles (LQ = 0.5); and information technology and telecommunications (LQ = 0.4).

Many of the key assets in this eight-county region are located in Monroe County, the county with the largest population and home of Indiana University. When Monroe County is excluded from the analysis, the LQs change significantly for several clusters, indicating that the region is composed of two distinct sub-regions. Most noticeable is the decrease in the LQ of the education and knowledge creation cluster from 3.2 to 0.4. Conversely, the LQs for several clusters increased significantly: mining from 2.9 to 4.3; forestry and wood products from 1.2 to 2.2; defense and security from 1.0 to 1.7; agribusiness, food processing and technology from 0.9 to 1.7; and energy from 0.9 to 1.7. However, two of these clusters—mining and forest and wood products—experienced a small decline in their LQs in the seven-county area between 2000 and through 2004.

This two-stage analysis—with and without Monroe County—suggests an integrated two-pronged development strategy for EGR 8. One component would attempt to take advantage of existing cluster strengths in the more rural areas of the region. The other component would attempt to build stronger connections between the more rural counties in EGR 8 and the metropolitan assets and capacity in Monroe County.

5.3.2. Stakeholder Mobilization and Planning in EGR 8

The research team laid the groundwork for introducing the project and analysis in EGR 8 very deliberately and strategically. The key organizational component was the establishment of a Regional Advisory Committee (RAC) with 25 members from across the eight-county region. RAC participants were identified in March 2006 through interviews with local elected officials, economic development professionals, and other community leaders. The lead economic development official

of each of the eight counties served on the committee, as did eight members of the cooperative extension service from within the region. Other RAC members included representatives from business, government, regional planning organizations, and the nonprofit sector.

Prior to the formation of the RAC, the research team had conducted general networking and awareness building within the region. For example, in the fall of 2005 a media release was distributed announcing the EDA grant and encouraging anyone interested to respond to either Purdue's Center for Regional Development, the Indiana Business Research Center, or the Strategic Development Group. The research team also provided a briefing at a December 2005 BRAC forum in the region hosted by Lt. Governor Skillman.[34]

As the RAC was becoming operational, the planning team initiated additional outreach, including the development of informational flyer, a press release, and a letter from Governor Daniels. These items described the project, explained how local officials and the public could participate and encouraged such participation. All three of the informational materials were sent to presidents of all county commissions, presidents of town councils, clerk-treasurers, and mayors. The media release went to all print media and electronic media in EGR 8. In January 2006, the team interviewed selected community leaders to collect existing local and regional development plans and to obtain nominations for the RAC.

The first meeting of the RAC was held March 28, 2006. This initial meeting introduced the project and the concept of cluster analysis. Subsequent meetings discussed the cluster results, how they could be helpful in launching a regional economic development strategy, and what a process for cluster activation might involve. The RAC also assisted in the design and process for gaining additional local input, including four focus groups and in-depth interviews with key stakeholders and decision-makers, such as local mayors.

Each of the four focus groups targeted a different set of cluster groupings: arts, entertainment, recreation and visitors industries; defense and information technology; biomed/biotech and advanced materials; and agribusiness, forest and wood products and natural resources. At the focus group meetings, the research team presented a series of questions for discussion, which resulted in a number of ideas for specific cluster-based projects that could be undertaken in EGR 8.

To supplement information gathered from Economic Growth Region 8 stakeholders via personal interviews and group meetings, the research team surveyed executives of businesses and other organizations in the region. This survey asked a number of questions about the region's business climate, its assets and liabilities as a place to do business, expectations for their firm's growth, and their views about industries or clusters worth targeting for economic development. Several different survey approaches were attempted (both online and with regular mail) before an adequate response rate was attained.

At the fourth meeting, the RAC agreed that the region did not have the resources to target all 17 clusters simultaneously. The RAC members felt they could narrow their focus by (a) having some additional analysis and information on the 17 clusters and (b) immersing themselves more fully in

[34] One of EGR 8's largest employers is the Naval Surface Warfare Center–Crane, a technology-intensive facility that spans three counties and was under consideration for closure or downsizing in the federal Base Realignment and Closing (BRAC) process. Many economic development leaders from the EGR 8 attended this meeting to learn about the future of the base and the region's economy.

the results of the focus groups and the in-depth interviews that had been completed by the research team.

At the RAC's May 31 meeting, the RAC identified two groups of clusters and four separate clusters for further exploration:

- Energy; Agribusiness, Food Processing and Technology; Forest and Wood Products
- Biomedical/Biotechnology; Advanced Materials
- Arts, Entertainment, Recreation, and Visitor Industries
- Transportation and Logistics
- Defense and Security
- Business and Financial Services

Given the strength of the agribusiness, food processing and technology cluster and the emerging opportunities and demand for alternative energy— especially in biomass—the RAC saw potential for significant growth in this area. In the biomedical/biotechnical (life sciences) cluster, the RAC identified two potential projects. The first is activating a hospital/healthcare roundtable to help small local healthcare groups survive and thrive in a difficult rural environment. The second project is to explore helping small advanced materials and manufacturing firms retool to supply the growing biotechnology industrial sector in Monroe and Owen counties. Several possibilities were identified for the arts and entertainment cluster, ranging from a series of regional festivals to year-around exhibits of the work of regional artists and craftspeople.

The RAC views EGR 8's proximity to two Interstate highways (I-65 and I-64) and the planned continuation of I-69 through the region as holding considerable potential for the transportation and logistics cluster. The RAC believes this cluster can be a major focus in the future.

Because the NSWC Crane is the second largest employer in southwest Indiana, the defense and security cluster was seen as critical to the region's economic future. Three counties in the region have already pioneered a new technology park on the west side of NSWC Crane. At least one county is planning a similar park on the eastern side. Enabling all eight counties to gain from Crane's powerful economic engine was an important choice for the RAC.

The business and financial services sector, whose LQ had increased quite significantly from 2001 to 2004, was seen as a cluster with great potential. The RAC felt EGR 8 is underserved in this cluster and wants to see it develop.

In addition, the RAC recognized the need to focus on two key infrastructure foundations that undergird several of the priority clusters identified:

- Highway Corridors
- Broadband Telecommunications

"Connectivity" is the underlying theme adopted by the RAC. Whether through improving inter-county highways to connect to nearby interstates, developing trails that connect people within counties to improve quality of life, or ensuring that broadband access is available to connect businesses and residents to all parts of the region and global market, the RAC was clear in its desire to promote connectivity.

5.4. Lessons Learned and Future Directions

Many lessons have been learned in the conduct of this study that may be helpful to rural areas seeking to plan and carry out regional economic development strategies. The more generally useful of these are summarized in this final section of the report.

General Observations

- Clusters are a useful concept for strategic planning for rural regional economic development. However, many people are not at all familiar with cluster-based strategies, nor accustomed to thinking in regional terms.
- Contrary to traditional thinking, most rural economies are not dependent upon agriculture. Each region likely has clusters of strength or potential—most often in nonagricultural clusters—that warrant careful analysis and strategic planning. Often rural areas within a region will have existing specialization in some clusters or will have strengths and linkages to clusters in nearby metro areas.
- There is some evidence of potential "convergence" in economic indicators between lagging and high performing counties

Technical Considerations in Conducting the Research

- Non-disclosure of employment and wage data at detailed NAICS levels for many counties is an obstacle to the finer-grained analysis that would be useful with the national database. Researchers throughout the nation have faced this challenge for many years in various contexts. In some states, state economic security or workforce agencies may be willing to collaborate with selected researchers (under carefully controlled conditions) by providing access to detailed data for the state. Such collaboration allowed the present research team to conduct a much more insightful analysis of cluster activity in Indiana and EGR 8 than would otherwise have been possible. If unsuppressed data were readily available for all U.S. counties, a variety of important research questions related to differences in cluster composition vis-à-vis variations in rurality, and many related questions, could be researched more effectively.
- With the success of the Local Employment Dynamics program and its synthetic estimation at the block group level and the significant strides made by the Bureau of Labor Statistics with its business employment dynamics data, the research team believes that over time the federal sources of establishment-based data will eventually provide the necessary level of detail for counties. However, users should take advantage of what is readily available.
- There is a metropolitan bias in the provision of federal data. While researchers are familiar with the problems of sample size for estimates, most economic development practitioners are not. The federal government and the statistical community at large has enhanced many data sets with the use of synthetic and other estimation techniques that provide the information needed without breaching confidentiality. Such data should be made available for all counties and regions, not just metro areas.
- The LQ maps are particularly helpful for portraying rural regions' economies. Generating the numerous maps created for this study was time-consuming, but not overly difficult thanks to the use of standard GIS tools.

- The initial survey of regional business executives initially yielded a lower response rate than the researchers had expected, considering the importance of the subject matter to their economic future. Multiple survey efforts were undertaken to help increase the response rate and reasonable success was achieved. Nevertheless, this was a frustrating and challenging area for the research team in the pilot area.

Lessons Learned Regarding the *Process* of Working with Rural Regions for Economic Development

- To carry out similar analysis and planning in other rural regions, the research team recommends allocating at least a full year to complete the project, including at least six months devoted to working directly with regional stakeholders in the planning process. It takes time to establish new relationships with regional partners in such an undertaking, develop operational procedures, obtain buy-in for the concept and to follow-through on recommendations. The present study benefited greatly from well-established connections in the target region. Even so, non-experts required significant time to understand and apply cluster analysis effectively.
- The concepts and techniques of cluster analysis appear to be a useful tool for regional leaders; however, an educational component on the front end of the project is essential. This type of analysis helps rural stakeholders become more comfortable with regional frameworks and rural-urban interdependencies—realities that may otherwise be difficult to embrace.
- The Regional Advisory Committee (RAC) established in Indiana's EGR 8 has expressed its willingness and intention to continue the planning process begun under this EDA grant. Consequently, efforts are now underway to seek state and other support for implementing the strategies developed by the RAC.
- Although rural stakeholders may not be accustomed to thinking in regional frameworks, this, too, is a mental bridge that can be crossed. In this particular region, the research team did not encounter any resistance to its introduction.
- Rural stakeholders seeking to carry out a project such as this one need to be flexible in defining an appropriate region. They may start with one boundary in mind (which doesn't need to coincide with a pre-existing administrative region), but then decide that some counties should be added or deleted from the original set as they examine the data and talk with stakeholders. In some cases, they might even define their region to include non-contiguous counties.
- Our experience in EGR 8 demonstrates that local community leaders from agriculture, economic development, business, and government can create effective regional strategies based on business clusters. Once regional representatives fully understood the data tools the research team brought to them, they fully bought in to the process.
- One key to our success was that the planning team's planning facilitators gave the regional steering committee the ability and authority to create their strategy. Thus the planning effort was supported by—but not driven by—the facilitators. As a consequence, the plan has buy-in from community leaders in the region and will have a greater chance of being implemented.

Directions for Future Research and Related Activities

The research team identified the following areas as promising for future research and related activities:

- The Index of Relative Rurality (IRR) developed for this study has proved to be a very useful tool in analyzing rural economies. Further research with the IRR is encouraged to evaluate the range of its utility and to validate it in other contexts.
- Much of the analysis of rural America has been overly simplistic. GIS tools and more advanced spatial analysis techniques are not commonly used. It is important that greater use of these more powerful approaches be applied to a wide range of issues facing rural America and its synergies with urban America.
- Analyzing per capita income across the United States without first taking into account cost of living differences can be problematic; thus, it would be beneficial to explore per capita income nationwide after making adjustments for cost of living. This is no small task and it is important to be aware of related work underway that can be most helpful in this regard. For example, the Self-Sufficiency Standard, developed by the University of Washington and the national organization Wider Opportunities for Women, takes into account county-level differences in cost of living (see **Appendix IV**). However, these data are only available for 35 states currently. Additionally, a recent study from the U. S. Department of Agriculture adjusts poverty rates to account for differences in the cost-of-living.[35]
- More research into the effects of data suppression on the accuracy of local and regional cluster descriptions would be beneficial to future cluster analysts and policy-makers.
- Continuing the work in EGR 8:
    - The RAC will seek funding from various sources to support implementation of the strategies developed under this project.
    - The EDA should consider supporting follow-up research in EGR 8 to study how a rural cluster strategy plays out as it moves from the planning to the implementation phase.
    - The research team may establish a blog for EGR 8 to enable interested parties to share their thoughts on the planning process and its implementation.
- There is a need to develop a user-friendly community guidebook (both hard copy and electronic) that will describe step-by-step, in straightforward language, how the planning process was initiated and conducted in EGR 8. The target for this guidebook would be local economic development officials and other community leaders interested in regional economic strategy development and implementation that is grounded in a combination of secondary data, local intelligence, and leadership to mobilize and implement regional efforts.
- To assess the generalizability of this work to other rural areas, similar projects should be conducted in rural regions with characteristics different from EGR 8.
- The time-series data used in the cluster analysis were of limited duration, because the new NAICS codes were first introduced in 2001, and at the time of this study the latest year

[35] Department of Agriculture, Economic Research Service, *The Cost of Living and the Geographic Distribution of Poverty*, Economic Research Reports, no. 26. Available online at http://www.ers.usda.gov/Publications/ERR26/.

available was 2004. Gaining economic insights and examining structural and spatial shifts will be enriched substantially if the analysis undertaken here can be extended over a longer time frame. Given the lag in release of data, a five-year analysis (2001-2006) should be planned for 2008.

- Operationalizing innovation potential is a challenge. More refined measures of educational attainment, such as degrees awarded in sciences and engineering, could be explored. However, these data are not available for workers by county, and data on degrees awarded by school do not reveal where those graduates are working. Further research on effective county-level measures of innovation and human capital is recommended.

Appendix I:
Cluster Taxonomy

Detailed Cluster Definitions

The following list provides the detailed six-digit NAICS definitions for each of the 17 clusters.

NAICS Code	ADVANCED MATERIALS
212325	Clay and ceramic and refractory minerals mining
316211	Rubber and plastics footwear manufacturing
322221	Coated and laminated packaging paper and plastics film manufacturing
322299	All other converted paper product manufacturing
324191	Petroleum lubricating oil and grease manufacturing
325110	Petrochemical manufacturing
325120	Industrial gas manufacturing
325131	Inorganic dye and pigment manufacturing
325132	Synthetic organic dye and pigment manufacturing
325181	Alkalies and chlorine manufacturing
325182	Carbon black manufacturing
325188	All other basic inorganic chemical manufacturing
325191	Gum and wood chemical manufacturing
325192	Cyclic crude and intermediate manufacturing
325193	Ethyl alcohol manufacturing
325199	All other basic organic chemical manufacturing
325211	Plastics material and resin manufacturing
325212	Synthetic rubber manufacturing
325221	Cellulosic organic fiber manufacturing
325222	Noncellulosic organic fiber manufacturing
325320	Pesticide and other ag. chemical manufacturing
325412	Pharmaceutical preparation manufacturing
325413	In-vitro diagnostic substance manufacturing
325414	Other biological product manufacturing
325510	Paint and coating manufacturing
325520	Adhesive manufacturing
325611	Soap and other detergent manufacturing
325612	Polish and other sanitation good manufacturing
325613	Surface active agent manufacturing
325620	Toilet preparation manufacturing

NAICS Code	ADVANCED MATERIALS
325910	Printing ink manufacturing
325920	Explosives manufacturing
325991	Custom compounding of purchased resins
325992	Photographic film and chemical manufacturing
325998	Other miscellaneous chemical product manufacturing
326112	Plastics packaging film and sheet (including laminated) manufacturing
326113	Unlaminated plastics film and sheet (except packaging) manufacturing
326121	Unlaminated plastics profile shape manufacturing
326140	Polystyrene foam product manufacturing
326150	Urethane and other foam product (except polystyrene) manufacturing
326199	All other plastics product manufacturing
326291	Rubber product manufacturing for mechanical use
326299	All other rubber product manufacturing
327112	Vitreous china, fine earthenware, and other pottery product manufacturing
327113	Porcelain electrical supply manufacturing
327124	Clay refractory manufacturing
327125	Nonclay refractory manufacturing
327420	Gypsum product manufacturing
327910	Abrasive product manufacturing
327992	Ground or treated mineral and earth manufacturing
327993	Mineral wool manufacturing
331111	Iron and steel mills
331210	Iron and steel pipe and tube manufacturing from purchased steel
331221	Rolled steel shape manufacturing
331222	Steel wire drawing
331311	Alumina refining
331314	Secondary smelting and alloying of aluminum
331315	Aluminum sheet, plate, and foil manufacturing
331316	Aluminum extruded product manufacturing
331319	Other aluminum rolling and drawing
331411	Primary smelting and refining of copper
331419	Primary nonferrous metal, except CU and AL
331421	Copper rolling, drawing, and extruding
331422	Copper wire, except mechanical, drawing
331423	Secondary processing of copper
331491	Nonferrous metal, except CU and AL, shaping
331492	Secondary processing of other nonferrous
331511	Iron foundries
331512	Steel investment foundries
331513	Steel foundries, except investment

NAICS Code	ADVANCED MATERIALS
331521	Aluminum die-casting foundries
331522	Nonferrous, except AL, die-casting foundries
331524	Aluminum foundries, except die-casting
331525	Copper foundries, except die-casting
331528	Other nonferrous foundries, exc. die-casting
332111	Iron and steel forging
332116	Metal stamping
332117	Powder metallurgy part manufacturing
332313	Plate work manufacturing
332322	Sheet metal work manufacturing
332618	Other fabricated wire product manufacturing
332710	Machine shops
332812	Metal coating, engraving (except jewelry and silverware), and allied services to manufacturers
332813	Electroplating, plating, polishing, anodizing, and coloring
332911	Industrial valve manufacturing
332991	Ball and roller bearing manufacturing
332995	Other ordnance and accessories manufacturing
332997	Industrial pattern manufacturing
332999	All other miscellaneous fabricated metal product manufacturing
333298	All other industrial machinery manufacturing
333313	Office machinery manufacturing
333319	Other commercial and service industry machinery manufacturing
333511	Industrial mold manufacturing
333513	Machine tool (metal forming types) manufacturing
333514	Special die and tool, die set, jig, and fixture manufacturing
333515	Cutting tool and machine tool accessory manufacturing
333518	Other metalworking machinery manufacturing
333912	Air and gas compressor manufacturing
334119	Other computer peripheral equipment manufacturing
334220	Radio and television broadcasting and wireless communications equipment manufacturing
334290	Other communications equipment manufacturing
334411	Electron tube manufacturing
334412	Bare printed circuit board manufacturing
334413	Semiconductors and related device manufacturing
334414	Electronic capacitor manufacturing
334415	Electronic resistor manufacturing
334416	Electronic coils, transformers, and inductors
334417	Electronic connector manufacturing
334418	Printed circuit assembly manufacturing
334419	Other electronic component manufacturing

NAICS Code	ADVANCED MATERIALS
334510	Electromedical and electrotherapeutic apparatus manufacturing
334511	Search, detection, navigation, guidance, aeronautical, and nautical system and instrument manufacturing
334512	Automatic environmental control manufacturing for residential, commercial, and appliance use
334513	Instruments and related products manufacturing for measuring, displaying, and controlling industrial process variables
334514	Totalizing fluid meter and counting device manufacturing
334515	Instrument manufacturing for measuring and testing electricity and electrical signals
334517	Irradiation apparatus manufacturing
334519	Other measuring and controlling device manufacturing
335110	Electric lamp bulb and part manufacturing
335314	Relay and industrial control manufacturing
335921	Fiber optic cable manufacturing
335931	Current-carrying wiring device manufacturing
336322	Other motor vehicle electrical and electronic equipment manufacturing
336399	All other motor vehicle parts manufacturing
336419	Other guided missile and space vehicle parts and auxiliary equipment manufacturing
339111	Laboratory apparatus and furniture manufacturing
339112	Surgical and medical instrument manufacturing
339113	Surgical appliance and supplies manufacturing
339991	Gasket, packing, and sealing device manufacturing
541380	Testing laboratories
541710	Research and development in the physical, engineering, and life sciences
541720	Research and development in the social sciences and humanities

NAICS Code	AGRIBUSINESS, FOOD PROCESSING AND TECHNOLOGY
111110	Soybean farming
111120	Oilseed, except soybean, farming
111130	Dry pea and bean farming
111140	Wheat farming
111150	Corn farming
111160	Rice farming
111191	Oilseed and grain combination farming
111199	All other grain farming
111211	Potato farming
111219	Other vegetable and melon farming
111310	Orange groves
111320	Citrus, except orange, groves
111331	Apple orchards
111332	Grape vineyards
111333	Strawberry farming

NAICS Code	AGRIBUSINESS, FOOD PROCESSING AND TECHNOLOGY
111334	Berry, except strawberry, farming
111335	Tree nut farming
111336	Fruit and tree nut combination farming
111339	Other noncitrus fruit farming
111411	Mushroom production
111419	Other food crops grown under cover
111421	Nursery and tree production
111422	Floriculture production
111910	Tobacco farming
111920	Cotton farming
111930	Sugarcane farming
111940	Hay farming
111991	Sugar beet farming
111992	Peanut farming
111998	All other miscellaneous crop farming
112111	Beef cattle ranching and farming
112112	Cattle feedlots
112120	Dairy cattle and milk production
112210	Hog and pig farming
112310	Chicken egg production
112320	Broilers and meat type chicken production
112330	Turkey production
112340	Poultry hatcheries
112390	Other poultry production
112410	Sheep farming
112420	Goat farming
112511	Finfish farming and fish hatcheries
112512	Shellfish farming
112519	Other animal aquaculture
112910	Apiculture
112920	Horses and other equine production
112930	Fur-bearing animal and rabbit production
112990	All other animal production
115111	Cotton ginning
115112	Soil preparation, planting, and cultivating
115113	Crop harvesting, primarily by machine
115114	Other postharvest crop activities
115115	Farm labor contractors and crew leaders
115116	Farm management services
311111	Dog and cat food manufacturing

NAICS Code	AGRIBUSINESS, FOOD PROCESSING AND TECHNOLOGY
311119	Other animal food manufacturing
311211	Flour milling
311212	Rice milling
311213	Malt manufacturing
311221	Wet corn milling
311222	Soybean processing
311223	Other oilseed processing
311225	Fats and oils refining and blending
311230	Breakfast cereal manufacturing
311311	Sugarcane mills
311312	Cane sugar refining
311313	Beet sugar manufacturing
311320	Confectionery manufacturing from cacao beans
311330	Confectionery manufacturing from purchased chocolate
311340	Nonchocolate confectionery manufacturing
311411	Frozen fruit and vegetable manufacturing
311412	Frozen specialty food manufacturing
311421	Fruit and vegetable canning
311422	Specialty canning
311423	Dried and dehydrated food manufacturing
311511	Fluid milk manufacturing
311512	Creamery butter manufacturing
311513	Cheese manufacturing
311514	Dry, condensed, and evaporated dairy products
311520	Ice cream and frozen dessert manufacturing
311611	Animal, except poultry, slaughtering
311612	Meat processed from carcasses
311613	Rendering and meat byproduct processing
311615	Poultry processing
311811	Retail bakeries
311812	Commercial bakeries
311813	Frozen cakes and other pastries manufacturing
311821	Cookie and cracker manufacturing
311822	Mixes and dough made from purchased flour
311823	Dry pasta manufacturing
311830	Tortilla manufacturing
311911	Roasted nuts and peanut butter manufacturing
311919	Other snack food manufacturing
311920	Coffee and tea manufacturing
311930	Flavoring syrup and concentrate manufacturing

NAICS Code	AGRIBUSINESS, FOOD PROCESSING AND TECHNOLOGY
311941	Mayonnaise, dressing, and sauce manufacturing
311942	Spice and extract manufacturing
311991	Perishable prepared food manufacturing
311999	All other miscellaneous food manufacturing
312111	Soft drink manufacturing
312112	Bottled water manufacturing
312113	Ice manufacturing
312120	Breweries
312130	Wineries
312140	Distilleries
312210	Tobacco stemming and redrying
312221	Cigarette manufacturing
312229	Other tobacco product manufacturing
325311	Nitrogenous fertilizer manufacturing
325312	Phosphatic fertilizer manufacturing
325314	Fertilizer, mixing only, manufacturing
325320	Pesticide and other ag. chemical manufacturing
333111	Farm machinery and equipment manufacturing
333112	Lawn and garden equipment manufacturing
333294	Food product machinery manufacturing
423820	Farm and garden machinery and equipment merchant wholesalers
424510	Grain and field bean whsle
424520	Livestock whsle
424590	Other farm product raw material merchant wholesalers
424910	Farm supplies merchant wholesalers

