



**South Central Illinois Regional Planning and
Development Commission**

South Central Illinois Regional Industry Cluster Analysis

Industry Cluster Structure and Trends 2001 – 2010

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Executive Summary of Cluster Findings

- The SCIRPDC region includes Clay, Effingham, Fayette, Jasper and Marion counties located in south-central Illinois adjacent to the St. Louis metropolitan area. Effingham and Marion counties are classified as micropolitan statistical areas.
- The region is part of the oil and natural gas-rich geologic Illinois Basin. High prices for crude oil and demand for new sources of natural gas have led to a resurgence of the energy extraction industry in the SCIRPDC area and other parts of Illinois. Coal deposits are also present, with hardwood forests providing an additional natural resource asset.
- The region was studied for evidence of cluster industry concentration, competitive advantage and change in 17 clusters and six sub-clusters over the period 2001 to 2010 (http://www.statsamerica.org/innovation/industry_clusters.html).
- The two largest clusters as of 2010 are the agribusiness, food processing & technology cluster and the energy cluster; followed by biomedical/biotechnical (life sciences), manufacturing, business and financial services and the transportation & logistics cluster.
- Jobs in the energy cluster increased by 28% over the period (1,447 jobs), whereas the number of jobs in the agribusiness cluster decreased by 13%. Jobs in the biomed/biotech cluster increased by 12% while manufacturing jobs decreased by 36% (1,846 jobs).
- In the manufacturing cluster, however, the fabricated metal products sub-cluster expanded by 33% (100 jobs) and computer and electronic products grew by 2,600% (312 jobs). Both of these sub-clusters are currently quite small (300-400 jobs).
- The only other regional cluster to expand during the study period was the transportation and logistics cluster, by a modest 3%.
- SCIRPDC region clusters that had both a high and increasing location quotient (“star” clusters) in 2010 include:
 - Energy (fossil and renewable) (LQ=1.9)
 - Forest and wood products (LQ=1.8)
 - Transportation and logistics (LQ=1.5)
 - Mining (LQ=2.2)
 - Agribusiness, food processing and technology (LQ=3.4)
 - Manufacturing supercluster (LQ=1.6)

The primary metals sub-cluster, which is part of the manufacturing supercluster, also falls into this category (LQ=1.4). A location quotient of 1.0 indicates the cluster’s share is equal to its share in the national economy; the study focuses on clusters with LQs of 1.2 or higher.

- The region’s “emerging” clusters (those with an increasing location quotient that is currently less than 1.2), include the biomedical/biotechnical (life sciences) cluster; the advanced materials, and apparel and textiles clusters, as well as the computer and electronic products and the fabricated metal products sub-clusters. These “emerging” or at least potentially emerging clusters may eventually become specialized in the region, and might benefit from support.
- The energy cluster had by far the largest economic output in terms of total annual regional earnings (\$458,183,934) in 2010, followed by



- Agribusiness, food processing and technology (\$284,607,088)
 - Manufacturing supercluster (\$201,709,200)
 - Biomedical/biotechnical cluster (\$178,930,944)
 - Transportation and logistics cluster (\$140,312,788)
- The mining cluster had the highest average earnings per worker at \$86,489 per annum in 2011 (Fig. 20), however it is a very small cluster. It is followed by advanced materials (\$74,092), energy (\$70,209), the manufacturing supercluster (\$61,950), chemicals and chemical-based products (\$51,365), and transportation and logistics (\$51,359).
- Shift Share analysis was conducted to assess which clusters had a positive competitive effect in the regional economy (i.e. a competitive advantage). Three clusters (energy; forest & wood products; and transportation & logistics) and three sub-clusters (computer & electronic products; fabricated metal products; and primary metals) had a positive competitive effect at the end of the study period, 2010. The energy cluster had by far the largest effect, followed by the forest and wood products and the transportation and logistics clusters.
- Cluster indicators were compared to demonstrate potential prioritization opportunities. The energy, forest and wood products, transportation and logistics, biomed/biotech (life sciences) clusters all show increase in location quotients over time, as do sub-clusters primary metals, fabricated metal products and computer and electronic products. All of these clusters and sub-clusters (with the exception of the biomed/biotech cluster), have positive competitive effects; and all, with the exception of the forest and wood products cluster have experienced positive growth in employment during the study period (Fig.24, p.40).
- The energy, forest and wood products, transportation and logistics, biomedical/ biotechnical (life sciences) clusters were selected for preliminary gap analysis. All four clusters demonstrate a need for a group of medium to higher-level service industries if they are to satisfy regional demand. In other words, these higher-