NAICS Code	APPAREL AND TEXTILES
313111	Yarn spinning mills
313112	Yarn texturizing, throwing, and twisting mills
313113	Thread mills
313210	Broadwoven fabric mills
313221	Narrow fabric mills
313222	Schiffli machine embroidery
313230	Nonwoven fabric mills
313241	Weft knit fabric mills
313249	Other knit fabric and lace mills
313311	Broadwoven fabric finishing mills
313312	Textile and fabric finishing (except broadwoven fabric) mills
313320	Fabric coating mills

NAICS Code	APPAREL AND TEXTILES
314110	Carpet and rug mills
314121	Curtain and drapery mills
314129	Other household textile product mills
314911	Textile bag mills
314912	Canvas and related product mills
314991	Rope, cordage, and twine mills
314992	Tire cord and tire fabric mills
314999	All other miscellaneous textile product mills
315111	Sheer hosiery mills
315119	Other hosiery and sock mills
315191	Outerwear knitting mills
315192	Underwear and nightwear knitting mills
315211	Men's and boys' cut and sew apparel contractors
315212	Women's, girls', and infants' cut and sew apparel contractors
315221	Men's and boys' cut and sew underwear and nightwear manufacturing
315222	Men's and boys' cut and sew suit, coat, and overcoat manufacturing
315223	Men's and boys' cut and sew shirt (except work shirt) manufacturing
315224	Men's and boys' cut and sew trouser, slack, and jean manufacturing
315225	Men's and boys' cut and sew work clothing manufacturing
315228	Men's and boys' cut and sew other outerwear manufacturing
315231	Women's and girls' cut and sew lingerie, loungewear, and nightwear manufacturing
315232	Women's and girls' cut and sew blouse and shirt manufacturing
315233	Women's and girls' cut and sew dress manufacturing
315234	Women's and girls' cut and sew suit, coat, tailored jacket, and skirt manufacturing
315239	Women's and girls' cut and sew other outerwear manufacturing
315291	Infants' cut and sew apparel manufacturing
315292	Fur and leather apparel manufacturing
315299	All other cut and sew apparel manufacturing
315991	Hat, cap, and millinery manufacturing
315992	Glove and mitten manufacturing
315993	Men's and boys' neckwear manufacturing
315999	Other apparel accessories and other apparel manufacturing
323113	Commercial screen printing
327910	Abrasive product manufacturing
325131	Inorganic dye and pigment manufacturing
325132	Synthetic organic dye and pigment manufacturing
325221	Cellulosic organic fiber manufacturing
325222	Noncellulosic organic fiber manufacturing
337910	Mattress manufacturing
337121	Upholstered household furniture manufacturing

NAICS Code	APPAREL AND TEXTILES
339993	Fastener, button, needle, and pin manufacturing
424310	Piece goods, notions, and other dry goods merchant wholesalers
424320	Men's and boys' clothing and furnishings merchant wholesalers
424330	Women's, children's, and infants' clothing and accessories merchant wholesalers
541430	Graphic design services
541490	Other specialized design services
541840	Media representatives
541850	Display advertising
541860	Direct mail advertising
541870	Advertising material distribution services
541890	Other services related to advertising

NAICS Code	ARTS, ENTERTAINMENT, RECREATION AND VISITOR INDUSTRIES
339920	Sporting and athletic goods manufacturing
339931	Doll and stuffed toy manufacturing
339932	Game, toy, and children's vehicle manufacturing
423910	Sporting goods merchant wholesalers
487110	Scenic and sightseeing transportation, land
487210	Scenic and sightseeing transportation, water
487990	Scenic and sightseeing transportation, other
512110	Motion picture and video production
512120	Motion picture and video distribution
512131	Motion picture theaters, except drive-ins
512132	Drive-in motion picture theaters
512191	Teleproduction and postproduction services
512199	Other motion picture and video industries
512210	Record production
512220	Integrated record production and distribution
512230	Music publishers
512240	Sound recording studios
512290	Other sound recording industries
515111	Radio networks
515112	Radio stations
515120	Television broadcasting
515210	Cable and other subscription programming
561510	Travel agencies
561520	Tour operators
561591	Convention and visitors bureaus
561599	All other travel arrangement and reservation services

NAICS Code	ARTS, ENTERTAINMENT, RECREATION AND VISITOR INDUSTRIES
711110	Theater companies and dinner theaters
711120	Dance companies
711130	Musical groups and artists
711190	Other performing arts companies
711211	Sports teams and clubs
711212	Racetracks
711219	Other spectator sports
711310	Promoters with facilities
711320	Promoters without facilities
711410	Agents and managers for public figures
711510	Independent artists, writers, and performers
712110	Museums
712120	Historical sites
712130	Zoos and botanical gardens
712190	Nature parks and other similar institutions
713110	Amusement and theme parks
713120	Amusement arcades
713210	Casinos, except casino hotels
713290	Other gambling industries
713910	Golf courses and country clubs
713920	Skiing facilities
713930	Marinas
713940	Fitness and recreational sports centers
713950	Bowling centers
713990	All other amusement and recreation industries
721110	Hotels and motels, except casino hotels
721120	Casino hotels
721191	Bed-and-breakfast inns
721199	All other traveler accommodation
721211	RV parks and campgrounds
721214	Recreational and vacation camps

NAICS Code	BIOMEDICAL/BIOTECHNICAL (LIFE SCIENCES)
325411	Medicinal and botanical manufacturing
325412	Pharmaceutical preparation manufacturing
325413	In-vitro diagnostic substance manufacturing
325414	Other biological product manufacturing
333314	Optical instrument and lens manufacturing
334510	Electromedical apparatus manufacturing

NAICS Code	BIOMEDICAL/BIOTECHNICAL (LIFE SCIENCES)
334516	Analytical laboratory instrument manufacturing
334517	Irradiation apparatus manufacturing
339111	Laboratory apparatus and furniture manufacturing
339112	Surgical and medical instrument manufacturing
339113	Surgical appliance and supplies manufacturing
339114	Dental equipment and supplies manufacturing
339115	Ophthalmic goods manufacturing
339116	Dental laboratories
423450	Medical equipment merchant wholesalers
423460	Ophthalmic goods merchant wholesalers
446110	Pharmacies and drug stores
446120	Cosmetic and beauty supply stores
446130	Optical goods stores
446191	Food, health, supplement stores
446199	All other health and personal care stores
541710	R&D in physical, engineering and life sciences
541720	R&D in social sciences and humanities
562211	Hazardous waste treatment and disposal
621410	Family planning centers
621420	Outpatient mental health centers
621491	HMO medical centers
621492	Kidney dialysis centers
621493	Freestanding emergency medical centers
621498	All other outpatient care centers
621511	Medical laboratories
621512	Diagnostic imaging centers
621610	Home health care services
621910	Ambulance services
621991	Blood and organ banks
621999	Miscellaneous ambulatory health care services
622110	General medical and surgical hospitals
622210	Psychiatric and substance abuse hospitals
622310	Other hospitals
623110	Nursing care facilities
623210	Residential mental retardation facilities
623220	Residential mental and substance abuse care
623311	Continuing care retirement communities
623312	Homes for the elderly
623990	Other residential care facilities

NAICS Code	BUSINESS AND FINANCIAL SERVICES
323115	Digital printing
323116	Manifold business forms printing
518111	Internet service providers
518112	Web search portals
518210	Data processing and related services
522210	Credit card issuing
522220	Sales financing
522291	Consumer lending
522292	Real estate credit
522293	International trade financing
522294	Secondary market financing
522298	All other nondepository credit intermediation
522310	Mortgage and nonmortgage loan brokers
522320	Financial transaction processing and clearing
522390	Other credit intermediation activities
523110	Investment banking and securities dealing
523120	Securities brokerage
523130	Commodity contracts dealing
523140	Commodity contracts brokerage
523210	Securities and commodity exchanges
523910	Miscellaneous intermediation
523920	Portfolio management
523930	Investment advice
523991	Trust, fiduciary, and custody activities
523999	Miscellaneous financial investment activities
524113	Direct life insurance carriers
524114	Direct health and medical insurance carriers
524126	Direct property and casualty insurers
524127	Direct title insurance carriers
524128	Other direct insurance carriers
524130	Reinsurance carriers
524210	Insurance agencies and brokerages
524291	Claims adjusting
524292	Third party administration of insurance funds
524298	All other insurance related activities
525110	Pension funds
525120	Health and welfare funds
525190	Other insurance funds
525910	Open-end investment funds

NAICS Code	BUSINESS AND FINANCIAL SERVICES
525920	Trusts, estates, and agency accounts
525930	Real estate investment trusts
525990	Other financial vehicles
531311	Residential property managers
531312	Nonresidential property managers
531390	Other activities related to real estate
533110	Lessors of other nonfinancial intangible asset
541110	Offices of lawyers
541120	Offices of notaries
541191	Title abstract and settlement offices
541199	All other legal services
541211	Offices of certified public accountants
541213	Tax preparation services
541214	Payroll services
541219	Other accounting services
541310	Architectural services
541320	Landscape architectural services
541330	Engineering services
541340	Drafting services
541350	Building inspection services
541360	Geophysical surveying and mapping services
541370	Other surveying and mapping services
541380	Testing laboratories
541410	Interior design services
541420	Industrial design services
541430	Graphic design services
541490	Other specialized design services
541511	Custom computer programming services
541512	Computer systems design services
541513	Computer facilities management services
541519	Other computer related services
541611	Administrative management consulting services
541612	Human resource consulting services
541613	Marketing consulting services
541614	Process and logistics consulting services
541618	Other management consulting services
541620	Environmental consulting services
541690	Other technical consulting services
541810	Advertising agencies
541820	Public relations agencies

NAICS Code	BUSINESS AND FINANCIAL SERVICES
541830	Media buying agencies
541840	Media representatives
541850	Display advertising
541860	Direct mail advertising
541870	Advertising material distribution services
541910	Marketing research and public opinion polling
541922	Commercial photography

NAICS Code	CHEMICALS AND CHEMICAL-BASED PRODUCTS
325110	Industrial gas manufacturing
325120	Inorganic dye and pigment manufacturing
325131	Synthetic organic dye and pigment manufacturing
325132	Alkalies and chlorine manufacturing
325181	Carbon black manufacturing
325182	Carbon black manufacturing
325188	All other basic inorganic chemical manufacturing
325191	Gum and wood chemical manufacturing
325192	Cyclic crude and intermediate manufacturing
325193	Ethyl alcohol manufacturing
325199	All other basic organic chemical manufacturing
325211	Plastics material and resin manufacturing
325212	Synthetic rubber manufacturing
325221	Cellulosic organic fiber manufacturing
325222	Noncellulosic organic fiber manufacturing
325311	Nitrogenous fertilizer manufacturing
325312	Phosphatic fertilizer manufacturing
325314	Fertilizer, mixing only, manufacturing
325320	Pesticide and other ag. chemical manufacturing
325411	Medicinal and botanical manufacturing
325412	Pharmaceutical preparation manufacturing
325413	In-vitro diagnostic substance manufacturing
325414	Other biological product manufacturing
325510	Paint and coating manufacturing
325520	Adhesive manufacturing
325611	Soap and other detergent manufacturing
325612	Polish and other sanitation good manufacturing
325613	Surface active agent manufacturing
325620	Toilet preparation manufacturing
325910	Printing ink manufacturing

NAICS Code	CHEMICALS AND CHEMICAL-BASED PRODUCTS
325920	Explosives manufacturing
325991	Custom compounding of purchased resins
325992	Photographic film and chemical manufacturing
325998	Other miscellaneous chemical product manufacturing
326111	Plastics bag manufacturing
326112	Plastics packaging film and sheet manufacturing
326113	Nonpackaging plastics film and sheet manufacturing
326121	Unlaminated plastics profile shape manufacturing
326122	Plastics pipe and pipe fitting manufacturing
326130	Laminated plastics plate, sheet, and shapes
326140	Polystyrene foam product manufacturing
326150	Urethane and other foam product manufacturing
326160	Plastics bottle manufacturing
326191	Plastics plumbing fixture manufacturing
326192	Resilient floor covering manufacturing
326199	All other plastics product manufacturing
326211	Tire manufacturing, except retreading
326212	Tire retreading
326220	Rubber and plastics hose and belting manufacturing
326291	Rubber product manufacturing for mechanical use
326299	All other rubber product manufacturing
327111	Vitreous china plumbing fixture manufacturing
327112	Vitreous china and earthenware articles manufacturing
327113	Porcelain electrical supply manufacturing
327121	Brick and structural clay tile manufacturing
327122	Ceramic wall and floor tile manufacturing
327123	Other structural clay product manufacturing
327124	Clay refractory manufacturing
327125	Nonclay refractory manufacturing
327211	Flat glass manufacturing
327212	Other pressed and blown glass and glassware
327213	Glass container manufacturing
327215	Glass product manufacturing made of purchased glass
327310	Cement manufacturing
327320	Ready-mix concrete manufacturing
327331	Concrete block and brick manufacturing
327332	Concrete pipe manufacturing
327390	Other concrete product manufacturing
327410	Lime manufacturing
327420	Gypsum product manufacturing

NAICS Code	CHEMICALS AND CHEMICAL-BASED PRODUCTS
327910	Abrasive product manufacturing
327991	Cut stone and stone product manufacturing
327992	Ground or treated minerals and earths manufacturing
327993	Mineral wool manufacturing
327999	Miscellaneous nonmetallic mineral products
424610	Plastics materials merchant wholesalers
424690	Other chemicals merchant wholesalers
424710	Petroleum bulk stations and terminals
424720	Other petroleum merchant wholesalers

NAICS Code	DEFENSE AND SECURITY
212291	Uranium-radium-vanadium ore mining
237130	Power and communication line and related structures construction
325920	Explosives manufacturing
332912	Fluid power valve and hose fitting manufacturing
332992	Small arms ammunition manufacturing
332993	Ammunition (except small arms) manufacturing
332994	Small arms manufacturing
332995	Other ordnance and accessories manufacturing
339113	Surgical appliance and supplies manufacturing
334290	Other communications equipment manufacturing
334511	Search, detection, navigation, guidance, aeronautical, and nautical system and instrument manufacturing
336411	Aircraft manufacturing
336412	Aircraft engine and engine parts manufacturing
336413	Other aircraft parts and auxiliary equipment manufacturing
336414	Guided missile and space vehicle manufacturing
336415	Guided missile and space vehicle propulsion unit and propulsion unit parts manufacturing
336419	Other guided missile and space vehicle parts and auxiliary equipment manufacturing
336611	Ship building and repairing
336612	Boat building
336992	Military armored vehicle, tank, and tank component manufacturing
423110	Automobile and other motor vehicle merchant wholesalers
423120	Motor vehicle supplies and new parts merchant wholesalers
423130	Tire and tube merchant wholesalers
423140	Motor vehicle parts (used) merchant wholesalers
423860	Transportation equipment and supplies (except motor vehicle) merchant wholesalers
541511	Custom computer programming services
541512	Computer systems design services
541513	Computer facilities management services

NAICS Code	DEFENSE AND SECURITY
541519	Other computer related services
541710	Research and development in the physical, engineering, and life sciences
561611	Investigation services
561612	Security guards and patrol services
561613	Armored car services
561621	Security systems services (except locksmiths)
561622	Locksmiths
811490	Other personal and household goods repair and maintenance (includes gun repair and maintenance)
922110	Courts
922120	Police protection
922130	Legal counsel and prosecution
922140	Correctional institutions
922150	Parole offices and probation offices
922160	Fire protection
922190	Other justice, public order, and safety activities
926120	Regulation and administration of transportation programs (includes coastguard and merchant marine)
927110	Space research and technology
928110	National security
928120	International affairs

NAICS Code	EDUCATION AND KNOWLEDGE CREATION
611210	Junior colleges
611310	Colleges, universities and professional schools
611410	Business and secretarial schools
611420	Computer training
611430	Management training
611511	Cosmetology and barber schools
611512	Flight training
611513	Apprenticeship training
611519	Other technical and trade schools
611610	Fine arts schools
611620	Sports and recreation instruction
611630	Language schools
611691	Exam preparation and tutoring
611692	Automobile driving schools
611699	Miscellaneous schools and instruction
611710	Educational support services
511110	Newspaper publishers
511120	Periodical publishers

NAICS Code	EDUCATION AND KNOWLEDGE CREATION
511130	Book publishers
516110	Internet publishing and broadcasting
519110	News syndicates
519120	Libraries and archives

NAICS Code	ENERGY (FOSSIL AND RENEWABLE)
211111	Crude petroleum and natural gas extraction
211112	Natural gas liquid extraction
212111	Bituminous coal and lignite surface mining
212112	Bituminous coal underground mining
212113	Anthracite mining
212291	Uranium-Radium-Vanadium ore mining
213111	Drilling oil and gas wells
213112	Support activities for oil and gas operations
213113	Support activities for coal mining
213114	Support activities for metal mining
221111	Hydroelectric power generation
221112	Fossil fuel electric power generation
221113	Nuclear electric power generation
221119	Other electric power generation
221121	Electric bulk power transmission and control
221122	Electric power distribution
221210	Natural gas distribution
221330	Steam and air-conditioning supply
237110	Water and sewer line and related structures construction (includes geothermal drilling)
237120	Oil and gas pipeline and related structures construction
237130	Power and communication line and related structures construction
237990	Other heavy and civil engineering construction (includes dams and hydroelectric facilities)
238210	Electrical contractors
238220	Plumbing, heating, and air-conditioning contractors
324110	Petroleum refineries
324199	All other petroleum and coal products manufacturing
325110	Petrochemical manufacturing
325120	Industrial gas manufacturing
325191	Gum and wood chemical manufacturing (include coke and charcoal)
325193	Ethyl alcohol manufacturing (includes ethanol manuf.)
332410	Power boiler and heat exchanger manufacturing
332420	Metal tank (heavy gauge) manufacturing
333131	Mining machinery and equipment manufacturing
333132	Oil and gas field machinery and equipment manufacturing

NAICS Code	ENERGY (FOSSIL AND RENEWABLE)
333414	Heating equipment (except warm air furnaces) manufacturing (includes solar and hydronic heating equipment manufacturing)
333611	Turbine and turbine generator set units manufacturing
334413	Semiconductor and related device manufacturing
334519	Other measuring and controlling device manufacturing
335311	Power, distribution, and specialty transformer manufacturing
335312	Motor and generator manufacturing
335313	Switchgear and switchboard apparatus manufacturing
335314	Relay and industrial control manufacturing
335911	Storage battery manufacturing
335912	Primary battery manufacturing
335929	Other communication and energy wire manufacturing
335931	Current-carrying wiring device manufacturing
335991	Carbon and graphite product manufacturing
335999	All other miscellaneous electrical equipment and component manufacturing
423520	Coal and other mineral and ore merchant wholesalers
423610	Electrical apparatus and equipment, wiring supplies, and related equipment merchant wholesalers
423690	Other electronic parts and equipment merchant wholesalers
423720	Plumbing and heating equipment and supplies (hydronics) merchant wholesalers
424710	Petroleum bulk stations and terminals
424720	Petroleum and petroleum products merchant wholesalers (except bulk stations and terminals)
447110	Gasoline stations with convenience stores
447190	Other gasoline stations
454311	Heating oil dealers
454312	Liquefied petroleum gas (bottled gas) dealers
454319	Other fuel dealers
486110	Pipeline transportation of crude oil
486210	Pipeline transportation of natural gas
486910	Pipeline transportation of refined petroleum products
486990	All other pipeline transportation
523910	Miscellaneous intermediation (includes mineral and oil royalties dealing)
523999	Miscellaneous financial investment activities (includes oil and gas lease brokers)
532412	Construction, mining, and forestry machinery and equipment rental and leasing
533110	Lessors of nonfinancial intangible assets (except copyrighted works) (includes oil royalty companies and leasing)
541330	Engineering services
541360	Geophysical surveying and mapping services
541380	Testing laboratories
541620	Environmental consulting services
541690	Other scientific and technical consulting services
541710	Research and development in the physical, engineering, and life sciences

NAICS Code	ENERGY (FOSSIL AND RENEWABLE)
926130	Regulation and administration of communications, electric, gas, and other utilities

NAICS Code	FOREST AND WOOD PRODUCTS
113110	Timber tract operations
113210	Forest nurseries and gathering forest products
113310	Logging
115310	Forestry support activities
238130	Framing contractors
238610	Shake and shingle, roof, installation
238170	Wood siding, installation
238330	Hardwood flooring
238350	Finish carpentry contractors
321113	Sawmills
321114	Wood preservation
321211	Hardwood veneer and plywood manufacturing
321212	Softwood veneer and plywood manufacturing
321213	Engineered wood member manufacturing
321214	Truss manufacturing
321219	Reconstituted wood product manufacturing
321911	Wood window and door manufacturing
321912	Cut stock, resawing lumber, and planing
321918	Other millwork, including flooring
321920	Wood container and pallet manufacturing
321991	Manufactured home (mobile home) manufacturing
321992	Prefabricated wood building manufacturing
321999	All other miscellaneous wood product manufacturing
322110	Pulp mills
322121	Paper, except newsprint, mills
322122	Newsprint mills
322130	Paperboard mills
322231	Die-cut paper and paperboard office supplies manufacturing
322211	Corrugated and solid fiber box manufacturing
322212	Folding paperboard box manufacturing
322213	Setup paperboard box manufacturing
322214	Fiber can, tube, and drum manufacturing
322215	Nonfolding sanitary food container manufacturing
322221	Coated and laminated packaging materials manufacturing
322222	Coated and laminated paper manufacturing
322223	Plastics, foil, and coated paper bag manufacturing
322224	Uncoated paper and multiwall bag manufacturing

NAICS Code	FOREST AND WOOD PRODUCTS
322225	Flexible packaging foil manufacturing
322226	Surface-coated paperboard manufacturing
322231	Die-cut paper office supplies manufacturing
322232	Envelope manufacturing
322233	Stationery and related product manufacturing
322291	Sanitary paper product manufacturing
322299	All other converted paper product manufacturing
323117	Books printing
325510	Paint and coating manufacturing
325191	Gum and wood chemical manufacturing
325520	Adhesive manufacturing
327910	Abrasive products manufacturing
332213	Wood cutting saw blades manufacturing
333210	Sawmill and woodworking machinery manufacturing
333291	Paper industry machinery manufacturing
333991	Power-driven handtool manufacturing
337110	Wood kitchen cabinet and countertop manufacturing
337121	Upholstered household furniture manufacturing
337122	Nonupholstered wood household furniture manufacturing
337127	Institutional furniture manufacturing
337129	Wood TV, radio, sewing machine cabinet manufacturing
337211	Wood office furniture manufacturing
337212	Custom architectural woodwork and millwork manufacturing
337215	Showcase, partition, shelving and locker manufacturing
337920	Blind and shade manufacturing
339992	Musical Instrument manufacturing
339995	Burial Casket manufacturing
423210	Furniture merchant wholesalers
423310	Lumber, Plywood, Millwork, and Wood Panel Merchant Wholesalers

NAICS Code	GLASS AND CERAMICS
327111	Vitreous china plumbing fixture manufacturing
327112	Vitreous china and earthenware articles manufacturing
327113	Porcelain electrical supply manufacturing
327121	Brick and structural clay tile manufacturing
327122	Ceramic wall and floor tile manufacturing
327123	Other structural clay product manufacturing
327124	Clay refractory manufacturing
327125	Nonclay refractory manufacturing

NAICS Code	GLASS AND CERAMICS
327211	Flat glass manufacturing
327212	Other pressed and blown glass and glassware
327213	Glass container manufacturing
327215	Glass product manufacturing made of purchased glass
327310	Cement manufacturing
327992	Ground or treated minerals and earths manufacturing
327999	Miscellaneous nonmetallic mineral products
332812	Metal coating, engraving (except jewelry and silverware), and allied services to manufacturers
332813	Electroplating, plating, polishing, anodizing, and coloring

NAICS Code	INFORMATION TECHNOLOGY AND TELECOMMUNICATIONS
238210	Electrical contractors
333613	Mechanical power transmission equipment manufacturing
333295	Semiconductor machinery manufacturing
334111	Electronic computer manufacturing
334112	Computer storage device manufacturing
334113	Computer terminal manufacturing
334119	Other computer peripheral equipment manufacturing
334210	Telephone apparatus manufacturing
334220	Broadcast and wireless communications equip.
334290	Other communications equipment manufacturing
334310	Audio and video equipment manufacturing
334411	Electron tube manufacturing
334412	Bare printed circuit board manufacturing
334413	Semiconductors and related device manufacturing
334414	Electronic capacitor manufacturing
334415	Electronic resistor manufacturing
334416	Electronic coils, transformers, and inductors
334417	Electronic connector manufacturing
334418	Printed circuit assembly manufacturing
334419	Other electronic component manufacturing
334512	Automatic environmental control manufacturing
334513	Industrial process variable instruments
334515	Electricity and signal testing instruments
334516	Analytical laboratory instrument manufacturing
334518	Watch, clock, and part manufacturing
334611	Software reproducing
334612	Audio and video media reproduction
334613	Magnetic and optical recording media manufacturing

NAICS Code	INFORMATION TECHNOLOGY AND TELECOMMUNICATIONS
335311	Electric power and specialty transformer manufacturing
335312	Motor and generator manufacturing
335313	Switchgear and switchboard apparatus manufacturing
335314	Relay and industrial control manufacturing
335911	Storage battery manufacturing
335912	Primary battery manufacturing
335921	Fiber optic cable manufacturing
335929	Other communication and energy wire manufacturing
335931	Current-carrying wiring device manufacturing
335932	Noncurrent-carrying wiring device manufacturing
335991	Carbon and graphite product manufacturing
335999	Miscellaneous electrical equipment manufacturing
423430	Computer and peripheral equip and software whsle
423690	Other electronic parts and equipment whsle
511210	Software publishers
517110	Wired telecommunications carriers
517211	Paging
517212	Cellular and other wireless carriers
517310	Telecommunications resellers
517410	Satellite telecommunications
517910	Other telecommunications
518111	Internet service providers (ISPs)
518112	Web search portals
518210	Data processing and related services
541511	Custom computer programming services
541512	Computer systems design services
541513	Computer facilities management services
541519	Other computer related services
541618	Other management consulting services
541710	Physical, engineering and biological research
541720	Social science and humanities research
926130	Regulation and administration of communications, electric, gas, and other utilities

NAICS Code	MANUFACTURING SUPERCLUSTER
331	**Primary metal manufacturing subcluster**
331111	Iron and steel mills
331112	Ferroalloy and related product manufacturing
331210	Iron, steel pipe and tube from purchase steel
331221	Rolled steel shape manufacturing
331222	Steel wire drawing
331311	Alumina refining
331312	Primary aluminum production
331314	Secondary smelting and alloying of aluminum
331315	Aluminum sheet, plate, and foil manufacturing
331316	Aluminum extruded product manufacturing
331319	Other aluminum rolling and drawing
331411	Primary smelting and refining of copper
331419	Primary nonferrous metal, except CU and AL
331422	Copper wire, except mechanical, drawing
331423	Secondary processing of copper
331491	Nonferrous metal, except CU and AL, shaping
331492	Secondary processing of other nonferrous
331511	Iron foundries
331512	Steel investment foundries
331513	Steel foundries, except investment
331521	Aluminum die-casting foundries
331522	Nonferrous, except AL, die-casting foundries
331524	Aluminum foundries, except die-casting
331525	Copper foundries, except die-casting
331528	Other nonferrous foundries, exc. die-casting
332	**Fabricated metal product manufacturing subcluster**
332111	Iron and steel forging
332112	Nonferrous forging
332114	Custom roll forming
332115	Crown and closure manufacturing
332116	Metal stamping
332117	Powder metallurgy part manufacturing
332211	Cutlery and flatware, except precious, manufacturing
332212	Hand and edge tool manufacturing
332213	Saw blade and handsaw manufacturing
332214	Kitchen utensil, pot, and pan manufacturing
332311	Prefabricated metal buildings and components
332312	Fabricated structural metal manufacturing

NAICS Code	MANUFACTURING SUPERCLUSTER
332313	Plate work manufacturing
332321	Metal window and door manufacturing
332322	Sheet metal work manufacturing
332323	Ornamental and architectural metal work manufacturing
332410	Power boiler and heat exchanger manufacturing
332420	Metal tank, heavy gauge, manufacturing
332431	Metal can manufacturing
332439	Other metal container manufacturing
332510	Hardware manufacturing
332611	Spring, heavy gauge, manufacturing
332612	Spring, light gauge, manufacturing
332618	Other fabricated wire product manufacturing
332710	Machine shops
332721	Precision turned product manufacturing
332722	Bolt, nut, screw, rivet, and washer manufacturing
332811	Metal heat treating
332812	Metal coating and nonprecious engraving
332813	Electroplating, anodizing, and coloring metal
332911	Industrial valve manufacturing
332912	Fluid power valve and hose fitting manufacturing
332913	Plumbing fixture fitting and trim manufacturing
332919	Other metal valve and pipe fitting manufacturing
332991	Ball and roller bearing manufacturing
332996	Fabricated pipe and pipe fitting manufacturing
332997	Industrial pattern manufacturing
332998	Enameled iron and metal sanitary ware manufacturing
332999	Miscellaneous fabricated metal product manufacturing
333	**Machinery manufacturing subcluster**
333111	Farm machinery and equipment manufacturing
333112	Lawn and garden equipment manufacturing
333120	Construction machinery manufacturing
333131	Mining machinery and equipment manufacturing
333132	Oil and gas field machinery and equipment
333210	Sawmill and woodworking machinery
333220	Plastics and rubber industry machinery
333291	Paper industry machinery manufacturing
333292	Textile machinery manufacturing
333293	Printing machinery and equipment manufacturing
333294	Food product machinery manufacturing
333295	Semiconductor machinery manufacturing

NAICS Code	MANUFACTURING SUPERCLUSTER
333298	All other industrial machinery manufacturing
333311	Automatic vending machine manufacturing
333312	Commercial laundry and drycleaning machinery
333313	Office machinery manufacturing
333314	Optical instrument and lens manufacturing
333315	Photographic and photocopying equipment manufacturing
333319	Other commercial and service machinery manufacturing
333411	Air purification equipment manufacturing
333412	Industrial and commercial fan and blower manufacturing
333414	Heating equipment, except warm air furnaces
333415	AC, refrigeration, and forced air heating
333511	Industrial mold manufacturing
333512	Metal cutting machine tool manufacturing
333513	Metal forming machine tool manufacturing
333514	Special tool, die, jig, and fixture manufacturing
333515	Cutting tool and machine tool accessory manufacturing
333516	Rolling mill machinery and equipment manufacturing
333518	Other metalworking machinery manufacturing
333611	Turbine and turbine generator set units manufacturing
333612	Speed changer, drive, and gear manufacturing
333613	Mechanical power transmission equipment manufacturing
333618	Other engine equipment manufacturing
333911	Pump and pumping equipment manufacturing
333912	Air and gas compressor manufacturing
333913	Measuring and dispensing pump manufacturing
333921	Elevator and moving stairway manufacturing
333922	Conveyor and conveying equipment manufacturing
333923	Overhead cranes, hoists, and monorail systems
333924	Industrial truck, trailer, and stacker manufacturing
333991	Power-driven handtool manufacturing
333992	Welding and soldering equipment manufacturing
333993	Packaging machinery manufacturing
333994	Industrial process furnace and oven manufacturing
333995	Fluid power cylinder and actuator manufacturing
333996	Fluid power pump and motor manufacturing
333997	Scale and balance, except laboratory, manufacturing
333999	Miscellaneous general purpose machinery manufacturing
334	**Computer and electronic product manufacturing subcluster**
334111	Electronic computer manufacturing
334112	Computer storage device manufacturing

NAICS Code	MANUFACTURING SUPERCLUSTER
334113	Computer terminal manufacturing
334119	Other computer peripheral equipment manufacturing
334210	Telephone apparatus manufacturing
334220	Broadcast and wireless communications equip.
334290	Other communications equipment manufacturing
334310	Audio and video equipment manufacturing
334411	Electron tube manufacturing
334412	Bare printed circuit board manufacturing
334413	Semiconductors and related device manufacturing
334414	Electronic capacitor manufacturing
334415	Electronic resistor manufacturing
334416	Electronic coils, transformers, and inductors
334417	Electronic connector manufacturing
334418	Printed circuit assembly manufacturing
334419	Other electronic component manufacturing
334510	Electromedical apparatus manufacturing
334511	Search, detection, and navigation instruments
334512	Automatic environmental control manufacturing
334513	Industrial process variable instruments
334514	Totalizing fluid meters and counting devices
334515	Electricity and signal testing instruments
334516	Analytical laboratory instrument manufacturing
334517	Irradiation apparatus manufacturing
334518	Watch, clock, and part manufacturing
334519	Other measuring and controlling device manufacturing
334611	Software reproducing
334612	Audio and video media reproduction
334613	Magnetic and optical recording media manufacturing
335	**Electrical equip, appliance and component manufacturing subcluster**
335110	Electric lamp bulb and part manufacturing
335121	Residential electric lighting fixture manufacturing
335122	Nonresidential electric lighting fixture manufacturing
335129	Other lighting equipment manufacturing
335211	Electric housewares and household fan manufacturing
335212	Household vacuum cleaner manufacturing
335221	Household cooking appliance manufacturing
335222	Household refrigerator and home freezer manufacturing
335224	Household laundry equipment manufacturing
335228	Other major household appliance manufacturing
335311	Electric power and specialty transformer manufacturing

NAICS Code	MANUFACTURING SUPERCLUSTER
335312	Motor and generator manufacturing
335313	Switchgear and switchboard apparatus manufacturing
335314	Relay and industrial control manufacturing
335911	Storage battery manufacturing
335912	Primary battery manufacturing
335921	Fiber optic cable manufacturing
335929	Other communication and energy wire manufacturing
335931	Current-carrying wiring device manufacturing
335932	Noncurrent-carrying wiring device manufacturing
335991	Carbon and graphite product manufacturing
335999	Miscellaneous electrical equipment manufacturing
336	**Transportation equipment manufacturing subcluster**
336111	Automobile manufacturing
336112	Light truck and utility vehicle manufacturing
336120	Heavy duty truck manufacturing
336211	Motor vehicle body manufacturing
336212	Truck trailer manufacturing
336213	Motor home manufacturing
336214	Travel trailer and camper manufacturing
336311	Carburetor, piston, ring, and valve manufacturing
336312	Gasoline engine and engine parts manufacturing
336321	Vehicular lighting equipment manufacturing
336322	Other motor vehicle electric equipment manufacturing
336330	Motor vehicle steering and suspension parts
336340	Motor vehicle brake system manufacturing
336350	Motor vehicle power train components manufacturing
336360	Motor vehicle seating and interior trim manufacturing
336370	Motor vehicle metal stamping
336391	Motor vehicle air-conditioning manufacturing
336399	All other motor vehicle parts manufacturing
336411	Aircraft manufacturing
336412	Aircraft engine and engine parts manufacturing
336413	Other aircraft parts and equipment
336414	Guided missile and space vehicle manufacturing
336415	Space vehicle propulsion units and parts manufacturing
336419	Other guided missile and space vehicle parts
336510	Railroad rolling stock manufacturing
336611	Ship building and repairing
336612	Boat building
336991	Motorcycle, bicycle, and parts manufacturing

NAICS Code	MANUFACTURING SUPERCLUSTER
336992	Military armored vehicles and tank parts manufacturing
336999	All other transportation equipment manufacturing

NAICS Code	MINING
212210	Iron ore mining
212221	Gold ore mining
212222	Silver ore mining
212231	Lead ore and zinc ore mining
212234	Copper ore and nickel ore mining
212291	Uranium-radium-vanadium ore mining
212299	All other metal ore mining
212311	Dimension stone mining and quarrying
212312	Crushed and broken limestone mining
212313	Crushed and broken granite mining
212319	Other crushed and broken stone mining
212321	Construction sand and gravel mining
212322	Industrial sand mining
212324	Kaolin and ball clay mining
212325	Clay, ceramic, and refractory minerals mining
212391	Potash, soda, and borate mineral mining
212392	Phosphate rock mining
212393	Other chemical and fertilizer mineral mining
212399	All other nonmetallic mineral mining
213114	Support activities for metal mining
213115	Support activities for nonmetallic minerals
482111	Line-haul railroads
482112	Short line railroads
532412	Construction, mining, and forestry machinery and equipment rental and leasing

NAICS Code	PRINTING AND PUBLISHING
323110	Commercial lithographic printing
323111	Commercial gravure printing
323112	Commercial flexographic printing
323113	Commercial screen printing
323114	Quick printing
323115	Digital printing
323116	Manifold business forms printing
323117	Books printing
323118	Blankbook, looseleaf binders, and devices manufacturing

NAICS Code	PRINTING AND PUBLISHING
323119	Other commercial printing
323121	Tradebinding and related work
323122	Prepress services
325910	Printing ink manufacturing
339950	Sign manufacturing
511110	Newspaper publishers
511120	Periodical publishers
511130	Book publishers
511140	Directory and mailing list publishers
511191	Greeting card publishers
511199	All other publishers
515111	Radio networks
515112	Radio stations
515210	Cable and other subscription programming
516110	Internet publishing and broadcasting
519110	News syndicates
519190	All other information services
541430	Graphic design services
541613	Marketing consulting services
541810	Advertising agencies
541820	Public relations agencies
541830	Media buying agencies
541840	Media representatives
541850	Display advertising
541860	Direct mail advertising
541870	Advertising material distribution services
541890	Other services related to advertising
541910	Marketing research and public opinion polling
541922	Commercial photography

NAICS Code	TRANSPORTATION AND LOGISTICS
481111	Scheduled passenger air transportation
481112	Scheduled freight air transportation
481211	Nonscheduled air passenger chartering
481212	Nonscheduled air freight chartering
481219	Other nonscheduled air transportation
482111	Line-haul railroads
482112	Short line railroads
483111	Deep sea freight transportation

NAICS Code	TRANSPORTATION AND LOGISTICS
483112	Deep sea passenger transportation
483113	Coastal and Great Lakes freight transportation
483114	Coastal and Great Lakes passenger transportation
483211	Inland water freight transportation
483212	Inland water passenger transportation
484110	General freight trucking, local
484121	General freight trucking, long-distance TL
484122	General freight trucking, long-distance LTL
484210	Used household and office goods moving
484220	Other specialized trucking, local
484230	Other specialized trucking, long-distance
485112	Commuter rail systems
485510	Charter bus industry
485999	All other ground passenger transportation
486110	Pipeline transportation of crude oil
486210	Pipeline transportation of natural gas
486910	Refined petroleum product pipeline transportation
486990	All other pipeline transportation
488111	Air traffic control
488119	Other airport operations
488190	Other support activities for air transportation
488210	Support activities for rail transportation
488310	Port and harbor operations
488320	Marine cargo handling
488330	Navigational services to shipping
488390	Other support activities for water transportation
488410	Motor vehicle towing
488490	Other support activities for road transportation
488510	Freight transportation arrangement
488991	Packing and crating
488999	All other support activities for transportation
492110	Couriers
492210	Local messengers and local delivery
493110	General warehousing and storage
493120	Refrigerated warehousing and storage
493130	Farm product warehousing and storage
493190	Other warehousing and storage
532411	Commercial air, rail, and water transportation equipment rental and leasing
541614	Process, phys dist and log consulting services
561910	Packaging and labeling services

Aggregated Cluster Definitions

To minimize the problems caused by data suppression in the nationwide county analysis, the research team revised the six-digit cluster definitions to use three-digit NAICS sectors wherever possible, minimizing reliance upon more-detailed NAICS levels as much as possible. The following list provides these definitions for each of the 17 clusters.

NAICS Code	ADVANCED MATERIALS
212325	Clay and ceramic and refractory minerals mining
316211	Rubber and plastics footwear manufacturing
322221	Coated and laminated packaging paper and plastics film manufacturing
322299	All other converted paper product manufacturing
324191	Petroleum lubricating oil and grease manufacturing
3251	Basic chemical manufacturing
3252	Resin, synthetic rubber, and artificial synthetic fibers and filaments manufacturing
32532	Pesticide and other agricultural chemical manufacturing
3254	Pharmaceutical and medicine manufacturing **(except 325411)**
3255	Paint, coating, and adhesive manufacturing
3256	Soap, cleaning compound, and toilet preparation manufacturing
326112	Plastics packaging film and sheet (including laminated) manufacturing
326113	Unlaminated plastics film and sheet (except packaging) manufacturing
326121	Unlaminated plastics profile shape manufacturing
32614	Polystyrene foam product manufacturing
326199	All other plastics product manufacturing
32629	Other rubber product manufacturing
327112	Vitreous china, fine earthenware, and other pottery product manufacturing
327113	Porcelain electrical supply manufacturing
327124	Clay refractory manufacturing
327125	Nonclay refractory manufacturing
32742	Gypsum product manufacturing
327910	Abrasive product manufacturing
327992	Ground or treated mineral and earth manufacturing
327993	Mineral wool manufacturing
3311	Iron and steel mills and ferroalloy manufacturing
3312	Steel product manufacturing from purchased steel
3313	Alumina and aluminum production and processing **(except 331311)**
3314	Nonferrous metal (except aluminum) production and processing
3315	Foundries
332111	Iron and steel forging
332116	Metal stamping

NAICS Code	ADVANCED MATERIALS
332117	Powder metallurgy part manufacturing
332313	Plate work manufacturing
332322	Sheet metal work manufacturing
332618	Other fabricated wire product manufacturing
33271	Machine shops
332812	Metal coating, engraving (except jewelry and silverware), and allied services to manufacturers
332813	Electroplating, plating, polishing, anodizing, and coloring
332911	Industrial valve manufacturing
332991	Ball and roller bearing manufacturing
332995	Other ordnance and accessories manufacturing
332997	Industrial pattern manufacturing
332999	All other miscellaneous fabricated metal product manufacturing
333298	All other industrial machinery manufacturing
333313	Office machinery manufacturing
333319	Other commercial and service industry machinery manufacturing
3335	Metalworking machinery manufacturing **(except 333512, 6)**
333912	Air and gas compressor manufacturing
334119	Other computer peripheral equipment manufacturing
334220	Radio and television broadcasting and wireless communications equipment manufacturing
334290	Other communications equipment manufacturing
3344	Semiconductor and other electronic component manufacturing
3345	Navigational, measuring, electromedical, and control instruments manufacturing **(except 334516, 8)**
33511	Electric lamp bulb and part manufacturing
335314	Relay and industrial control manufacturing
335921	Fiber optic cable manufacturing
335931	Current-carrying wiring device manufacturing
336322	Other motor vehicle electrical and electronic equipment manufacturing
336399	All other motor vehicle parts manufacturing
336419	Other guided missile and space vehicle parts and auxiliary equipment manufacturing
339111	Laboratory apparatus and furniture manufacturing
339112	Surgical and medical instrument manufacturing
339113	Surgical appliance and supplies manufacturing
339991	Gasket, packing, and sealing device manufacturing
54138	Testing laboratories
5417	Scientific research and development services

NAICS Code	AGRIBUSINESS, FOOD PROCESSING AND TECHNOLOGY
111	Crop production
112	Animal production

NAICS Code	AGRIBUSINESS, FOOD PROCESSING AND TECHNOLOGY
1141	Fishing
1151	Support activities for crop production
1152	Support activities for animal production
311	Food manufacturing
312	Beverage and tobacco product manufacturing
3253	Pesticide, fertilizer, and other agricultural chemical manufacturing
33311	Agricultural implement manufacturing
333294	Food product machinery manufacturing
42382	Farm and garden machinery and equipment merchant wholesalers
4245	Farm product raw material merchant wholesalers
42491	Farm supplies merchant wholesalers

NAICS Code	APPAREL AND TEXTILES CLUSTER
313	Textile mills
314	Textile product mills
315	Apparel manufacturing
323113	Commercial screen printing
32513	Synthetic dye and pigment manufacturing
32522	Artificial and synthetic fibers and filaments manufacturing
32791	Abrasive product manufacturing
33791	Mattress manufacturing
337121	Upholstered household furniture manufacturing
339993	Fastener, button, needle, and pin manufacturing
4243	Apparel, piece goods, and notions merchant wholesalers **(except 42434)**
54143	Graphic design services
54149	Other specialized design services
54184	Media representatives
54185	Display advertising
54186	Direct mail advertising
54187	Advertising material distribution services
54189	Other services related to advertising

NAICS Code	ARTS, ENTERTAINMENT, RECREATION AND VISITOR INDUSTRIES
33992	Sporting and athletic goods manufacturing
33993	Doll, toy, and game manufacturing
42391	Sporting and recreational goods and supplies merchant wholesalers
487	Scenic and sightseeing transportation
512	Motion picture and sound recording industries

NAICS Code	ARTS, ENTERTAINMENT, RECREATION AND VISITOR INDUSTRIES
515	Broadcasting (except internet)
5615	Travel arrangement and reservation services
711	Performing arts, spectator sports, and related industries
712	Museums, historical sites, and similar institutions
713	Amusement, gambling, and recreation industries
7211	Traveler accommodation
7212	Rv (recreational vehicle) parks and recreational camps

NAICS Code	BIOMEDICAL/BIOTECHNICAL (LIFE SCIENCES)
3254	Pharmaceutical and medicine manufacturing
333314	Optical instrument and lens manufacturing
334510	Electromedical and electrotherapeutic apparatus manufacturing
334516	Analytical laboratory instrument manufacturing
334517	Irradiation apparatus manufacturing
3391	Medical equipment and supplies manufacturing
42345	Medical, dental, and hospital equipment and supplies merchant wholesalers
446	Health and personal care stores
5417	Scientific research and development services
562112	Hazardous waste collection
562211	Hazardous waste treatment and disposal
621	Ambulatory health care services **(except 6211, 6212, 6213)**

NAICS Code	BUSINESS AND FINANCIAL SERVICES CLUSTER
323115	Digital printing
323116	Manifold business forms printing
518	Internet service providers, web search portals, and data processing services
5222	Nondepository credit intermediation
5223	Activities related to credit intermediation
523	Securities, commodity contracts, and other financial investments and related activities
524	Insurance carriers and related activities
525	Funds, trusts, and other financial vehicles
5313	Activities related to real estate **(except 531320)**
533	Lessors of nonfinancial intangible assets (except copyrighted works)
5411	Legal services
5412	Accounting, tax preparation, bookkeeping, and payroll services
5413	Architectural, engineering, and related services
5414	Specialized design services
5415	Computer systems design and related services
5416	Management, scientific, and technical consulting services

NAICS Code	BUSINESS AND FINANCIAL SERVICES CLUSTER
5418	Advertising and related services
54191	Marketing research and public opinion polling
541922	Commercial photography

NAICS Code	CHEMICALS
325	Chemical manufacturing
326	Plastics and rubber products manufacturing
327	Nonmetallic mineral product manufacturing
4246	Chemical and allied products merchant wholesalers
4247	Petroleum and petroleum products merchant wholesalers

NAICS Code	DEFENSE AND SECURITY
212291	Uranium-radium-vanadium ore mining
23713	Power and communication line and related structures construction
32592	Explosives manufacturing
332912	Fluid power valve and hose fitting manufacturing
332992	Small arms ammunition manufacturing
332993	Ammunition (except small arms) manufacturing
332994	Small arms manufacturing
332995	Other ordnance and accessories manufacturing
33429	Other communications equipment manufacturing
334511	Search, detection, navigation, guidance, aeronautical, and nautical system and instrument manufacturing
3364	Aerospace product and parts manufacturing
3366	Ship and boat building
336992	Military armored vehicle, tank, and tank component manufacturing
339113	Surgical appliance and supplies manufacturing
4231	Motor vehicle and motor vehicle parts and supplies merchant wholesalers
423860	Transportation equipment and supplies (except motor vehicle) merchant wholesalers
5415	Computer systems design and related services
541710	Research and development in the physical, engineering, and life sciences
5616	Investigation and security services
81149	Other personal and household goods repair and maintenance
922	Justice, public order, and safety activities
92612	Regulation and administration of transportation programs
927	Space research and technology
928	National security and international affairs

NAICS Code	EDUCATION AND KNOWLEDGE CREATION
611	Educational services
51111	Newspaper publishers
51112	Periodical publishers
51113	Book publishers
516	Internet publishing and broadcasting
519	Other information services

NAICS Code	ENERGY (FOSSIL AND RENEWABLE)
211	Oil and gas extraction
2121	Coal mining
213	Support activities for mining **(except 213115)**
212291	Uranium-radium-vanadium ore mining
2211	Electric power generation, transmission and distribution
2212	Natural gas distribution
22133	Steam and air-conditioning supply
2371	Utility system construction
2379	Other heavy and civil engineering construction (includes dams and hydroelectric facilities)
23821	Electrical contractors
23822	Plumbing, heating, and air-conditioning contractors
32411	Petroleum refineries
324199	All other petroleum and coal products manufacturing
32511	Petrochemical manufacturing
32512	Industrial gas manufacturing
325191	Gum and wood chemical manufacturing (include coke and charcoal)
325192	Cyclic crude and intermediate manufacturing
325193	Ethyl alcohol manufacturing (includes ethanol manuf.)
33241	Power boiler and heat exchanger manufacturing
33242	Metal tank (heavy gauge) manufacturing
33313	Mining and oil and gas field machinery manufacturing
333414	Heating equipment (except warm air furnaces) manufacturing (includes solar and hydronic heating equipment manufacturing)
333611	Turbine and turbine generator set units manufacturing
334413	Semiconductor and related device manufacturing
334519	Other measuring and controlling device manufacturing
3353	Electrical equipment manufacturing
3359	Other electrical equipment and component manufacturing
42352	Coal and other mineral and ore merchant wholesalers
42361	Electrical apparatus and equipment, wiring supplies, and related equipment merchant wholesalers
42369	Other electronic parts and equipment merchant wholesalers
42372	Plumbing and heating equipment and supplies (hydronics) merchant wholesalers

NAICS Code	ENERGY (FOSSIL AND RENEWABLE)
4247	Petroleum and petroleum products merchant wholesalers
447	Gasoline stations
45431	Fuel dealers
486	Pipeline transportation
52391	Miscellaneous intermediation (includes mineral and oil royalties dealing)
523999	Miscellaneous financial investment activities (includes oil and gas lease brokers)
532412	Construction, mining, and forestry machinery and equipment rental and leasing
533	Lessors of nonfinancial intangible assets (except copyrighted works)
54133	Engineering services
54136	Geophysical surveying and mapping services
54138	Testing laboratories
54162	Environmental consulting services
54169	Other scientific and technical consulting services
54171	Research and development in the physical, engineering, and life sciences
92613	Regulation and administration of communications, electric, gas, and other utilities

NAICS Code	FOREST AND WOOD PRODUCTS
113	Forestry and logging
1153	Support activities for forestry
23813	Framing contractors
23817	Siding contractors
23833	Flooring contractors
23835	Finish carpentry contractors
23816	Roofing contractors
321	Wood product manufacturing
322	Paper manufacturing
323117	Books printing
325191	Gum and wood chemical manufacturing
3255	Paint, coating, and adhesive manufacturing
32791	Abrasive product manufacturing
332213	Saw blade and handsaw manufacturing
33321	Sawmill and woodworking machinery manufacturing
333291	Paper industry machinery manufacturing
333991	Power-driven handtool manufacturing
337	Furniture and related product manufacturing **(except 337124, 337125, 337214)**
339992	Musical instrument manufacturing
339995	Burial casket manufacturing
4232	Furniture and home furnishing merchant wholesalers
4233	Lumber and other construction materials merchant wholesalers

NAICS Code	GLASS AND CERAMICS
3271	Clay product and refractory manufacturing
3272	Glass and glass product manufacturing
3273	Cement and concrete product manufacturing
327992	Ground or treated mineral and earth manufacturing
327999	All other miscellaneous nonmetallic mineral product manufacturing
3328	Coating, engraving, heat treating, and allied activities

NAICS Code	INFORMATION TECHNOLOGY AND TELECOMMUNICATIONS
23821	Electrical contractors
333613	Mechanical power transmission equipment manufacturing
333295	Semiconductor machinery manufacturing
3341	Computer and peripheral equipment manufacturing
3342	Communications equipment manufacturing
3343	Audio and video equipment manufacturing
3344	Semiconductor and other electronic component manufacturing
334512	Automatic environmental control manufacturing for residential, commercial, and appliance use
334513	Instruments and related products manufacturing for measuring, displaying, and controlling industrial process variables
334515	Instrument manufacturing for measuring and testing electricity and electrical signals
334516	Analytical laboratory instrument manufacturing
334518	Watch, clock, and part manufacturing
3346	Manufacturing and reproducing magnetic and optical media
3353	Electrical equipment manufacturing
3359	Other electrical equipment and component manufacturing
42343	Computer and computer peripheral equipment and software merchant wholesalers
42369	Other electronic parts and equipment merchant wholesalers
5112	Software publishers
517	Telecommunications **(except 5175)**
518	Internet service providers, web search portals, and data processing services
5415	Computer systems design and related services
541618	Other management consulting services
5417	Scientific research and development services
92613	Regulation and administration of communications, electric, gas, and other utilities

NAICS Code	MANUFACTURING SUPERCLUSTER
331	Primary metal manufacturing
332	Fabricated metal product manufacturing **(except 332992, 3, 4, 5)**
333	Machinery manufacturing
334	Computer and electronic product manufacturing
335	Electrical equip, appliance and component manufacturing

NAICS Code	MANUFACTURING SUPERCLUSTER
336	Transportation equipment manufacturing

NAICS Code	MINING
2122	Metal ore mining
2123	Nonmetallic mineral mining and quarrying
213114	Support activities for metal mining
213115	Support activities for nonmetallic minerals
482	Rail transportation
532412	Construction, mining, and forestry machinery and equipment rental and leasing

NAICS Code	PRINTING AND PUBLISHING
323	Printing and related support activities
325910	Printing ink manufacturing
339950	Sign manufacturing
511	Publishing industries (except Internet)
51511	Radio broadcasting
51521	Cable and other subscription programming
516	Internet publishing and broadcasting
51911	News syndicates
51919	All other information services
54143	Graphic design services
541613	Marketing consulting services
5418	Advertising and related services
54191	Marketing research and public opinion polling
541922	Commercial photography

NAICS Code	TRANSPORTATION AND LOGISTICS
481	Air transportation
482	Rail transportation
483	Water transportation
484	Truck transportation
485112	Commuter rail systems
4855	Charter bus industry
485999	All other ground passenger transportation
486	Pipeline transportation
488	Support activities for transportation
492	Couriers and messengers
493	Warehousing and storage

Appendix II:
EGR 8 Materials

Letter to Local Elected Officials from Governor Daniels

May 1, 2006

Dear Elected Official:

With the assistance and support of my office, Purdue University and Indiana University were awarded a grant from the U.S. Economic Development Administration (EDA) to study growth business clusters in rural areas across the country. This was one of only two such grants awarded nationally.

One aspect of the grant required the identification of a "pilot" region in which the research team could conduct a thorough analysis and also provide valuable insights, findings and guidance to local stakeholders. The region chosen, again with the assistance of my office, was Economic Growth Region 8 (EGR 8): Brown, Daviess, Greene, Lawrence, Martin, Monroe, Orange and Owen counties.

Although the research team has been compiling relevant data from the U. S. Census and other sources; they also need insights, input and support from the ground-level. I am writing to ask for your assistance when members of the research team contact you to gain your insights about the strengths, opportunities, challenges and other relevant factors about your community and the larger region.

Strategic Development Group (SDG), located in Bloomington, is assisting the university team in contacting and working with regional EGR 8 leaders to gain their insight and input. To facilitate coordination with existing initiatives and to ensure solid community input, the university team has also assembled an advisory committee of local economic development professionals, business leaders and local Extension Educators. As a local official, your input and support is also essential. We think you will also benefit greatly from the work and analysis that will be forthcoming from the project.

My administration believes local leaders and citizens are the ones who need to make critical strategic decisions about the future of their communities and the larger region in which the local economy operates. However, good analysis and the process of systematically gaining local insights— as is being done in this project— can be immensely helpful to the local decision-making process. That is why we are excited and supportive of this project. If it is as successful as we think it will be, it could then be modified as needed and replicated in other regions of the state. This project also has national implications in that the EDA is also looking to learn from our "pilot" effort and help make these "best practices" available for other rural regions in the U.S.

The university team, working with SDG, will be scheduling meetings with you and your colleagues in the region. I strongly encourage your full participation and involvement. If you have any questions or suggestions, please contact either of the following:

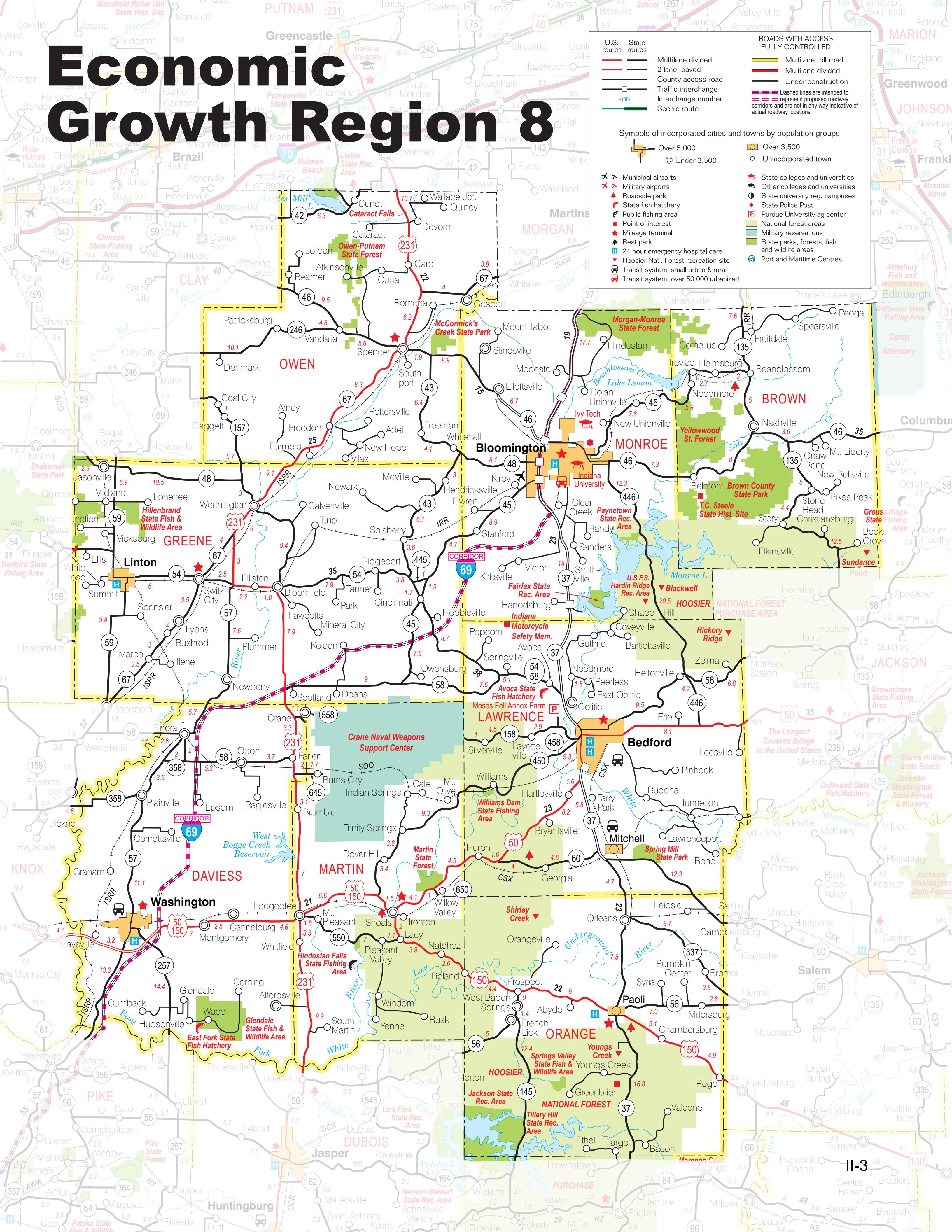
- **Christine Nolan**, Purdue Center for Regional Development, (765) 494-9262, cenolan@purdue.edu
- **Thayr Richey**, Strategic Development Group, (800) 939-2449, trichey@sdg.us

I look forward to your involvement in this initiative, and others, that can help improve the economy and quality of life for all Hoosiers.

Sincerely,

Mitchell E. Daniels Jr.
Governor

Economic Growth Region 8



Media Release

Purdue and Indiana Universities Will Help Create New Strategy
for Indiana Economic Growth Region 8
(Brown, Greene, Lawrence, Martin, Monroe, Orange and Owen Counties)

For Release: 9:00 a.m. EDT
Thursday, May 4, 2006

West Lafayette, Ind.

Purdue and Indiana Universities will work with local leaders in an eight-county area to create a model approach to regional development.

Purdue University's Center for Regional Development and Indiana University's Indiana Business Research Center received one of two grants from the U. S. Economic Development Administration to study growth business clusters in rural areas across the country. The universities, with the support of state government, will use their research findings to help identify industries with growth potential in **Economic Growth Region 8** (Brown, Daviess, Greene, Lawrence, Martin, Monroe, Orange, and Owen counties).

"We hope to create an innovative model for regional development in the U. S." said Sam Cordes, co-director of the Purdue Center for Regional Development. "The partnership among state government (through the Governor's and Lieutenant Governor's offices), Indiana University and Purdue University has brought significant strength to this project."

Strategic Development Group, Inc., an Indiana-based firm, will facilitate the planning process. The regional advisory committee, which will oversee the plan, is comprised of economic development professionals, extension educators, and other representatives from the eight counties. The PU-IU team will hold focus groups and interviews as well as meet with local officials throughout the region. In addition, the team will survey business executives in EGR8. At least one public meeting will be held in each county.

The final report and recommendations of the study are expected to be released this summer.

For more information contact:

Christine Nolan, Purdue University, Center for Regional Development
(765) 494-9262
cenolan@purdue.edu

Jerry Conover, Indiana University, Kelley School of Business, Indiana Business Research Center
(812) 855-7476
conover@indiana.edu

Jan Jones, Strategic Development Group
800-939-2449
January@sdg.us

List of Mayors in EGR 8

1. Mayor Abel, Washington, Daviess County
2. Mayor Bowling, Loogootee, Martin County
3. Mayor Chastain, Mitchell, Lawrence County
4. Mayor Jones, Linton, Greene County
5. Mayor Klumpp, Bedford, Lawrence County
6. Mayor Kruzan, Bloomington, Monroe County

Indiana has a strong mayoral system of government. While county commissioners, county councils, city councils, and town councils play important roles in local and regional development, mayors have significant powers and can provide substantial support to regional economic development activities. The six mayors of EGR 8 are all supportive of a regional economic development strategy.

Fax to EGR 8 Mayors

Strategic Development Group, Inc.
Planning & Information Services
2901 N. Walnut Street
Bloomington, IN 47404
Tel: (812)331-1282
Fax: (812)331-1285
E-mail: trichey@sdg.us

To: The Mayor

From: Thayr Richey

Re: A New Strategy for Economic Growth Region 8

March 24, 2006

Number of pages, including cover: 1.

Dear Mayor

An innovative approach to planning for economic development in your region will begin toward the end of this month.

Purdue and Indiana universities, working with state government, will use new research to help create a regional strategy to improve the economy. Purdue and IU were awarded a grant to study growth business clusters in rural areas across the country. The universities will use their research findings to help identify growth areas in **Economic Growth Region 8** (Brown, Daviess, Greene, Lawrence, Martin, Monroe, Orange, and Owen counties).

Strategic Development Group will assist leaders in EGR 8 in creating the plan. **We will be meeting with you and other local elected officials individually. However, you are invited to attend any or all of the planning events.**

Our regional advisory committee, which includes economic development professionals and other local leaders, will have its first meeting at the Bedford Chamber of Commerce on Tuesday, March 28, from 10:00 to 11:30. The Chamber is located at 116 W. 16th St. You will receive a written summary of the meeting.

If you would be interested in attending, or if you have any questions about the planning process, please let me know.

Draft Summary of Local Economic Development Plans from EGR 8: April 10, 2006

Monroe County

BEDC Vision Statement: Quality economic development supports economic security, fulfilling careers, home ownership, local amenities, strong schools, and superior public services.

BEDC's Role: The BEDC plays important roles as a direct service provider, partner, forum, and catalyst.

Business Sectors: education; information; professional, scientific, and technical services; finance and insurance; health care and social assistance; arts, entertainment, and recreation.

Key Strategies:

- Systematic Business Expansion and Retention Outreach and Support
- Business Development Assistance & Building the Entrepreneurial Culture
- Seed and Venture Capital
- Technology Development:
- Support Development of Local Technology Infrastructure
- Seek to Build Greater Information Technology Critical Mass
- Support Health Care/Life Science Development
- Business Development Marketing & Promoting The New Economy:
- Core Marketing Activities
- Partner to Market and Develop the Central Indiana Technology Corridor
- Support IU & University-Led Development
- Restructure BEDC Staff Assignments To Fit The New Strategy
- Substantially shift human resources from business retention to entrepreneurship and technology development

Orange County

Vision: Through leadership, education, cooperation and planning, Orange County has created a vibrant, diverse economy and a creative entrepreneurial spirit while preserving its small town, family-oriented communities and protecting the natural environment.

Goals:

- Create a progressive business development strategy and a supportive entrepreneurial environment.
- Help community residents, including the young, to learn skills, abilities, and work habits they need to find rewarding and meaningful work.
- Protect our small town neighborly values, the natural forests, the cultural and recreational opportunities and healthy family farms.
- Grow our leadership base and empower our leaders to promote prosperity, countywide cooperation, and community well-being.
- Prepare Orange County residents and public officials to anticipate and respond to natural disasters.

Economic Development Strategies:

1. Existing Industry Development
2. Entrepreneurship/Small Business Development
3. Tourism/Visitor Attraction

Orange County 2006 Benchmarking Study

Orange County's highest industry concentration relative to the nation lies in the furniture industry. When you add in other forest and wood products industries, this broad cluster still generates a large share of the county's employment and income.

Manufacturing outside of the forest and wood products industries is not nearly so dominant, though the manufacturing sector still accounts for twice as much employment and wages as one would expect in a county of Orange's size. The only other manufacturing area contributing to this is the small ready-mix concrete manufacturing industry.
This latter industry might be considered part of the larger construction cluster, especially concentrated locally in the water and sewer system construction industry, which has the highest average wage of any of Orange County's concentrated industries.

Industries with High LQs and Potential for Serving Markets Beyond the Local Area

NAICS	Industry	Establish-ments	Employ-ment	Wages ($)	Avg Wage ($)	Employment LQ	Wages LQ	Avg Wage LQ
31-33	Manufacturing	30	1,418	43,719,736	30,834	2.07	2.05	0.99
337	Furniture and related product manufacturing	7	931	29,931,196	32,144	34.04	51.93	1.53
33721	Office furniture and fixtures manufacturing*	5	848	23,718,884	27,962	126.96	153.80	1.21
23	Construction	50	697	27,732,091	39,807	2.09	3.16	1.51
237	Heavy and civil engineering construction	10	564	24,616,073	43,646	13.10	18.68	1.43
23711	Water and sewer system construction	4	417	19,324,773	46,333	46.00	76.58	1.66
721	Accommodation	6	298	5,264,789	17,657	3.47	4.16	1.20
6231	Nursing care facilities	3	221	4,740,544	21,475	2.92	3.95	1.35
321	Wood product manufacturing	10	131	3,001,954	22,945	4.97	5.31	1.07
7139	Other amusement and recreation industries	4	127	1,682,470	13,213	2.49	3.08	1.23
48412	General freight trucking, long-distance	10	94	3,681,777	39,029	2.72	4.14	1.52
2123	Nonmetallic mineral mining and quarrying	5	66	2,646,667	40,050	12.84	17.18	1.34

NAICS	Industry	Establish-ments	Employ-ment	Wages ($)	Avg Wage ($)	Employment LQ	Wages LQ	Avg Wage LQ
321113	Sawmills*	5	48	981,411	20,517	9.57	9.33	0.98
238911	Residential site preparation contractors	6	30	720,247	24,210	4.89	5.17	1.07
32732	Ready-mix concrete manufacturing*	3	13	439,363	33,369	2.31	2.91	1.24

Orange County Shift-Share Analysis, 1994 to 2004

	Component of Employment Change					
	National Growth		Industrial Mix		Competitive Shift	
Sector	Percent	Jobs	Percent	Jobs	Percent	Jobs
Public Administration	14.9	19	-6.3	-8	171.6	216
Construction	14.9	55	22.9	84	52.6	193
Trade, Transportation, and Utilities	14.9	113	-4.1	-31	19.9	151
Natural Resources and Mining	14.9	13	-16.9	-14	50.8	43
Professional and Business Services	14.9	20	18.6	25	29.2	40
Other Services	14.9	13	2.6	2	20.8	18
Information	14.9	7	-2.8	-1	-5.9	-3
Financial Activities	14.9	29	1.4	3	-54.1	-106
Education and Health Services	14.9	181	10.3	124	-15.4	-186
Leisure and Hospitality	14.9	122	9.5	77	-34.6	-282
Manufacturing	14.9	445	-31.0	-922	-36.4	-1,085
Totals		1,017		-661		-1,001

Brown County

Areas of Focus: Tourism

1. Hire events coordinator
2. Improve marketing and local linkages
3. Build upon Brown County's existing artistic offerings to further enhance the "Arts Colony" experience
4. Expand the scope and diversity of work in the visual arts.
5. Increase the visibility of area artists.
6. Seek new partnerships with visiting artists.
7. Increase the scope of large scale music offerings with the addition of jazz, classical, and/or pops festivals.
8. Increase the variety of theatre offerings in Brown County.

9. Develop a dance program.
10. Consider the construction of new educational and performance facilities.
11. Build a new Visitor's Center near the intersection of Routes 46 and 135 in Nashville.
12. Endeavor to host professional conferences in the visual and performing arts.
13. Develop creative and unique promotional and educational tools to communicate the breadth of Brown County's offerings to a variety of new potential audiences.

Greene County

1. Enhance the ability of business and labor to compete.
2. Support Crane.
3. Promote and assist small business.
4. Promote Greene County retailers
5. Identify agricultural-based economic development projects that increase the local agricultural community's market share.
6. Create new opportunities for small business development and new employer recruitment.
7. Create a site development team to acquire and develop marketable employer sites.
8. Create an employer attraction team to recruit at least one new basic employer every three years.
9. Formalize current retention and expansion program for established basic employers.
10. Identify and plan for economic development projects that will result from the extension of Interstate 69 through southwest Indiana.
11. Find users for all available existing industrial buildings by undertaking a targeted marketing effort to appropriate prospects.

Analysis of Local Economic Development Plans from EGR 8: April 11, 2006

Prepared by SDG

EGR 8 is heterogeneous, with both rural counties of relatively small populations to one of the more populous counties in the state. Nonetheless, all of the counties in EGR 8 that have written economic development strategies, have a number of issues in common.

- A focus on new basic employer recruitment
- A focus on retention and expansion of basic employers
- A focus on infrastructure development
- A focus on workforce development – especially from the perspective of employer needs

Most counties also have a focus on small business development.

- some of these counties have or plan to have a business incubator focused on technology
- Daviess, Greene and Martin counties have a joint technology-oriented business park

Several counties have a focus on tourism.

- Tourism is Brown County's major focus
- Tourism has a heightened focus in Orange County

A majority of counties recognize the need to maintain and grow NSWC Crane.

Here are the industry sectors that are emphasized in various plans:

1. The visual and performing arts
2. Health care/Life science
3. Agriculture
4. Manufacturing
5. Higher education
6. Retail
7. Technology-based employers

Many counties focus on the manufacturing sector without targeting subsectors.

One Regional Plan Commission's top economic development projects range from infrastructure to financing.

The Indiana Strategic Skills Initiative (SSI) strategy for EGR 8 targets the following sectors for its workforce development program:

- Manufacturing
- Health care
- Professional, scientific, and technical services
- Hospitality

Following are key occupations that the strategy identified:

- First Line Supervisors of Production Workers
- Team Assemblers
- Registered Nurses

- Licensed Practical Nurses
- Nurses Aides
- Respiratory Therapists
- Electrical and Electronics Engineering Techs
- Drafting, Engineering and Mapping Techs, other

SSI is likely to provide a major focus for workforce development for the next two years. Because it covers all of EGR 8, the RAC should attempt to make its regional strategy congruent with SSI.

Agenda

Creating a New Strategy For Economic Growth Region 8

Regional Advisory Committee Meeting
March 28, 2006

EGR 8 includes the Counties

Brown

Daviess

Greene

Lawrence

Martin

Monroe

Orange

Owen

1. **Welcome and introductions**

2. **Strategic planning overview**
   - The EDA-funded project
   - EGR 8
   - Time frame
   - Cluster analysis
   - Implementation

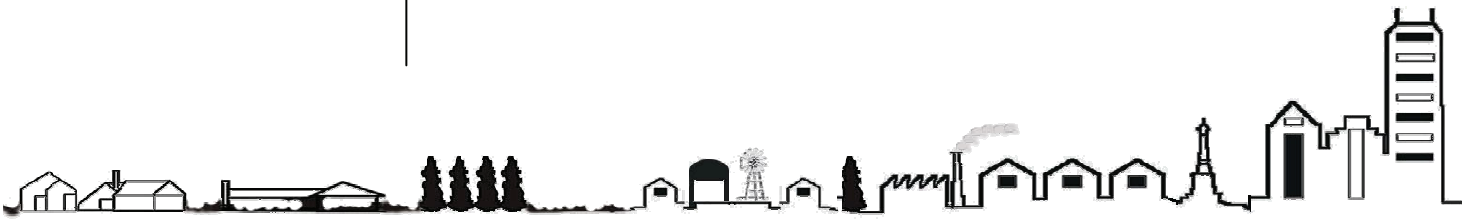
3. **The planning process**
   - Reviewing previous plans
   - Examining assets and barriers
   - Determining focus groups
   - Designing a business climate survey
   - Conducting meetings with local officials
   - Conducting public meetings
   - Building on growth clusters
   - Finding funds for implementation

4. **Meeting schedule**

5. **Other issues**

6. **Next steps**

7. **Meeting adjourns**



Agenda

Creating a New Strategy For Economic Growth Region 8

Regional Advisory Committee Meeting
9:00 – 10:30 (EDT)
April 11, 2006
Bedford Chamber of Commerce

EGR 8 includes the Counties

Brown

Daviess

Greene

Lawrence

Martin

Monroe

Orange

Owen

9:00	**Welcome and introductions**
9:10	**Summary of 3-28 Meeting**
9:15	**Suggestions for focus groups and interviews**
9:20	**Discussion of business survey**
9:30	**Discussion of EGR 8 growth clusters**
10:00	**Review of current local strategies**
10:15	**Other issues**
10:25	**Next steps**
10:30	**Meeting adjourns**

Reminder: Next the RAC will meet next on April 26

Purdue Center for Regional Development

Kelley School of Business | IBRC Indiana Business Research Center

Agenda

Creating a New Strategy For Economic Growth Region 8

Regional Advisory Committee Meeting
10:00-11:30 (EDT)
Bedford Chamber of Commerce
Wednesday, April 26, 2006

EGR 8 includes the Counties

Brown

Daviess

Greene

Lawrence

Martin

Monroe

Orange

Owen

10:00 Welcome and introductions

10:05 EGR 8 clusters briefly revisited

- Cluster analysis
- Location Quotients
- The Bubble Chart

10:15 Thinking Ahead: EGR 8 Economy 2011

- Current major clusters
- Major clusters in 2011

10:40 Regional Business Climate Changes Required

- Workforce skills & education
- Infrastructure
- Ability to work among different counties

11:15 SDG Interviews & Focus Groups

11:20 Other issues

11:25 Next Meeting

11:30 Meeting adjourns

Agenda

Creating a New Strategy For Economic Growth Region 8

Regional Advisory Committee Meeting
10:00-12:00 (EDT)
Bedford Chamber of Commerce
Tuesday, May 23, 2006

EGR 8 includes the Counties

Brown

Daviess

Greene

Lawrence

Martin

Monroe

Orange

Owen

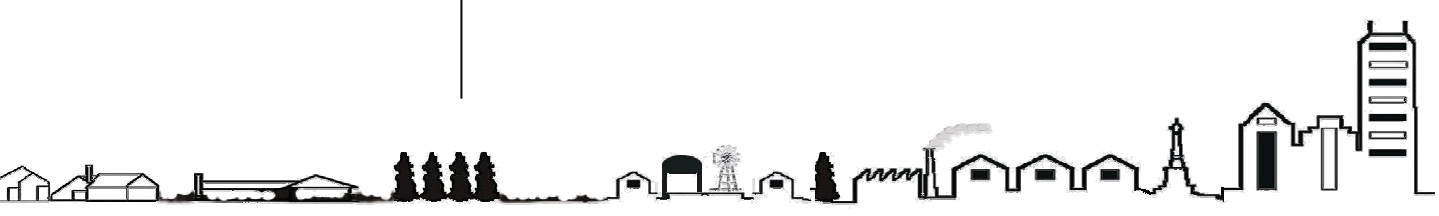
1. **Welcome and introductions**

2. **Report on Interviews and Focus Groups**
   a. Bio-Tech and manufacturing
   b. Agri-Business, Forest & Wood Products, and Mining
   c. Defense-Information Technology
   d. Arts & Entertainment

3. **Possible Clusters to Activate**
   a. Supporting CTI in Activating the Defense-Info Cluster
   b. Activating the Health Care Cluster (Bio-Med)
   c. Activating EGR 8 Growers' Guild
   d. Activating the EGR 8 Arts & Entertainment Cluster
   e. Activating the EGR 8 Agri-Business Cluster
   f. Supporting the Current Bio-Tech-manufacturing Cluster
   g. Other

4. **Discussing Possible Projects**

5. **Next Steps**



Possible Cluster Projects

1. Assisting Small, Regional Manufacturers in the Transition to the Life Sciences Market

With Monroe and Owen County in the process of becoming a major center for bio-tech research and production, there is an opportunity for selected small manufacturers throughout the region to transition to becoming a supplier for this new market. A few companies have already begun that process.

EGR 8 could make the technical assistance available to those companies that are interested in beginning to serve that market.

2. Maintaining an EGR 8 Rural Products On-Line Database

This could serve a wide ranging Agri-Business market. EGR 8 could help promote small businesses by creating and maintaining an on-line database of products – from furniture to produce.

3. Promoting Organic Crops

EGR 8 has a growing number of small farms that focus on specialty crops. This project would provide communications links among organic growers. This project would probably work closely with the region's extension service offices.

There is also an opportunity to bring additional acreage of EGR 8 farmland into organic crop production. As thousands of acres of EGR 8 farmland is removed from the CRP (Set Aside) program, much of this acreage will have been out of crop production for a decade and will be eligible for organic crop production.

4. Developing Leased Hunting Fields

Outdoor recreation, including hunting, is a growing area in tourism. Many of the counties in EGR 8 depend upon outdoor recreation for tourism. One possible project would be to provide technical assistance to farmers who wanted to lease fields to hunters.

5. Developing and Promoting an EGR 8 Motorcycle Trail

Many of the back roads of EGR 8 are ideal for motorcycling. EGR 8 could work with county tourism programs to develop and promote an eight-county motorcycle trail.

6. Helping Develop/Promote Eight Arts Festivals During an Eight-Week Period in the Summer with Artists from EGR 8

Identify and promote a series of weekly arts festivals in the region that would emphasize EGR 8 artists and crafts people. The series would be promoted by all counties and by the EGR 8 host organization.

7. Creating an Alliance of Tech Parks in EGR 8

There are currently two certified tech parks in the region, covering four counties, and there is at least one more being discussed. EGR 8 could provide initial support and communications to help the parks work together to maximize their impact on the region.

8. Creating a Regional Arts and Crafts On-Line Directory

This service is related to the rural products directory, but is focused only on arts and crafts from regional residents. Ultimately, this could evolve into a regional arts and crafts center, such as West Virginia's Tamarack program.

9. Support CTI in Its Activation of Defense Cluster Subcontractors

CTI is in the process of identifying prime and secondary contractors for NSWC Crane. EGR 8 could help support CTI's efforts by providing update cluster statistics and by keeping them updated on EGR 8's efforts in related clusters, such as biotech and manufacturing. .EGR 8 could also assist by keeping regional officials aware the importance of the Defense cluster. One approach would be to create an EGR 8 LEO Defense Advisory Committee whose members would discuss the Defense Cluster's business climate needs with their fellow LEOs.

10. Support the Creation of an EGR 8 Hospital/Healthcare Roundtable

EGR 8's hospitals and healthcare system face numerous challenges. The roundtable would deal with issues such as telecommunications, distance learning, competition, costs, and workforce.

11. Other

Agenda

Creating a New Strategy For Economic Growth Region 8

Regional Advisory Committee Meeting
10:00-12:00 (EDT)
Bedford Chamber of Commerce
Wednesday, May 31, 2006

EGR 8 includes the Counties

Brown

Daviess

Greene

Lawrence

Martin

Monroe

Orange

Owen

1. **Welcome and introductions**

2. **Brief Review of Focus Groups**
   a. Bio-Tech, Advanced Materials, and manufacturing
   b. Agri-Business, Forest & Wood Products, and Mining
   c. Defense-Information Technology
   d. Arts & Entertainment

3. **Discussion of Cluster Matrix and Other Data**

4. **Identifying which Clusters to Activate in Phase One and which Cluster to Activate Later**

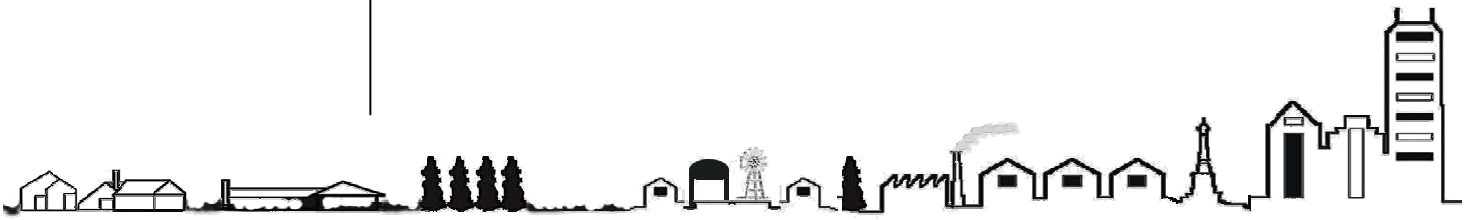
5. **Discussion of RAC Members Willingness to Continue Implementation Planning during the Summer**

6. **Discussion of Regional Host**

7. **Other Issues**

8. **Next Steps**

9. **Meeting adjourns**



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11. Other

Focus Group Questions

1. Describe/discuss the current status of the arts & entertainment cluster in EGR 8.

2. Identify the key players/stakeholders.

3. How important is this cluster to EGR 8's economic future?

4. What are the opportunities and challenges?

5. How should the region begin to activate an arts & entertainment (defense, biotech, and agribusiness) cluster program in EGR 8?

Inventory of Regional Assets

March 20, 2006

EGR 8, which includes the counties of Brown, Daviess, Greene, Lawrence, Martin, Monroe, Orange and Owen, is a heterogeneous area. The region, while predominantly rural, includes one of the state's ten most populous cities. Its major employers include NSWC Crane and Indiana University. It has a number of small and mid-size industrial operations that range from consumer appliances to limestone quarrying.

The following preliminary inventory of assets will be reviewed and developed by the regional advisory committee.

Assets

- Quality of life – with a focus on Midwestern, small town living and outdoor recreation.
- Safe environment
- Natural resources
- Available workforce, with a large number of commuters both within and without the region
- Affordable housing
- Presence of IU-B and Ivy Tech system
- Close proximity to Indianapolis, Cincinnati and Louisville markets
- Access to major Midwest and Upper South markets
- Basic employers
- Economic development programs

Military

NSWC Crane—this extensive naval base has a wealth of equipment that it develops, maintains and repairs for all branches of the military. Some of its products, services and facilities are listed in an appendix to this inventory.

Tourism Attractions

- Brown County State Park
- Nashville Artist Colony
- Springs Valley Casino
- Hoosier National Forest
- Goose Pond
- Lake Monroe
- Patoka Lake
- Amish Culture

Transportation

- SR 37
- I-65
- Proposed extension of I-69
- US 31
- SR 67
- US 50
- SR 46
- Local and regional airports
- Railroads

List of NSWC Crane Assets

Facilities

1. Acoustic Sensor Testing and Evaluation – Atf Tanks
2. Acoustic Sensor Testing and Evaluation – Hydrostatic Tanks
3. Battery and Power Systems – Electrochemical Facility
4. Battery and Power Systems – Battery Evaluation and Abuse Facility
5. Chemical/Biological Detection Center
6. Commercial Shipping – Aviation – Microwave Tube Testing Lab
7. Commercial Shipping – Aviation – Process and Failure Analysis Lab
8. Commercial Shipping – Aviation – Tri-Service/NASA Cathode Life Test
9. Communications Equipment Testing – Antenna Analysis Facility
10. Communications Equipment Testing – Component Test and Evaluation
11. Communications Equipment Testing – Integrated Environmental Test Facility
12. Communications Equipment Testing – Microwave Integrated Circuit Lab
13. Computer Performance Evaluation – Computer Performance Labs
14. Conventional Ammunition Development – Ammunition Engineering Labs
15. Conventional Ammunition Development – Electro Optic Analysis Lab
16. Conventional Ammunition Development – Ordnance Test Area
17. Conventional Ammunition Development – Pyrotechnic Prototype Manufacturing
18. Corrections – Security and Biometrics Test Lab
19. Corrosion Testing – Corrosion Control and Repair Facility
20. Electro-Optic Testing – Electro-Optic Center
21. Electronic Module Test and Repair – Printed Circuit Technology Facility
22. Electronic Module Test and Repair – Progressive Level Repair Lab
23. Equipment Calibration – Calibration and Equipment Lab
24. Infrared Testing – Automated Infrared Test
25. Laser Testing – Laser Designator/ Marker Test Station
26. Management of Battery Resources – Electrochemical Facility
27. Metals Finishing – Powder Coating Facility
28. Powder Coat Application and Testing – Powder Coating Facility
29. Prototyping and Fabrication – Prototype Fabrication Shop
30. Pyrotechnics and Explosives – Ordnance Test Area
31. Pyrotechnics and Explosives – Prototype Manufacturing Facility
32. Security – Security and Biometrics Test Lab
33. Software Development – ATE Software Development Facility
34. Specialized ammunition – Loading Facility for Limited Production
35. Specialized Storage – Explosive Storage Magazines
36. Training – Electro-Optic Center
37. Training – Electro-Optic Test and Training Range
38. Weapons Development – Prototype Fabrication Shop
39. Weapons Repair – Small Arms Repair Facility
40. Weapons Testing – Indoor Test Range
41. Weapons Testing – Ordinance Test Area
42. Weapons Testing – Outdoor Test Facility
43. Weapons Testing – Facility
44. Weapons Testing – Walk-in Environmental Chamber
45. Wind Testing – Ram Air Turbine Wind Tunnel

Additional NSWC Crane Economic Development Resources

NSWC Crane is a large U. S. Navy Base located entirely in EGR 8. Although the base has been under consideration for significant downsizing, in the Base Realignment and Closure (BRAC) efforts to-date, Crane has remained at its current size.

This base has numerous departments and programs, many of which could serve as vehicles for regional economic growth. Currently a three-county tech park, West Gate @ Crane, is under development to take advantage of some of these programs.

Below are samples of these programs.

Resources for Electronics Systems Failure Analysis

Facilities

- Electronics Evaluation Laboratory
- Electronics Repair Shop
- Materials Analysis Laboratory
- Materials Analysis Laboratory
- X-Ray Laboratory

Specialized Equipment

- Electron Microscope
- Electron Microscope
- Heat Flow Calorimeter
- Linear Accelerator
- Microscopic Probe

Services

- Circuit board continuity testing
- Design Modeling And Simulation
- Product Engineering
- Radiography
- Shock Testing

Specialties

- Climate Testing
- Component And Systems Test
- Corrosion Control
- Environmental Testing
- Materials Composition
- Non-Destructive Testing
- Radiation Hardened Electronics
- Reverse Engineering

SAMPLE Resource Catalog Index

PRELIMINARY Crane Product and Service Catalog Index PRELIMINARY						
Resources available	**Resource Description**				**Location**	
Industrial Application	**Name of Resource**	Capacity or limits	Applicable Industrial Standards	Type of Resource	**Department**	Code
Acoustic Composite Products	Acoustic Composite Products			Product	Undersea Systems	60.7
Acoustic Sensor Testing & Evaluation	Atf Tanks			Facility	Acoustic Sensors	60.7
Acoustic Sensor Testing & Evaluation	Hydrostatic Tanks			Facility	Acoustic Sensors	60.7
Air Pollution Control	Chemical Bio Detection & Protection			Equipment	Acquisition Department	1.16
Air Pollution Control	Material Management & Supply			Product	Global Material Logistics	11.33
Air Pollution Control	Material Management & Supply			Product	Global Material Logistics	11.33
Air Quality Testing	Environmental Lab			Equipment	Expl Science	40.52
Altitude Analysis	Environmental Conditions Chamber			Expertise	Environmental Testing	40.55
Antenna Performance	Anechoic Chamber			Equipment	SEW	80.7
Asbestos Testing	Chemical Analysis Lab		Epa M V	Equipment	Expl Science	40.52
Battery & Power Systems	Electrochemical Facility			Facility	Battery & Power Systems	60.9
Battery & Power Systems	Battery Evaluation & Abuse Facility			Facility	Battery & Power Systems	60.9
Battery & Power Systems	Prototyping, & Fuel Cell Evaluation			Equipment	Battery & Power Systems	60.9
Biometrics	Electronic Badging System			Product	Defense Security Systems	40.4
Centrifuge And Gravitational Testing	Centrifuge			Expertise	Environmental Testing	40.55
Chem/bio Detection	Chem/bio Detection Center			Facility	Chem/bio Warfare Detection	80.5
Chem/bio Detection	Chemical Vapor Diagnostic Test Sets			Equipment	Chem/bio Warfare Detection	80.5
Chem/bio Detection	Repair Chemical Detection Devices			Expertise	Chem/bio Warfare Detection	80.5
Chem/bio Detection	Specialized Detection Equipment			Equipment	Chem/bio Warfare Detection	80.5
Chem/bio Detection	Thermal Collimeters			Equipment	Chem/bio Warfare Detection	80.5

PRELIMINARY Crane Product and Service Catalog Index PRELIMINARY						
Resources available	**Resource Description**				**Location**	
Industrial Application	**Name of Resource**	Capacity or limits	Applicable Industrial Standards	Type of Resource	**Department**	Code
Chemical Spill Management				Expertise	Chemical Spills	95
Chromatography	Chemical Analysis Lab			Equipment	Expl Science	40.52
Commercial Shipping, Aviation	Microwave Tube Test & Evaluation			Expertise	Microwave Technologies	80
Commercial Shipping, Aviation	Microwave Tube Testing Lab			Facility	Microwave Technologies	80
Commercial Shipping, Aviation	Process & Failure Analysis Lab			Facility	Microwave Technologies	80
Commercial Shipping, Aviation	Tri-Service/ Nasa Cathode Life Test			Facility	Microwave Technologies	80
Commercial Shipping, Aviation	Vacuum Electronic Devices			Equipment	Microwave Technologies	80
Common Access Card	Electronic Badging System			Product	Defense Security Systems	40.4
Communications Equipment Testing	Antenna Analysis Facility			Facility	Microwave Technologies	80
Communications Equipment Testing	Component Test & Evaluation			Facility	Microwave Technologies	80
Communications Equipment Testing	Integrated Environmental Test Facility			Facility	Microwave Technologies	80
Communications Equipment Testing	Microwave Integrated Circuit Lab			Facility	Microwave Technologies	80
Computer Aided Design & Engineering	Failure And Materials Analysis			Expertise	Advanced Technology	60.5
Computer Hardware & Software	Hardware & Software Development			Product	Undersea Systems	60.7
Computer Performance Evaluation	Computer Performance Labs			Facility	Microelectronics	
Contactless Cards	Electronic Badging System			Product	Defense Security Systems	40.4
Conventional Ammunition Development	Ammunition Engineering Labs			Facility	Ammunition Engineering	40

PRELIMINARY Crane Product and Service Catalog Index PRELIMINARY						
Resources available	**Resource Description**				**Location**	
Industrial Application	**Name of Resource**	Capacity or limits	Applicable Industrial Standards	Type of Resource	**Department**	Code
Conventional Ammunition Development	Electro Optic Analysis Lab			Facility	Ammunition Engineering	40
Conventional Ammunition Development	Ordnance Test Area			Facility	Ammunition Engineering	40
Conventional Ammunition Development	Pyrotechnic Prototype Manufacturing			Facility	Ammunition Engineering	40
Corrections	Badging Systems			Expertise	Defense Security Systems	40.4
Corrections	High Security Lock Dvcs			Expertise	Defense Security Systems	40.4
Corrections	On-Site Support & Training			Expertise	Defense Security Systems	40.4
Corrections	Security & Biometrics Test Lab			Facility	Defense Security Systems	40.4
Corrections	System Integration			Expertise	Defense Security Systems	40.4
Corrections	Technology Assessment / Insertion			Expertise	Defense Security Systems	40.4
Corrosion Analysis	Materials Analysis Lab			Equipment	Expl Science	40.52
Corrosion Testing	Corrosion Control & Repair Facility			Facility	Electronic Warfare Systems	80
COTS Evaluation & Application	COTS Evaluation & Application			Expertise	Microelectronics	
Cots Obsolescence Management	Sustainment Engineering			Expertise	Surface Ships Systems	60.8
Cots Product Assessment	Applications Engineering Labs			Expertise	Surface Ships Systems	60.8
Custom Cable Manufacturing	Custom Cable Manufacturing			Product	Undersea Systems	60.7
Custom Cushion Fabrication	Pyrotechnics, Plastics & Packaging			Product	Pyrotechnics Development	40.7
Destructive Physical Analysis	Failure And Materials Analysis			Expertise	Advanced Technology	60.5
Diminishing Manufacturing Sources	Sustainment Engineering			Expertise	Surface Ships Systems	60.8
Drinking Water Analysis	Environmental Lab			Equipment	Expl Science	40.52
Drip Analysis	Environmental Conditions Chamber			Expertise	Environmental Testing	40.55

PRELIMINARY Crane Product and Service Catalog Index PRELIMINARY						
Resources available	**Resource Description**				**Location**	
Industrial Application	**Name of Resource**	Capacity or limits	Applicable Industrial Standards	Type of Resource	**Department**	Code
Drug Interdiction And Special Projects	P-3 Support			Expertise	Airborne EW Systems	80.2
Electro -Optic Testing	Automated Intensifier System			Equipment	Night Vision, Electro-Optics	80.5
Electro -Optic Testing	Electro-Optic Center			Facility	Night Vision, Electro-Optics	80.5
Electro -Optic Testing	Electro-Optic Test & Training Range			Facility	Night Vision, Electro-Optics	80.5
Electro -Optic Testing	Mast Mounted Sight Test Support			Equipment	Night Vision, Electro-Optics	80.5
Electro -Optic Testing	Sensor Electronics Test Set			Equipment	Night Vision, Electro-Optics	80.5
Electro -Optic Testing	Sensor Optical Test Set			Equipment	Night Vision, Electro-Optics	80.5
Electronic Failure Analysis	Failure Analysis			Expertise	Strategic Systems	60.5
Electronic Module Test & Repair	Equipment Substitution			Expertise	Electronic Module Test & Rpr	60
Electronic Module Test & Repair	Integrated Logistic Support			Expertise	Electronic Module Test & Rpr	60
Electronic Module Test & Repair	Life Cycle Support Of Ate			Expertise	Electronic Module Test & Rpr	60
Electronic Module Test & Repair	Manufacturing Process Engineering			Expertise	Electronic Module Test & Rpr	60
Electronic Module Test & Repair	Printed Circuit Technology Facility			Facility	Electronic Module Test & Rpr	60
Electronic Module Test & Repair	Progressive Level Repair Lab			Facility	Electronic Module Test & Rpr	60
Electronic Module Test / Analysis	Electronic Module Test / Analysis			Expertise	Microelectronics	
Electronic/ Mechanical Design	Applications Engineering Labs			Expertise	Surface Ships Systems	60.8
Electronics Continuity Testing	Manual Probe Stations			Equipment	Advanced Technology	60.5
Electronics Continuity Testing	Semiautomatic Probe Station			Equipment	Advanced Technology	60.5

PRELIMINARY Crane Product and Service Catalog Index PRELIMINARY						
Resources available	**Resource Description**				**Location**	
Industrial Application	**Name of Resource**	Capacity or limits	Applicable Industrial Standards	Type of Resource	**Department**	Code
Electronics Systems Analysis	Failure Analysis			Expertise	Strategic Systems	60.5
Element Analysis	Secondary Ion Mass Spectrometer			Equipment	Advanced Technology	60.5
Elemental Analysis	Gas Chromatograph Mass Spctromtr			Equipment	Advanced Technology	60.5
Emissions Testing	Environmental Lab		Epa M V	Equipment	Expl Science	40.52
Energy Conservation				Expertise	Energy Conservation	09.Z 5
Engineering Analysis & Repair	Engineering Analysis & Repair			Product	Undersea Systems	60.7
Environmental Testing	Environmental & Life Test Equipment			Equipment	Advanced Technology	60.5
Environmental Testing	Environmental Conditioning Chambers			Equipment	Test And Evaluation Dpt	40.5
Environmental Testing	Environmental Conditioning Chambers			Equipment	Test And Evaluation Dpt	40.5
Environmental Testing	Environmental Simulation			Expertise	Ammunition Engineering	40
Equipment Calibration	Calibration & Equipment Lab			Facility	Fleet Mntnce & Engineering	60.8
Evidence Evaluation	Radiography & Nondestructive Testing			Expertise	Test And Evaluation Dptt	40.5
Explosive management, Safety	EOD Mobil Unit			Expertise	Explosive Ordnance Disposal	40
Fabrication, Testing, & Qualification	Pyrotechnics, Plastics & Packaging			Product	Pyrotechnics Development	40.7
Failure Analysis	Failure Analysis Lab			Facility	Battery & Power Systems	60.9
Failure Analysis	Materials Analysis Lab			Equipment	Expl Science	40.52
Failure And Materials Analysis	Failure And Materials Analysis			Expertise	Advanced Technology	60.5
Fire Protection	Fire Department			Expertise	Fire Protection	13
Fire Training	Fire Training			Expertise	Fire School	
Fractography	Materials Analysis Lab			Equipment	Expl Science	40.52
Fungus Testing	Environmental Lab			Equipment	Expl Science	40.52
Gas Analysis	Residual Gas Analyzers			Equipment	Advanced Technology	60.5
Gps Reciever Integration	GPS Satellites & Recievers			Expertise	Strategic Systems	60.5
Gps Reciever Integration	GPS Satellites & Recievers			Expertise	Strategic Systems	60.5

PRELIMINARY Crane Product and Service Catalog Index PRELIMINARY						
Resources available	**Resource Description**				**Location**	
Industrial Application	**Name of Resource**	Capacity or limits	Applicable Industrial Standards	Type of Resource	**Department**	Code
Hardness Testing	Microhardness Tester			Equipment	Advanced Technology	60.5
Hazardous Material Management	Material Management & Supply			Product	Global Material Logistics	11.33
Hazardous Material Management	Material Management & Supply			Product	Global Material Logistics	11.33
Hazardous Wast Detection	Chemical Analysis Lab			Equipment	Expl Science	40.52
Heavy Cargo Management	Public Works			Expertise	Heavy Cargo	96.1
Heavy Equipment Operation / Mntnce	Public Works			Expertise	Heavy Equipment	96.3
Homeland Security	Chemical Bio Detection & Protection			Equipment	Acquisition Department	1.16
Icing Analysis	Environmental Conditions Chamber			Expertise	Environmental Testing	40.55
In Service Engineering And Testing	In-Service Engineering			Expertise	Electronic Warfare Systems	80
Infrared Testing	Automated Infrared Test			Facility	Pyrotechnics Development	40.7
Injection Molding	Pyrotechnics, Plastics & Pkg Development			Product	Pyrotechnics Development	40.7
Inventory And Exporting	Material Management & Supply			Product	Global Material Logistics	11.33
Laser Safety	Safety Evaluations & Certifications			Expertise	Night Vision, Electro-Optics	80.5
Laser Testing	Laser Designator / Marker Test Station			Facility	Night Vision, Electro-Optics	80.5
Law Enforcement	Material Management & Supply			Expertise	Global Material Logistics	11.33
Leak Testing	Fine & Gross Leak Testing			Equipment	Advanced Technology	60.5
Management Of Battery Resources	Electrochemical Facility			Facility	Battery & Power Systems	60.9
Material Failure Analysis	Material Analysis			Expertise	Strategic Systems	60.5
Material Spc Analysis	Materials Analysis Lab		ASTM	Equipment	Expl Science	40.52
Materials Analysis	Failure And Materials Analysis			Expertise	Advanced Technology	60.5
Materials Failure Analysis	Materials Failure Analysis			Expertise	Microelectronics	

PRELIMINARY Crane Product and Service Catalog Index PRELIMINARY						
Resources available	**Resource Description**				**Location**	
Industrial Application	**Name of Resource**	Capacity or limits	Applicable Industrial Standards	Type of Resource	**Department**	Code
Metallography	Chemical Analysis Lab			Equipment	Expl Science	40.52
Metals Finishing	Powder-Coating Facility			Facility	Weapons Department	40.8
Microscopic Analysis	Optical Microscope			Equipment	Advanced Technology	60.5
Microscopic Analysis	Scanning Electron Microscope			Equipment	Advanced Technology	60.5
Microscopic Inspection	Failure Analysis Equipment			Equipment	Advanced Technology	
Mixed Mode Vibration Testing	Vibration Test Equipment			Expertise	Environmental Testing	40.55
New Product Performance Testing	Vibration Test Equipment			Expertise	Environmental Testing	40.55
Open Systems Architecture	Applications Engineering Labs			Expertise	Surface Ships Systems	60.8
Packaging & Thermal Analysis	Packaging & Thermal Analysis			Expertise	Microelectronics	
Packaging Design & Qualification	Pyrotechnics, Plastics & Packaging			Product	Pyrotechnics Development	40.7
Particle Size Analysis	Materials Analysis Lab			Equipment	Expl Science	40.52
Personnel Protection	Anti-Terrorism/ Force Protection			Expertise	Defense Security Systems	40.4
Physical Property Analysis	Materials Analysis Lab			Equipment	Expl Science	40.52
Police Training	Police Training			Expertise	Riot Control & Swat	
Powder Coat Application And Testing	Powder-Coating Facility			Facility	Weapons Department	40.8
Power Generation	Material Management & Supply			Product	Global Material Logistics	11.33
Power Generation	Material Management & Supply			Product	Global Material Logistics	11.33
Precision Machining & Waterjet Cutting	Pyrotechnics, Plastics & Packaging			Product	Pyrotechnics Development	40.7
Pressure And Vacuum Testing	Pressure Vacuum Test Equipment			Equipment	Environmental Testing	40.55
Printed Wiring Boards	Failure And Materials Analysis			Expertise	Advanced Technology	60.5
Product Engineering	Product Engineering			Expertise	Strategic Systems	60.5

PRELIMINARY Crane Product and Service Catalog Index PRELIMINARY						
Resources available	**Resource Description**				**Location**	
Industrial Application	**Name of Resource**	Capacity or limits	Applicable Industrial Standards	Type of Resource	**Department**	Code
Production Design Audits & Reviews	Audits & Technical Reviews			Product	Undersea Systems	60.7
Protoryping And Fabrication	Prototype Fabrication Shop			Facility	Weapons Department	40.8
Prototype Pyrotechnic Manufacturing	Pyrotechnics, Plastics & Packaging			Product	Pyrotechnics Development	40.7
Prototyping And Modeling	Computer Modeling			Expertise	Weapons Department	40.8
Prototyping And Modeling	Design Modeling & Simulation			Expertise	Strategic Systems	60.5
Prototyping And Modeling	Prototyping & Limited Production			Expertise	Electronic Warfare Systems	80
Prototyping/ Limited Production	Applications Engineering Labs			Expertise	Surface Ships Systems	60.8
Purchasing, Inventory, Acquisition	Ammunition Acquisition			Equipment	USMC Ammunition Logistics	40.3
Pyrotechnics And Explosives	Ordnance Test Area			Facility	Ammunition Engineering	40
Pyrotechnics And Explosives	Prototype Manufacturing Facility			Facility	Ammunition Engineering	40
Radiated Noise Analysis	Radiated Noise Analysis			Expertise	Undersea Systems	60.7
Radiation Testing & Evaluation	Radiation Testing & Evaluation			Equipment	Advanced Technology	60.5
Railroad Maintenance	Public Works			Expertise	RR Equip Maintenance	96.7
Railroad Operations	Public Works			Expertise	RR Operations	96.6
Random Vibration Testing	Vibration Test Equipment			Expertise	Environmental Testing	40.55
Refraction Analysis	Chemical Analysis Lab			Equipment	Expl Science	40.52
Requirements & Specification Dvlpment	Requirements & Specification Dvlpmnt			Product	Undersea Systems	60.7
Rubber & Polyurethane Molding	Rubber & Polyurethane Molding			Product	Undersea Systems	60.7
Safety Certification	Safety Certification			Expertise	Battery & Power System s	60.9
Salt Testing	Environmental Conditions Chamber			Expertise	Environmental Testing	40.55

PRELIMINARY Crane Product and Service Catalog Index PRELIMINARY						
Resources available	**Resource Description**				**Location**	
Industrial Application	**Name of Resource**	Capacity or limits	Applicable Industrial Standards	Type of Resource	**Department**	Code
Security	Technology Assessment / Insertion			Expertise	Defense Security Systems	40.4
Security	Anti-Terrorism/ Force Protection			Expertise	Defense Security Systems	40.4
Security	Badging Systems			Expertise	Defense Security Systems	40.4
Security	On-Site Support & Training			Expertise	Defense Security Systems	40.4
Security	Security & Biometrics Test Lab			Facility	Defense Security Systems	40.4
Security	System Integration			Expertise	Defense Security Systems	40.4
Semiconductor Devices	Failure And Materials Analysis			Expertise	Advanced Technology	60.5
Semiconductor Radiation Effects	Semiconductor Radiation Effects			Expertise	Microelectronics	
Serial Number Tracking	Material Management & Supply			Expertise	Global Material Logistics	11.33
Shipping And Distribution	Material Management & Supply			Expertise	Shipping	11.33
Sinusoidal Vibration Testing	Vibration Test Equipment			Expertise	Environmental Testing	40.55
Smart Cards	Electronic Badging System			Product	Defense Security Systems	40.4
Softward Development And Analysis	Software Support			Expertise	Electronic Warfare Systems	80
Software Development	ATE Software Development Facility			Facility	Electronic Warfare Systems	80
Soil Testing	Chemical Analysis Lab			Equipment	Expl Science	40.52
Sonar System	Acoustic Composite Products			Product	Undersea Systems	60.7
Specialized Ammunition	Loading Facility For Limited Production			Facility	Weapons Department	40.8
Specialized Storage	Explosives Storage			Expertise	Ammunition Engineering	40
Specialized Storage	Explosives Storage Magazines			Facility	Weapons Department	40.8
Stack Sampling	Environmental Lab		Epamthdv	Equipment	Expl Science	40.52
Surveillance	Automated Intensifier Measurement			Equipment	Night Vision, Electro-Optics	80.5
Surveillance	Mast Mounted Sight Test Support			Equipment	Night Vision, Electro-Optics	80.5
Surveillance	Sensor Electronics Test Set			Equipment	Night Vision, Electro-Optics	80.5

PRELIMINARY Crane Product and Service Catalog Index PRELIMINARY						
Resources available	**Resource Description**				**Location**	
Industrial Application	**Name of Resource**	Capacity or limits	Applicable Industrial Standards	Type of Resource	**Department**	Code
Surveillance	Sensor Optical Test Set			Equipment	Night Vision, Electro-Optics	80.5
System Testing, Debuggig	Failure Analysis, Testing, Debuggig			Product	Undersea Systems	60.7
System Retirement	System Retirement			Expertise	Battery & Power Systems	60.9
Systems Architecture & Networking	Systems Architecture/ Network Dvlpmt			Product	Undersea Systems	60.7
Systems Design	Systems Design			Expertise	Electronic Warfare Systems	80
Technology Refresh/ Insertion	Sustainment Engineering			Expertise	Surface Ships Systems	60.8
Temperature & Humidity Analysis	Environmental Conditions Chamber			Expertise	Environmental Testing	40.55
Temperature Shock Analysis	Environmental Conditions Chamber			Expertise	Environmental Testing	40.55
Temperature Storage & Cycling Testing	Environmental Conditions Chamber			Expertise	Environmental Testing	40.55
Thermal Analysis	Heat Flow Calorimeters			Equipment	Test And Evaluation Dpt	40.5
Thermal Analysis	Materials Analysis Lab			Equipment	Expl Science	40.52
Thermal Analysis	Materials Thermal Analysis Equipment			Equipment	Advanced Technology	60.5
Total Ownership Cost Analysis	Sustainment Engineering			Expertise	Surface Ships Systems	60.8
Training	Electro-Optic Center			Facility	Night Vision, Electro-Optics	80.5
Training	Electro-Optic Test & Training Range			Facility	Night Vision, Electro-Optics	80.5
Training	Image Intensifier Tube Test			Expertise	Night Vision, Electro-Optics	80.5
Training	Safety Evaluations & Certifications			Expertise	Night Vision, Electro-Optics	80.5
Training	Training Department			Expertise	Training	1.21
Training, Repair, & Technical Support	Operator Support			Expertise	Expeditionary Warfare	60.6
Transportation Management				Expertise	Transportation Management	96
Vacuum And Temperature Testing	Deep Space Chamber			Equipment	Environmental Testing	40.55

PRELIMINARY Crane Product and Service Catalog Index PRELIMINARY						
Resources available	**Resource Description**				**Location**	
Industrial Application	**Name of Resource**	Capacity or limits	Applicable Industrial Standards	Type of Resource	**Department**	Code
Vacuum Forming	Pyrotechnics, Plastics & packaging			Product	Pyrotechnics Development	40.7
Vehicle Maintenance	Public Works			Expertise	Vehicle Maintenance	96.5
Vendor Product Serveillance	Failure And Materials Analysis			Expertise	Advanced Technology	60.5
Video Imagery	Pioneer Support			Expertise	Airborne EW Systems	80.2
Waste Disposal And Recycling	Material Management & Supply			Product	Global Material Logistics	11.33
Wastewater Testing	Environmental Lab			Equipment	Expl Science	40.52
Weapons Development	Computer Modeling			Expertise	Weapons Department	40.8
Weapons Development	Prototype Fabrication Shop			Facility	Weapons Department	40.8
Weapons Repair	Small Arms & Ammunition Support			Expertise	Weapons Department	40.8
Weapons Repair	Small-Arms Repair Facility			Facility	Weapons Department	40.8
Weapons Testing	Indoor Test Range			Facility	Weapons Department	40.8
Weapons Testing	Ordinance Test Area			Facility	Test / Evaluation Dptt	40.5
Weapons Testing	Outdoor Test Range			Facility	Weapons Department	40.8
Weapons Testing	Radiography & Nondestructive Testing			Expertise	Test And Evaluation Dpt	40.5
Weapons Testing	Underground Test Facility			Facility	Weapons Department	40.8
Weapons Testing	Underwater Ordnance Evaluation			Expertise	Test And Evaluation Dpt	40.5
Weapons Testing	Walk-In Environmental Chamber			Facility	Weapons Department	39.8
Wind Testing	Ram Air Turbine Wind Tunnel			Facility	Electronic Warfare Systs	80
Wire Repair	Automated Wire Wrap Machine			Equipment	Sew	80.7
X-Ray Analysis	Radiography			Expertise	Ammunition Engineering	40

List of Regional Advisory Committee Members

Jo Arthur
Executive Director
Southern Ind. Development Commission

Ron Arnold
Executive Director
Daviess County Growth Council

Amy Couch
Brown County Commission

Laura Albertson
Director
Martin County Solid Waste District

John Beach – Greene
4-H Youth Development, CED, ECD
Purdue University Cooperative Extension Service
Greene County Office

Andrew Boston – Orange
ANR, CED
Purdue University Cooperative Extension Service

Barbara Bowman – Brown
Extension Educator - CED, Consumer & Family Sciences, 4-H/Youth Development
Purdue University Cooperative Extension

Kerry Conway
Greene County Community Foundation

Charley Dibble
Executive Director
Greene County Economic Development Corporation

Mark Evans – Owen
ANR, CED
Purdue University Cooperative Extension Service
Owen County Office

Lisa Gehlhausen
Executive Director
Region 15 Plan Commission

Judy Gray
Executive Director
Orange County Economic Development Partnership

Gene McCracken
Executive Director
Lawrence Co. Economic Growth Council

Chad Pfitzer – Daviess
ANR
Purdue University Cooperative Extension Service
Daviess County Office

Adele Purlee
Executive Director
Bedford Chamber of Commerce

Jerry Ott
Martin County Economic Development

Dan Peterson
Cook Life Sciences
V.P., Industry & Gov Affairs
Cook Group, Inc

David Redman – Lawrence
ANR, CED
Purdue University Cooperative Extension Service

Jeff Quyle
Hoosier Energy

Jean Robinson
Executive Director
Brown County Economic Development Commission

Mary Jo Robinson
Orange County 4-H Youth Development/ CFS Ext. Educator
Purdue University Cooperative Extension Service

Denise L. Shaw
Interim Executive Director
Owen County Chamber of Commerce & Economic Development Corporation

Gary Shelley
Economic Development Representative
Duke Energy

Amy Thompson
Purdue Cooperative Extension Service-Monroe County
Extension Educator Agriculture/Natural Resources

Darrell White
Community Relations Coordinator
Boston Scientific

Linda Williamson
President
Bloomington Economic Development Corporation

Gary Wilson – Greene
ANR
4-H Youth Development, CED, ECD
Purdue University Cooperative Extension Service
Greene County Office

Appendix III:
EGR 8 Survey Materials

E-mail Sent to 602 Organizations in EGR 8 Inviting Participation in Survey

I'd like to ask you to take part in an important study on the future of our region's economy.

With support from the U.S. Economic Development Administration and Indiana state government, researchers from Purdue and Indiana Universities are studying opportunities for economic growth in rural regions of the nation. A key part of the study examines economic conditions in a particular region. For this purpose we've chosen Indiana's **Economic Growth Region 8**, which includes Brown, Daviess, Greene, Lawrence, Martin, Monroe, Orange and Owen counties.

Through this survey we're asking business and community leaders to share their views on the region's strengths and weaknesses as a place to do business and help identify promising opportunities to target for economic development.

All responses will be treated confidentially; only statistics pooled across respondents will be reported from the survey. Any individual responses will remain anonymous, so you should feel free to respond frankly to the survey questions. We will gladly share a report of the study's findings with you when it is completed.

I hope you will take a moment today to complete the survey online at **www.ibrc.indiana.edu/EGR8survey.html**. If you have any questions, you may contact us at 812-855-5507 or **ibrc@iupui.edu**. Your opinions can make a difference in our region's economic future. Thank you for taking part in this important study.

Sincerely,

Jerry N. Conover, Ph.D., Director
Indiana Business Research Center
Kelley School of Business – Indiana University
1275 E Tenth St., Bloomington, IN 47405-1701

Cover Letter Mailed to Selected Regional Stakeholders Inviting Survey Participation

May 2006

I am writing to ask you to take part in an important study on the future of our region's economy.

With support from the U.S. Economic Development Administration and Indiana state government, researchers from Purdue and Indiana Universities are studying opportunities for economic growth in rural regions of the nation. This study has the full support of Governor Mitch Daniels and the Office of Rural Affairs.

A key part of the study focuses on a detailed analysis of economic conditions and opportunities in a particular region. For this purpose we've chosen Indiana's **Economic Growth Region 8**, which includes Brown, Daviess, Greene, Lawrence, Martin, Monroe, Orange and Owen counties; for your reference, a map of the region appears on the reverse side of this page.

This survey is one of several means we're using to gather information from business and community leaders in the region. Your participation will enhance understanding of the region's strengths and weaknesses as a place to do business and help identify promising opportunities to target for economic development.

All responses will be treated confidentially; only statistics pooled across respondents will be reported from the survey. Any individual responses will remain anonymous, so please feel free to respond frankly to the survey questions. We will gladly share a report of the study's findings with you when it is completed.

I hope you will take a moment today to complete the survey. The easiest way to do so is online at www.ibrc.indiana.edu/EGR8survey.html. If you prefer, you may complete the enclosed survey form and mail or fax it to us at the indicated address or number.

Your opinions can make a difference in our region's economic future. Thank you for taking part in this important study.

Sincerely,

Jerry N. Conover, Ph.D., Director

Cover Letter Mailed to a Second List of 150 Organizations in EGR 8 Inviting Survey Participation

June 2006

I am writing to ask you to take part in an important study on the future of our region's economy.

With support from the U.S. Economic Development Administration and Indiana state government, researchers from Purdue and Indiana Universities are studying opportunities for economic growth in rural regions of the nation. This study has the full support of Governor Mitch Daniels and the Office of Rural Affairs.

A key part of the study focuses on a detailed analysis of economic conditions and opportunities in a particular region. For this purpose we've chosen Indiana's **Economic Growth Region 8**, which includes Brown, Daviess, Greene, Lawrence, Martin, Monroe, Orange and Owen counties; for your reference, a map of the region appears on the reverse side of this page.

This survey is one of several means we're using to gather information from business and community leaders in the region. Your participation will enhance understanding of the region's strengths and weaknesses as a place to do business and help identify promising opportunities to target for economic development.

All responses will be treated confidentially; only statistics pooled across respondents will be reported from the survey. Any individual responses will remain anonymous, so please feel free to respond frankly to the survey questions. We will gladly share a report of the study's findings with you when it is completed.

I hope you will take a moment today to complete the survey. The easiest way to do so is online at www.ibrc.indiana.edu/EGR8survey.html. If you prefer, you may complete the enclosed survey form and mail or fax it to us at the indicated address or number.

Your opinions can make a difference in our region's economic future. Thank you for taking part in this important study.

Sincerely,

Jerry N. Conover, Ph.D., Director

Mailed Version of the Survey on the Business Climate in Economic Growth Region 8

You are encouraged to complete this survey **online** at www.ibrc.indiana.edu/EGR8survey.html
Please mark your answers to the questions below as indicated. If you feel a need to explain an answer, you may write in the margins or on the back of the page.

Your Organization. This information will help us understand the perspectives of people in different kinds of organizations.

1. How many years has your organization operated in this region?

   ❑ 1 to 2 years ❑ 3 to 5 years ❑ 6 to 10 years ❑ 11 to 20 years ❑ more than 20 years

2. Is your organization headquartered outside this region? ❑ YES ❑ NO

3. In which county is your organization located? _____

4. Which classification best describes the primary business of your organization? (Check only one)

   ❑ Agriculture, forestry, fishing or hunting
   ❑ Mining
   ❑ Utilities
   ❑ Construction
   ❑ Manufacturing
   ❑ Wholesale Trade
   ❑ Retail Trade
   ❑ Transportation or Warehousing
   ❑ Information (media, communications, etc.)
   ❑ Finance or Insurance
   ❑ Real Estate, Rental or Leasing firms
   ❑ Professional, Scientific or Technical Services
   ❑ Management of Companies or Enterprises
   ❑ Admin. & Support Svcs, Waste Mgt. or Remediation Svcs
   ❑ Educational Services
   ❑ Health Care or Social Services
   ❑ Arts, Entertainment & Recreation
   ❑ Accommodation & Food Services
   ❑ Other Services (except public administration)
   ❑ Public Administration
   ❑ Other (please specify:_____)

5. If you know your organization's NAICS (industry) code, what is it? (2 to 6 digits) _____

6. Describe the **primary** product(s) or service(s) your organization offers from this location:

7. What percent of the customers of your local organization are from each of these areas? *(should sum to 100%)*

   ____ % within this county
   ____ % elsewhere in Indiana
   ____ % outside of Indiana but within the U.S.
   ____ % outside the U.S.

8. Why is your organization located in this area? _____

   _____

9. How many people currently work for your organization in this county?

❑ 1 to 5 ❑ 6 to 10 ❑ 11 to 20 ❑ 21 to 50 ❑ 51 to 100 ❑ 101 to 200 ❑ 201+

10. By what percentage do you expect your organization's local workforce to change in the next 12 months?

❑ grow by more than 20%
❑ grow by 10% to 20%
❑ grow by less than 10%
❑ stay about the same
❑ shrink by less than 10%
❑ shrink by 10% to 20%
❑ shrink by more than 20%

Local Business Climate. The remaining questions deal with doing business in the local area.

11. How would you rate the **importance** of the following **local factors** to the success of your business in the local area? (Circle a number for each factor.)

	Very Important	Moderately Important	Slightly Important	Not Important	Unsure or Not Applicable
Availability of land for expansion	1	2	3	4	5
Being close to suppliers	1	2	3	4	5
Being close to customers	1	2	3	4	5
Being close to distribution facilities	1	2	3	4	5
Availability of freight transportation	1	2	3	4	5
Low cost of transportation	1	2	3	4	5
Availability of labor in the region	1	2	3	4	5
Low labor costs	1	2	3	4	5
Quality of workforce	1	2	3	4	5
Access to capital	1	2	3	4	5
Low cost of utilities	1	2	3	4	5
Low business property taxes	1	2	3	4	5
Affordable housing	1	2	3	4	5
Cultural amenities & recreational activities	1	2	3	4	5
Concerns about environmental problems	1	2	3	4	5
Citizens' support for economic growth	1	2	3	4	5
Responsive local government officials	1	2	3	4	5

12. How would you rate the **availability** of labor in the region for your business? (Circle a number for each type. If you have no experience with a particular type of labor, circle 5 for "N/A".)

	Excellent	Good	Fair	Poor	N/A
HOURLY:					
Skilled	1	2	3	4	5
Semi-skilled	1	2	3	4	5
Unskilled	1	2	3	4	5
SALARIED:					
Management/Administrative	1	2	3	4	5
Professional/Technical	1	2	3	4	5

Sales/Marketing	1	2	3	4	5

Comments:

13. How would you rate the **quality** of labor in the region for your business? (Circle a number. If you have no experience with a specific type of labor, circle 5 for "N/A".)

	Excellent	Good	Fair	Poor	N/A
HOURLY:					
Skilled	1	2	3	4	5
Semi-skilled	1	2	3	4	5
Unskilled	1	2	3	4	5
SALARIED:					
Management/Administrative	1	2	3	4	5
Professional/Technical	1	2	3	4	5
Sales/Marketing	1	2	3	4	5

Comments:

14. Please rate the following local services in terms of how well they meet business needs. (Circle a number for each service. If you have no experience with a specific service, circle "N/A".)

	Excellent	Good	Fair	Poor	N/A
Water service	1	2	3	4	5
Sewer service	1	2	3	4	5
Solid waste disposal	1	2	3	4	5
Electrical service	1	2	3	4	5
Natural gas or propane service	1	2	3	4	5
Basic telephone service	1	2	3	4	5
High-speed Internet service	1	2	3	4	5
Fire protection	1	2	3	4	5
Police protection	1	2	3	4	5
Construction services	1	2	3	4	5
Availability of affordable child care	1	2	3	4	5
Schools (kindergarten – high school)	1	2	3	4	5
Access to higher education	1	2	3	4	5
Highway access to other areas	1	2	3	4	5
Local roads	1	2	3	4	5
Nearby airport facilities	1	2	3	4	5
Access to major airports	1	2	3	4	5
Air cargo/express service	1	2	3	4	5
Rail cargo service	1	2	3	4	5
Quality of healthcare services	1	2	3	4	5
Affordability of healthcare services	1	2	3	4	5
Business financing	1	2	3	4	5
Professional & business services	1	2	3	4	5

Facilities for business meetings	1	2	3	4	5
Lodging for business visitors	1	2	3	4	5
Process for obtaining local permits/licenses	1	2	3	4	5

Comments:

15. In your opinion, the business climate in this region is:

❑ improving ❑ stable ❑ getting worse

16. In your opinion, what are the main **assets of this region** when it comes to doing business here? Assets include such things as particular organizations or facilities in the area, natural resources or features, proximity to key markets, cultural or recreational opportunities, physical infrastructure (highways, utilities, etc.), helpful local government, and so on.

17. In your opinion, what are the main **drawbacks of this region** when it comes to doing business here?

18. Finally, we'd appreciate any other comments or suggestions you may have about the **advantages or disadvantages of doing business in this region** or the **prospects for the area's economic future**. Feel free to share your views on which industries the region should target for economic growth, and why. (Continue on back if necessary.)

Finally, in case we need to contact you to clarify a response or to send you a copy of the survey results if you requested one, please provide the following information. This information will not be shared with anyone nor used for any other purpose.

Name: _____ Title: _____

Organization: _____

Telephone Number: _____ e-mail address: _____

A copy of the **survey results** will be e-mailed to you if you provide your e-mail address. *Your e-mail address will not be shared nor used for any purpose unrelated to this survey.*

Thank you very much for your help with this survey!

Survey Responses to Open-Ended Questions

Question 8 Responses

Why is your organization located in this area?

ROOTS

1. been in Daviess Co. since its establishment in 1888
2. Began here.
3. born and raised here
4. family company that started in Orange County
5. Founded here, relocation would be costly
6. grew up in this area
7. Grew up near here
8. History and opportunity. Although we have grown to a $100 Million per year organization, almost all construction is considered local to some degree. As we work throughout the Central and Southern regions of the State and beyond, this area is a good place for our headquarters.
9. history, past good market, good way of life
10. Home of owner, scenic beauty, more affordable standard of living
11. I am here
12. I live here
13. I moved to Lake Monroe 25 years ago. Attended IU in prior years
14. I was born in Bloomington. I started the company because I couldn't get a good job here.
15. just where I was living
16. long history in this area (almost 100 years); good workforce
17. My wife and I like the area. Bloomfield is very centrally located between Indianapolis, Evansville, Terre Haute, Vincennes, and Bloomington. You can partake in the social activities these cities offer and then leave their social problems behind. Bloomfield provides an excellent quality of life. Insurance services can be marketed from virtually any location.
18. organization founded here
19. original home area of husband and wife who started business out of their garage and kitchen table
20. Originally started at this location - near farming area
21. Originally started in this area in 1926 because of the local hardwoods.
22. our kids live here
23. Owners born here
24. started here
25. started here 33 years ago, owners located here to start another business: location, IU, size of community
26. the company was founded here in 1962
27. The founder of the company lived here.
28. the founder chose Bloomington because they liked the Bloomington area and Indiana
29. This is where our parent organization is located.
30. We have always been in southern Indiana as a family.
31. where it originated
32. where opportunity presented itself 29 years ago

COMMUNITY/REGIONAL SERVICE

33. community based hospital system founded over 100 years ago
34. county hospital
35. established and publicly funded to serve Monroe County
36. in the county we serve
37. it is here to support local businesses
38. it's the area hospital
39. local affiliate of a statewide network of providers - founders were Monroe Co. resident

40. local economic development organization
41. Provide a service to the community
42. Provide the region the most up to date information.
43. tax supported
44. The main office is located in Bloomington, Monroe County. we serve 11 counties: Monroe, Morgan, Owen, Lawrence, Orange, Brown, Bartholomew, Decatur, Jennings, Jackson & Scott
45. The people of this area support a daily newspaper and have for over a 150 years. We are interested in the future growth and the current conditions of our area.
46. to assist/support the Orleans business community
47. To best serve our membership and the county.
48. to educate young people
49. to provide electricity to the rural areas of Daviess, Martin & Lawrence Counties
50. to provide electric service to the rural people of these counties (Daviess, Martin & Lawrence)
51. To provide outreach/education/information on behalf on Purdue Unversity which will help improve the lives of Monroe Counties citizens.
52. to service area businesses
53. was created to promote existing businesses, services and promote our area
54. We are a Community College and geographically we cover distinct territories.
55. we are an operating telephone company
56. We are located in every county in the State of Indiana.; county organization
57. We are one of fourteen regions of the community college.
58. We are part of County Government
59. we have an office in every county in Indiana
60. We service students from families who live in this area.
61. We were organized for the purpose of representing the local business community.
62. we were organized in 1937 to provide electric service to rural areas the investor owned utilities refused to serve.

CUSTOMERS

63. 1. Central location for many customers. 2. History.
64. Company serves south central Indiana. Bloomington is a centralized location for our business. In addition we are able to recruit labor in this community.
65. customer base
66. good geographic location to serve our customers (Honda-Ohio, Toyota - Indiana & Kentucky, SIA - Indiana, etc.)
67. home office of primary company
68. our major customer was located in Monroe County in the past and we had decided to locate our facility as close as possible to the customer in order to save transportation cost and time required
69. Started based on local contacts.
70. where we do business

MANDATE

71. by law
72. by state statute
73. Indiana code requirements 5.28.15 - enterprise zone
74. Licensed in this location by the FCC
75. state mandate
76. State requirement
77. the County is our juridictional boundary

UNIVERSITY

78. developed out of a program at IU
79. It was Indiana University employees who first chartered the credit union.
80. Near Indiana University
81. proximity to Bloomington campus of IU
82. We serve the university

ACQUISITION

83. acquisition
84. aquired product from Cook, Inc.
85. Prior purchase of another company who started this plant, presumably due to low wage rates.
86. purchased the existing company and have not been inclined to move to another location; public school

NEED

87. It was founded in 1971 to address an unmet need for emergency services, and has grown and developed in the region.
88. need
89. need for services

DON'T KNOW

90. ?
91. I dunno.
92. It was here when I started so i can't really answer that

OTHER

93. chance
94. Grassroots organization started in Bloomington.
95. no good reason except we started here
96. Office in Bloomington (Monroe)
97. public education
98. public school corp.
99. Public school corporation
100. public school corporation
101. Quality of living and availability of talent.
102. school corporation
103. self explanatory
104. Talent pool. Quality of life in community, market
105. this area allows us to provide affordable quality resources to our customer

Question 16 Responses

*In your opinion, what are the main **assets of this region** when it comes to doing business here? Assets include such things as particular organizations or facilities in the area, natural resources or features, proximity to key markets, cultural or recreational opportunities, physical infrastructure (highways, utilities, etc.), helpful local government, and so on.*

MULTIPLE ASSETS LISTED

1. 1. cost and availability of utilities are moderate 2. labor and living cost are reasonable 3. availability of purchasing factory supply and parts is better 4. supports by local government are remarkable
2. 1. Central location for customers. 2. Quality of life helps retain some employees. 3. Indiana University is a plus in some important ways.
3. 1. Cost and availability of utilities are moderate. 2. Labor and living cost are reasonable. 3. Availability of purchasing factory supply and parts is better. 4. Supports by local government are remarkable.
4. Bio-Med Manufacturing; Forest & Wood Products; Great potetial for tourism; Local gov. finally working together for econ. dev.; 3 major highways intersecting
5. chambers in county, Crane, proximity to higher education, Goosepond/Beehunter marsh, RedBird SRA, Gr. Sullivan St. Forest, good local utilities, hospital, schools, potential for agri-tourism
6. colleges, healthcare, shopping, businesses like Baxter, Cook, GE
7. Educated population, natural scenic beauty, cultural events, SBDC, Chamber of Commerce,
8. educational institutions like IU, Ivy Tech, etc.Cultural and recreational opportunities that contribute to the quality of lie and attract workers. Cultural and socio-economic diversity of area. Relative proximity to larger cities such as Indianapolis, St. Louis, Chicago, Cincinnati, Cleveland, Louisville
9. employees, quality of life, Ivy Tech, water, Indiana University
10. Excellent attitude of governmental units.Integrity, work ethic, values of the citizens. Adequate highways, access to entire midwest. Good educational institutions. Dependable utility service. Well-run local airport.
11. Good people, Beautiful area, IU, Forward thinking governmental services
12. Honesty and integrity of local workforce. Proximity to several cities (Indianapolis, IN, Louisville, KY, Cincinnati,OH, St. Louis, MO, Chicago, IL, Nashville, TN) without the problems cities usually have (Eg. crime, traffic, etc.). Very good local engineering schools (Univ. of Evansville, Rose-Hulman, Univ. of Louisville, Purdue).
13. infrastructure, low cost of doing business, local government
14. IU/Ivy Tech; healthcare delivery system; amenities of southern Indiana region; life sciences companies
15. low cost of labor; reasonable cost of housing; accommodative government environment usually; availability of financing for business
16. low cost of living - open business climate - location to U.S. Population
17. low crime, Crane Naval Support Center, good weather climate
18. Midwest location, limestone industry, proximity to Indiana University, located midway between Indianapolis and Louisville, low labor rate.
19. natural resources (coal, oil, gas, stone, water); proximity to crane; recreational (fishing, hunting & camping); (lots of strip pits); hospital & schools
20. our recycling material recovery facility is rated as one of the top 3 in the State of Indiana. US & national gypsum companies provide good wage employment. Our county has some of the best scenery - but w/ no roads - tourism is poor. Crane Military Base.
21. Proximity to Crane and Bloomington Life Sciences. Good location between Louisville, Indy, Evansville, St. Louis, etc. logistical advantage. Coal, Agriculture, access to cheap labor. IU. Good distance education programs in Indiana.
22. quality workforce, enterprise zones, Crane Naval Center, GM, limestone - natural resources

QUALITY OF LIFE

23. big town sophistication with a small town atmosphere, I.U., engaged citizenry

24. Close knit communities who truly care about their citizens.
25. community; low cost of living; I-69 future; low crime
26. cultural or recreational opportunities
27. High quality of life for staff. Relatively affordable cost of living which creates a more stable labor pool.
28. In many ways this is a progressive, entrepreneurial community, with a city government that supports innovation to some extent. There are a number of resources to support this, cultural, professional, infrastructure, and it is a pleasant place to live with a lot going on in the arts and a huge variety of services.
29. life style
30. no local congestion - rural setting, good environment to raise children, good highways to north
31. Not as rushed as in the larger metro areas.
32. quality of life, available labor
33. quality of life, location, Lake Monroe, I.U., Ivy Tech, Arts & Entertainment, close to Indy airport (1 hr.), Mon. Co. Airport, Downtown square
34. quality of life, recreational activities, access to university and activities
35. The local lifestyle, geography, and the availability of relatively inexpensive property is attractive to our employees. These employees want to live in this area and are typically very loyal and appreciative of their jobs.
36. This region is known for its rich diversity and cultural existence. I think it has a solid and strong reputation of being a place of interest. It is inviting, safe, attainable and has much to offer.
37. Working in 11 counties, they all have their unique features. Overall Region 8 provides us with recreational, cultural and educational resources that enhance our ability to deliver quality leadership and career development programs to girls aged 5-17. Many of our collaborations are in Monroe County however, they are growing in Lawrence County. we look to Indiana University for interns in the service learning programs.

UNIVERSITY

38. Access to affordable higher education and responsiveness to workforce training needs of local business community through presence of Ivy tech Community College-Bloomington.
39. higher educational opportunities
40. I. U.
41. I. U.
42. Indiana University - educational and cultural opportunities to customers
43. Indiana University has helped our business to grow.
44. Indiana University is a major draw and source of business
45. Indiana University students and the spouses of students.
46. Indiana University, cultural and recreational facilities, good people
47. Indiana University, cultural/arts opportunities.
48. Indiana University, Ivy Tech
49. Location to Bloomington - I.U. and Ivy Tech
50. University generates business for about 8 months a year.
51. university resources; active Chambers of Commerce

ACCESS

52. access to limestone; local government
53. access to river barges, good employee workforce, rural community
54. fly from Indianapolis to most locations in eastern US 4-5 hours; drive to many locations within 8 hours
55. Grain processing plant, farming community, within 100 miles of Indianapolis airport, Vincennes University less than 20 miles, Southern Indiana University within 50 miles, Sits on Hwy 50 & Hwy 57. Amusement parks, theatre and major sporting events of any kind all within 100 miles. What else could you want?
56. Proximity to Indianapolis/Terre Haute/ Columbus and somewhat Evansville. Indiana University and a good regional Hospital such as Bloomington Hospital. Also, the proximity to the Crane Naval Base.
57. proximity to larger cities - culture and higher education

58. Smaller area, easy to get around town. (most of the time) Highway 37 gives easy access to other areas, such as Martinsville and Bedford.

NATURAL RESOURCES

59. natural beauty, natural resources, progressive community cultural activites
60. natural resources
61. natural resources our best sell - wooded hillsides, water - small lakes/large lakes common road, Brown County State Park, Art Colony, wildlife
62. natural resources, new casino currently being constructed in French Lick
63. natural resources, recreational facilities, desire of locals to make things better, make SW Indiana a place with potential
64. natural resources, tourism, recreation, new casino at French Lick

LABOR

65. affordable labor force
66. Affordable labor. Low competition.
67. good work force; willingness of government to offer incentives
68. quality workforce for our business in place
69. willingness of workforce to train for new jobs; hard working blue collar; nearness to Evansville, Bloomington, Terre Haute; Crane; Amish

CRANE

70. Crane base
71. West Gate @ Crane Technology ParkCrane NSWCAccess to training and higher educationBusiness friendly government

NONE

72. none
73. There are no assets when it comes to my business.

OTHER

74. availability of low cost land, buildings
75. Close to local farming area
76. Consistent customer base.
77. enterprise zone incentives
78. Lawrence County & Bedford small enough to be communicative!
79. Local government is weak so most everything in county and surrounding counties suffer. Utilities are stable and crop farming, coal mining and tourism is always promising.
80. local govt. controls utilities, Goosepond
81. local, need for same day service
82. locally owned/managed utilities; huge recreation area; The physical infrastructure is acceptable for our business. There is no other particular asset that would keep our business here.
83. physical infrastructure
84. Please see survey
85. recreational opportunities, natural resources
86. recreational, shopping and artistic venues add to our business from people coming in for full weekend packages. If we were to promote and expand these areas, more people would come, increasing our business.
87. strong local chamber of commerce - local government - strong Daviess Co. Growth Council
88. utilities, fiber availability, cultural and recreational

Question 17 Responses

*In your opinion, what are the main **drawbacks of this region** when it comes to doing business here?*

MULTIPLE DRAWBACKS LISTED

1. 1. Lack of Interstate access. 2. Lack of engineering school in area. 3. Under investment in infrastructure in area, especially sewers & highways.
2. poor highway to Louisville; distance to nearest higher education institution; unskilled workforce - low % of college graduates
3. Property available is nonexistent, high taxes with poor services, roads (county) are dirt/rock, very poor. No culture here i.e. movie theaters, art galleries or lodging. We have 1 motel which has 12 rooms with no phones in the rooms.
4. Very limited access to major highways/interstates--difficult to travel. Very limited quality, affordable housing--difficult to attract talent to area. Limited cultural events--must drive 1 hour+ to get to. Very homogeneous population with limited cultural/ethnic diversity--difficult to attract culturally diverse talent.

INFRASTRUCTURE

5. Access from other areas due to having to rely on State Road 37 or State Road 46.
6. Access to Highway system
7. Access to major airport
8. access, although 69 going in will only help people coming in from Indy.
9. Distance from a major airport.
10. Educational level of citizens (needs to be improved); East/West highways need up-grading, widening, lane additions.
11. Greene Co. does not have a four lane road; No land for sale; Rural area does not have sewer in all areas (infrastructure)
12. inadequate infrastructures in an area; expensive housing in surrounding areas
13. inconvenience of road system - has not grown with population
14. Infrastructure and roadways. There is no Interstate close by.
15. interstate highway availability
16. lack for infrastructure (i.e. server & comm tech)need for highway expansion to help with traffic flow
17. lack of 4-way highway, lack of area airport, good quality lodging, lack of 911 addressing, no local mfg., too many commuting out of county to work so they do their 'trading' where they work vs. at home, housing
18. lack of connecting Interstate Hwy. (i.e. I69 needed) north to south. Lack of high (good) paying medium skilled jobs in area.
19. lack of infrastructure and local politics
20. lack of interstate (need for I-69)
21. lack of interstate, lack of resources for start-ups, needs more of a regional approach without being over run by Evansville & Bloomington
22. need a better transportation link
23. Need Interstate
24. no commercial airport service; I-69 progress is too slow
25. no major highways; airports
26. opposition to I69 extension
27. physical infrastructure - lack of good access to the interstate highway system
28. physical infrastructure - roads, water, sewer
29. poor highway system
30. poor roads, higher energy & utility cost
31. poor roads, transportation, out dated infrastructure
32. poor state highways / no interstate highways within 30 miles of area
33. roads (Interstate highway, sewers)
34. roads are not large enough to accommodate traffic
35. Secondary roads

36. transportation, lack of large industry
37. transportation, job opportunities
38. we have no major highways, need I-69 ASAP

LABOR FORCE

39. deteriorating work ethic; trainability of workers
40. It is getting hard for us to hire factory workers, even unskilled workers, who have better working attitudes, behaviors and enthusiasm.
41. labor pool
42. Lack of available qualified workforce
43. lack of skilled workforce
44. Professional and skilled labor is difficult to find and we have trouble encouraging personnel to relocate to Indiana.; n.a.
45. Quality of labor. Willingness to work. Motivation of work force.
46. seasonal, always transitioning work force because of university,
47. supply of good employees; lack of economic growth
48. The lack of economic activity forces us to seek construction projects outside of the region. The workforce is lacking in the computer and communication skills needed in a business environment. Administrative, Managerial and Professional positions are difficult to fill due to a lack of candiates with post high school educations.
49. The percentage of employees without skills
50. understaffing, cultural differences
51. union mentality

BUSINESS CLIMATE

52. a very difficult business climate on receptivity to marketing, development, and permits.
53. Bloomington is very anti-growth. Difficulty in finding qualified staff in surrounding rural areas, eg, nurses
54. city government is not business friendly! special interest groups creates conflicts. topography limits expansion
55. economically depressed, but improving
56. government (local) not easy to work with. Community not visionary or progressive. not business friendly
57. Indiana has become anti small & midsize business! Almost no communication through all the many agencies we deal with! The worst being IDEM!
58. negative political business climate
59. no effective LEDO; lack of cooperation between local governments; no growth - don't rock the boat mentality
60. This region is not aggressive in trying to attract and retain a diverse business base as other locals that we work. Much discussion on Growth Management Plans, Property Tax incentives, Utility hook-on fees and the predictability of the consistency of the planning and zoning process. Also, local transportation improvement initiatives are woefully lacking compared to other locals.

LOCAL GOVERNMENT

61. city government
62. Government anti-business views
63. lack of county zoning, land sue planning, industrial parks, airport too small, economic development funding - permanent sources like credit tax
64. local government
65. Local government support, highways
66. local government viewed (and generally acts) as anti-growth
67. no permanent economic development funding source such as an EDIT tax
68. political bureaucracy; image/attitude towards business climate and growth; workforce issues (supply)
69. somewhat hostile government

OTHER

70. availability of vacant buildings and sites that are affordable
71. business resources, employees, customers,
72. cost of living, workflow preparation
73. environmental wackos at IU that only want growth in other parts of Indiana (No I-69)
74. Few manufacturing businesses, when/if one shuts down, it would greatly affect the region, need to have more diversified smaller manufacturers and other businesses so if one goes out, the region is not as greatly impacted.
75. For our fund raising purposes the need of donors to maintain their dollars within their home county often impairs our ability to spread the wealth around to less fortunate areas. Attracting and retaining quality professional staff has been a challenge due to the transient nature of the IU population in Bloomington. Just when you have a well-trained educated employee, their spouse/ partner earns a PhD and transfers to another state. We see a decline in volunteers when there are layoffs and closings which impacts our ability to deliver comprehensive girl programs.
76. high cost of housing--disproportionate to the wages in the area; erosion of base of higher wage jobs for unskilled workers
77. high school education is POOR, not much manufacturing
78. I see no drawbacks what so ever.
79. I think the only drawback is that it still has some small town mentalities. It is not easy for outsiders to enter the market without having prior relationships.
80. jobs that bring new money into the local economy have disappeared, 95% of the industrial-manufacturing facilities have moved or closed, these jobs are moving to areas that have close access to interstate highways. lack of a good airport. lack of demand for our type of coal combine to leave no opportunities for our young people. we are slowly losing our customer base!
81. location - mature setting; competition - gambling boats; build up of facilities in our older facilities; major market - Indianapolis
82. manufacturing - going out or out of county
83. Most of the industry in this area is gone. We lost most of the factory jobs that paid a livable wage to people in this area. A lot of people we use to work for now do their own work or have moved to other areas. The university trains a lot of people, but most have to relocate to larger areas to find good paying jobs.
84. permanent local economic development funding, shovel ready sites, communities investing in themselves, access to capital
85. Religion too pervasive into everyday culture. Discounting of education. A pathetic view on life. Too much Wal-mart, litter, fast food, country music. Culture is dead in Southern Indiana (not in Bloomington).; No established product to sell.
86. Slow economic growth makes it more difficult to grow a local business. High unemployment for example creates less demand for our products and services as people can't afford them.
87. Summertime is very slow.
88. The lack of retail sales outlet and no prospects for the future.
89. The main drawback is this is a rural area and much travel is required, and having to compete with the urban areas for professional healthcare workers.
90. This is the most expensive rental house market in the state. We have a very high percentage of high school dropouts to whom little official attention is paid. we are a divided community in this respect--more advanced degree holders than elsewhere, as well, and the perspectives of these two groups do not necessarily know about and certainly don't help one another. We have virtually no health care for uninsured or working poor, except the emergency room, and little public will to change that, strangely enough. So class divisions exist, the rich and better educated live well, and a large percentage barely scrapes by. The lack of attention to this on the part of the economic development gurus here is dismaying, and just not healthy for the long term economy.
91. Transportation - receiving; many freight companies from north will only come here when they get a full load. Freight is held for days or we have to make trip to Indy to pick-up at Freight Terminal. Time - we waste hours each week, will schedule an appointment only to find surprise by 1 hr. time difference over our distribution trucks lose many hours per week crossing back & forth in & out of time differences. Banks - are not business friendly expect if don't need the _____. Banks should not be allowed to ___ CPA firms used or to have CPA on board. When banks are bought out or merged,

past loaning practices should not be changed for at least one year. We have witnessed many businesses in our area that are forced out because banking formulated change in exceeding credit.

92. WAY TOO LIBERAL

Question 18 Responses

*Finally, we'd appreciate any other comments or suggestions you may have about the **advantages or disadvantages of doing business in this region** or the **prospects for the area's economic future**. Feel free to share your views on which industries the region should target for economic growth, and why.*

1. access to interstate roads
2. any manufacturing not related to wood or wood processing
3. area needs vast improvement in governmental cooperation with business community (very poor at present time)
4. automotive part suppliers
5. Because we have a relatively stagnant economy, losing well-paid manufacturing jobs, and emphasizing high-tech new economy on the high end, we need to take a step back and consider where this is all going. Typical of the United States perhaps, but i am convinced we could do better. we have created jobs for women who are not good employees, because of their history of abuse, and they are beginning, with time, to thrive, but there are few opportunities for them here, in competition with under-employed PhD's and MA's not to mention students.
6. Bedford City Council - Pro Business Environment, Partnerships with local industry
7. businesses succeed and fail everywhere - it is the people not the government that make small business work
8. change the public view of economic development
9. completion of I-69 important for continued growth; tech park at Westgate of Crane needs more committed tenants and that would boost area economy, see 16 & 17 above
10. disadvantage in lack of growth. The prospects are questionable with infrastructure, need support jobs to existing industry (Toyota) (plastics) (drugs) and or service opportunities.
11. Don't feel really advantage unless you are a high paying tech company. Government officials make life pretty miserable for companies that aren't flavor of the month. If we started operations today, doubt we would open our headquarters here.
12. Friendly attitudes of people and family-oriented activities of the area should be great attractions for small to medium, light manufacturing. The area should encourage small, developing businesses in high tech fields.
13. Greene County needs a growth plan with zoning
14. healthy economic development entities and climate
15. I see brain drain everyday. We cannot keep the talent we produce and those left are of a poor selection. Pay is low!
16. I think that the emphasis on medical (Cook, Baxter, Boston Scientific, etc) is a good start. I also think the new Arts Corridor (or whatever we are calling it) I would like to see CAREFUL growth, as I lived in Colorado, and watched it get ruined by unbridled growth
17. I-69 can help with access to other markets
18. I'm part of the university so my business doesn't really fit with the rest of the community. I will say that housing is very expensive here.
19. In the next two years Girl Scouts of the USA will be consolidating operations and reducing the number of Girl Scout Councils in Indiana from 14 to 3. There will be a nothern, central and southern council. The southern council will incorporate all of EGR 8 and will extend east/west from Ohio to Illinois and

north/south from Owen County to the Ohio River. The need for employed staff will increase by over 60% as will the need for services for the corporation and its staff.

20. Indiana University and Monroe County Community School are helpful greatly in general and this is one of the factors which make this region more attractive.
21. industries that pertain to outdoor activities and high tech
22. Lack of good roads south, east, & west a problem! Too many nonsensical restrictions to expand any business! Government is our biggest obstacle!
23. most of the infrastructure is in place but there is a faction that wants the area to retro back to the 50's and 60's. we either change and move forward or we die. the future does not wait.
24. must become more business friendly
25. our middle class customers are being laid off and distressed. 19% unemployment in Nashville
26. Recent economic activity has increased from the construction of the French Lick casino. Hopefully, the casino and resort can continue to spur activity once the construction is complete.
27. recreation (make the goose pond into a lake that can support fishing & boating); coal (liquefication) plants; push the recreational opportunities
28. Senior services will be a greater need in all areas. The anticipated number of senior citizens in the coming years far exceeds the area's capacity. More healthcare professionals will be needed to meet the demand as well as an increase in services and beds.
29. Target industries may include manufacturing, food processing, Crane suppliers & vendors, and tourism.
30. The drawback mentioned above can also be a positive. There is comfort for many with the feel of a small town.
31. The future will depend on high tec and well trained employees like for Cook Pharmica
32. The prospects look good. We have an excellent workforce and co. gov. officials ready to move forward. INDOT has been slow to bring important road improvements, but hopefully that will change in next 5 years.
33. the sewer system needs to be extended to the airport for future growth
34. The university brings in a lot of retired people that enjoy the arts and other activities that Bloomington has to offer. Also has lots of visitors for large events. Sports, shows...etc. A smaller town with larger town extras.
35. There are not the traffic issues in the rural areas that are associated with the urban areas.
36. There is tremendous opportunity for development in the area. Someone willing to make an investment in the local area by developing housing, infrastructure improvement, etc. could spur significant economic growth.
37. this area (Bloomington) has tremendous potential for continued growth in the life-sciences. we have several companies already in Bloomington in this market, IU & Ivy Tech for support.
38. This region has a natural beauty and a very good quality of life with all the offerings of Indiana University and the proximity to Indianapolis, Chicago, Louisville, St. Louis, Cincinnati, etc. This allows us to attract a good professional employee base. I also believe that one of this region’s strengths to target for future growth has got to be the life sciences. With Cook, Baxter, Boston Scientific, Cook Pharmica, Indiana University, and the logistical advantages of the Indianapolis area, this region is ideally suited to capitalize on this ever expanding business area.
39. timber, agriculture, ag tourism
40. very good water

41. Wal-Mart Superstore going in at Bedford, but there should be more small manufacturing and other services to complement the area so when Dana, Ford, and GM go down it doesn't make such a major impact. Crane navy base seems to be stable for a time being, but we need small business incentives instead of putting all of our eggs into a few large baskets.
42. we are in serious need of jobs for semi & unskilled people
43. We are in several counties in this region so it is hard to understand how to answer several of the questions.
44. We are in the process of establishing a tech park.; My Ranking: 1) access to broadband for rural communties; 2) cluster energy, advanced materials, agribusiness and defense (Crane); 3) prepare for I-69 4) develop trails, rail to trails. White River Recreational Area.
45. we at present have no product on the shelf in order to be competitive in attracting business
46. We find local govt. and sometimes state govt. to not always be supportive of business growth.
47. We have been at mercy in approx. 1,500,00 in bankruptcy in Indiana alone, in past 2 years, New Ameria or Indiana people are taking over motels -c-stores in Indy. the climate is too good for them when they abuse taxes etc., we have to collect cash for products, ownerships are transferred too easy without company like ours have equipment investment and they take off with equipment. Police are not helpful.
48. We need additional tax base and jobs not just a lot of talk out of Indianapolis. Interstate 69 is very important to our long term economic growth as is West Gate, the tri-county tech park on the northwest corner of NSWC Crane. Greene County has the problem of being the 3rd or 4th largest county in Indiana, but only around 61st in tax base. We can't afford the necessary new infrastructure to support economic expansion. State and federal dollars are vital to our economic expansion. This includes roads, sewer, water and school funding. Saving NSWC Crane in BRAC '05 was critical to the counties surrounding Crane. Had it closed we would have suffered unemployment levels of 25% to 35% in Greene, Daviess and Martin Counties. Cranes future impact on the local economy is huge and cannot be overstated.
49. We see the Westgate and Crane Technology Park as a turning point for our county with higher paying jobs available - new business (store front types) would be encouraged to open; better housing, construction starts?
50. West Gate @ Crane Tri-county Technology Park holds the future for the region.
51. when I-69 does get finished it will bring a great economic boost to our area
52. with 30M+ students in a city of @70M and county of @120M the service industry IS the primary need. unemployment (county) has historically been one of the lowest in the state.
53. with the casino project nearing completion, roads and housing MUST be improved ASAP

Appendix IV:
Cost-of-Living Differences between Rural and Urban Areas in Indiana—

Examining the Real Prosperity of Rural Regions

The Index of Relative Rurality (IRR) provides a convenient scale for assessing how rural and urban areas differ in ways beyond their rurality. One such issue of interest to the present study is the general question of whether rural and non-rural areas differ with respect to the cost of living. Discussions of the economic competitiveness of rural regions often implicitly assume that residents of such areas tend to enjoy lower costs of living than their urban counterparts.

Evaluation of this hypothesis requires a suitable measure of the cost of living at the county level. Unfortunately, there is no widely accepted standard indicator for this purpose. The Consumer Price Index (CPI) is published by the Bureau of Labor Statistics only for the nation, for a few very large regions, and for a handful of the largest cities, with no county-level data. ACCRA (the Council for Community and Economic Research) publishes a popular metric comparing the relative cost of living for more than 300 metropolitan areas, but most of the nation's rural counties are not covered.

In the absence of a standard county-level cost-of-living indicator, this analysis employed a metric developed for a somewhat different but related purpose. The Self-Sufficiency Standard (SSS) was developed as a superior alternative to the federal poverty level to estimate the income required for families to pay for their basic needs (Nielsen-Farrel 2006). Computed at the county level, the SSS takes into account the costs of food, housing, health insurance, childcare, transportation, taxes, and other basic expenses, with component values varying across more than 70 different family types. SSS wages have been calculated to date for all counties in 35 states and the District of Columbia. Though not available for all rural counties in the United States, the SSS represents a good starting point for examining how costs of living vary across counties or groups of counties.

To explore the link between rurality and cost of living, the IRR and the annual self-sufficiency wages (SSW) were determined for each Indiana county for a family of two parents and two children, one a preschooler and the other a grade-school-age child. For the same counties, additional data were compiled, including median household income, poverty rate (for all persons), and unemployment rate, as shown in **Table 1**. The counties are sorted by IRR from low (most urban) to high (most rural).

Indiana's urban counties tended to have significantly higher costs of living (i.e., self-sufficiency wages) than rural counties, as evidenced by the strong correlation coefficient ($r = -0.77$). The mean SSW for the 15 most urban counties ($39,963) was $7,501 higher than for the 15 most rural counties ($32,462; $z = 19.0$, $p < .0001$). These most-urban counties also had median household incomes $9,090 higher than the most-rural set ($z = 7.2$, $p < .0001$). Rurality was not related significantly to the ratio of median incomes to SSW; thus, it appears that higher urban costs of living are offset by higher incomes. Poverty rates were unrelated to rurality, while the unemployment rate was slightly higher in rural areas. Thus, the data for Indiana suggest that the

cost of living in rural areas is generally in proportion to their lower incomes, and that other differences are not profound.

Table 1. Rurality and Prosperity in Indiana Counties

County	IRR 2000	SSW* 2005 ($)	Median HH income 2003 ($)	HH Income / SSW	2003 % in poverty	2005 annual average % unemployed
Marion	0.114	42,580	41,416	0.97	12.5	5.6
Lake	0.149	42,313	39,727	0.94	12.7	6.2
Hamilton	0.200	45,628	80,691	1.77	3.6	3.1
St. Joseph	0.221	37,289	40,213	1.08	11.8	5.3
Johnson	0.228	45,460	54,025	1.19	7.0	4.2
Vanderburgh	0.231	38,134	38,275	1.00	11.8	5.2
Allen	0.232	38,502	42,974	1.12	10.2	5.3
Porter	0.235	42,920	54,685	1.27	6.8	4.7
Floyd	0.242	35,829	45,098	1.26	9.2	5.2
Clark	0.254	35,488	41,503	1.17	9.4	5.2
Hendricks	0.266	41,538	61,475	1.48	4.6	3.8
Tippecanoe	0.305	39,480	39,471	1.00	11.9	4.6
Hancock	0.308	39,883	58,866	1.48	5.0	4.2
Elkhart	0.311	36,818	45,253	1.23	9.5	4.6
Madison	0.328	37,583	39,469	1.05	11.0	6.6
Monroe	0.328	40,101	35,572	0.89	12.4	4.6
Delaware	0.329	40,397	35,212	0.87	13.4	6.7
Warrick	0.332	35,660	53,782	1.51	5.8	4.5
Howard	0.333	40,460	45,856	1.13	10.3	6.6
Boone	0.338	39,706	57,336	1.44	5.8	4.0
Vigo	0.338	34,087	34,536	1.01	13.7	6.8
Morgan	0.344	36,881	49,561	1.34	7.8	4.9
Shelby	0.367	39,779	44,152	1.11	8.5	5.0
LaPorte	0.370	34,119	40,127	1.18	9.9	6.0
Bartholomew	0.371	40,805	45,550	1.12	8.3	4.8
Dearborn	0.378	36,878	52,687	1.43	6.8	5.6
Jasper	0.400	34,952	45,916	1.31	7.4	5.6
Wells	0.414	32,824	44,279	1.35	6.8	4.8
Gibson	0.416	33,367	43,057	1.29	8.1	4.9
Putnam	0.418	35,140	41,193	1.17	9.1	6.6
Washington	0.441	32,042	37,347	1.17	10.5	6.2
Grant	0.445	34,170	36,643	1.07	12.5	8.4
Franklin	0.450	33,137	46,909	1.42	8.0	6.4
Henry	0.458	34,293	40,667	1.19	9.5	6.8
Harrison	0.459	34,315	45,614	1.33	8.1	6.3
Posey	0.461	35,876	48,851	1.36	7.6	4.7
Whitley	0.469	33,139	47,405	1.43	6.2	5.1
Jefferson	0.476	29,953	39,765	1.33	10.3	5.2
Clay	0.482	32,349	38,602	1.19	9.6	6.9

County	IRR 2000	SSW* 2005 ($)	Median HH income 2003 ($)	HH Income / SSW	2003 % in poverty	2005 annual average % unemployed
Vermillion	0.486	30,918	38,172	1.23	9.2	7.3
Greene	0.487	31,947	36,374	1.14	10.9	6.5
Scott	0.490	34,593	35,809	1.04	11.8	6.2
Knox	0.491	31,818	33,300	1.05	13.7	5.0
Wayne	0.493	31,039	35,825	1.15	11.7	7.1
Tipton	0.499	32,303	49,600	1.54	6.7	5.7
DeKalb	0.500	33,288	45,700	1.37	7.0	6.3
Montgomery	0.500	31,410	41,355	1.32	9.2	4.6
Sullivan	0.503	31,256	34,284	1.10	11.8	7.4
Jackson	0.509	35,094	41,502	1.18	8.8	4.9
Kosciusko	0.511	35,082	47,034	1.34	7.5	4.4
Newton	0.512	35,895	40,803	1.14	8.2	5.4
Cass	0.512	30,523	38,850	1.27	9.7	5.8
Brown	0.513	34,953	45,589	1.30	8.2	5.6
Decatur	0.516	32,422	42,959	1.32	9.0	5.0
Miami	0.521	33,699	39,479	1.17	10.0	6.3
Wabash	0.522	33,288	40,567	1.22	8.7	6.6
Huntington	0.526	35,859	42,245	1.18	7.6	5.6
Ohio	0.529	34,993	41,496	1.19	7.0	5.2
Clinton	0.529	34,855	41,075	1.18	9.1	5.7
Fayette	0.531	34,239	39,262	1.15	10.4	8.1
Lawrence	0.534	31,259	38,510	1.23	9.7	7.7
Rush	0.535	33,139	40,091	1.21	8.6	4.8
Carroll	0.538	32,410	44,589	1.38	7.5	5.1
Adams	0.541	32,449	41,967	1.29	9.9	4.9
Blackford	0.545	32,351	36,296	1.12	9.2	7.1
Marshall	0.551	34,975	42,975	1.23	7.5	5.2
Orange	0.551	28,304	32,699	1.16	12.0	7.3
Jennings	0.557	33,847	39,514	1.17	9.8	6.7
Noble	0.557	32,752	43,116	1.32	8.1	6.2
Jay	0.562	31,533	35,833	1.14	10.9	5.4
Dubois	0.571	33,197	49,223	1.48	5.6	3.9
Randolph	0.573	30,381	36,830	1.21	10.9	7.4
Ripley	0.577	36,513	43,572	1.19	8.1	5.2
White	0.579	34,019	39,482	1.16	8.3	5.9
Owen	0.586	32,629	37,296	1.14	10.3	6.0
Starke	0.589	32,544	36,828	1.13	11.7	7.1
Fountain	0.592	31,836	39,156	1.23	9.3	5.5
Perry	0.597	29,594	38,538	1.30	9.4	5.8
Daviess	0.598	31,154	35,967	1.15	12.4	4.1
Pulaski	0.601	32,989	36,964	1.12	9.5	5.0
Steuben	0.611	35,923	41,930	1.17	8.1	6.2
Benton	0.619	34,349	39,538	1.15	7.5	5.1

County	IRR 2000	SSW* 2005 ($)	Median HH income 2003 ($)	HH Income / SSW	2003 % in poverty	2005 annual average % unemployed
Fulton	0.623	32,368	39,411	1.22	9.5	5.3
Lagrange	0.628	35,218	44,358	1.26	7.9	5.0
Martin	0.630	31,382	37,970	1.21	9.9	5.5
Pike	0.636	31,866	37,747	1.18	9.2	5.5
Parke	0.637	32,160	36,296	1.13	11.3	6.4
Crawford	0.651	30,223	34,853	1.15	12.9	7.6
Switzerland	0.652	33,383	36,518	1.09	10.9	4.6
Union	0.654	33,131	38,931	1.18	9.1	5.6
Spencer	0.672	29,866	44,456	1.49	7.6	5.7
Warren	0.705	33,328	43,321	1.30	7.2	4.3
Correl. with IRR: r =		(0.768)	(0.427)	0.071	0.004	0.225
t =		(11.37)	(4.48)	0.68	0.04	2.19
p <		0.0001	0.005			0.025

Sources and Notes:

* SSW = self-sufficiency wage
Poverty rates (all ages) & median household income: http://www.census.gov/cgi-bin/saipe/saipe.cgi
SSW: http://www.ibrc.indiana.edu/ibr/2006/spring/article2.html
Index of Relative Rurality (IRR): Waldorf (2006)
Unemployment rate: Bureau of Labor Statistics, Local Area Unemployment Statistics

Appendix V:
List of Contributors and Supporters

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Mayor Donald Bowling—Loogootee, Martin County
Mayor Morris Chastain—Mitchell, Lawrence County
Mayor Thomas Jones—Linton, Greene County
Mayor Joseph Klumpp—Bedford, Lawrence County
Mayor Mark Kruzan—Bloomington, Monroe County
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Appendix VI:
Guide to the U.S. Database

The large time-series database constructed to support the analysis of this project had two purposes in mind. The first was to provide data to support the research questions posed in each of the two projects. The second, and arguably more important in the long run, was to provide a database that could be provided and maintained online for others to use as a guide to their own explorations of rurality and economic clusters.

The following were the primary goals of Project 1:

- The linkages between cluster structure, degree of rurality, and economic performance
- The spatial clustering of industrial clusters and the interface between rural and metropolitan regions in emerging agglomeration economies
- Growth trajectories for counties that are differentiated by cluster makeup, degree of rurality, and distance to metropolitan areas

The goals of Project 2 were to use the database to analyze the cluster structure of a selected region, supplement these secondary data with additional local knowledge, and mobilize the regional constituency in a planning process that was grounded in both secondary data and localized primary data. In essence, Project 2 was a pilot study designed to create and document a prototype process for rural regional development planning and action—one that can be replicated in other rural regions of the country.

The Indiana Business Research Center (IBRC) will maintain and enhance the online database that is available at **www.ibrc.indiana.edu/innovation/data.html.**

The database is enhanced with information on basic demographic and social indicators to provide users with a more comprehensive understanding of regional challenges and opportunities for growth.

The database contains data sets from the following sources:

- **Quarterly Census of Employment and Wages (CEW)** from the U.S. Bureau of Labor Statistics**.** The Indiana Business Research Center (IBRC) administers the confidential research version of this file for the state. Additionally, the IBRC maintains public data for all U.S. counties by NAICS back to 1990 for establishments, wages, and jobs.
- **Longitudinal Employment and Household Dynamics (LEHD)** from the Census Bureau**.** This file is used to help determine longitudinal birth, death, and transition demographics of businesses in the selected county or region. This dataset also provides important information on the age and sex of workers by industry, wages of new hires versus existing workers, turnover rates and more. The research versions of these data were used for this study.
- **Demographics, educational attainment, occupation, housing, and income data from the national decennial census**
- **County data on occupation and commuting** contained in the 1990 and 2000 Equal Employment Opportunity (EEO) special tabulations compiled by the U.S. Census Bureau.

Specific Data Sets Provided

Clusters
- Economic Clusters — National Perspective

Commuting
- Worker Flows

Education
- Attainment

Employment and Wages
- Census of Employment and Wages (CEW)

Housing and Households
- Building Permits
- Household Makeup
- Housing Units

Income
- Median Household Income
- Per Capita Income
- Personal Income
- Poverty

Labor Force
- Resident Labor Force

Population (Census & Estimates)
- Population
- Population by Age
- Population by Race
- Migration, Births, Deaths

Rurality
- Index of Relative Rurality
- USDA Rurality Codes
- Distance to Nearest Metro Area
- USA Counties in Profile

Detailed instructions on the use of the online database and information specific to the data provided there are available on the website.

Online Access

This database is available at **www.ibrc.indiana.edu/innovation**—click on the Data section of the site. Questions may be directed to the IBRC at ibrc@iupui.edu.

Appendix VII:
U.S. and EGR 8 Maps

List of Map Series

Series A: Clusters in Indiana and EGR 8
Series B: Rurality by U.S. County
Series C: Distribution of Cluster Establishments by U.S. County
Series D: Distribution of Cluster Employment by U.S. County
Series E: Location Quotients by U.S. County

Maps are available at
http://www.ibrc.indiana.edu/innovation/maps.html

Notes

- In Series A, the employment and establishment symbols in the economic growth region maps of Indiana are placed randomly within the region or county; they are not actual locations of industries or businesses.
- In Series C and D, points are placed randomly within the counties in employment and establishment point-pattern cluster maps of U.S. counties; they do not represent the actual location of an industry or a business. The distribution patterns are best understood at the state or higher levels of geography.
- In Map A-5, the symbols showing businesses with $1 million or more sales in Economic Growth Region 8 are actual locations based on street addresses.
- In Series E, the symbols showing counties specialized in clusters are locations of geographic centroids of those counties. Counties with a location quotient of 1.2 or more are categorized as specialized locations for clusters.
- The research team used various ESRI products and Adobe Illustrator for mapping.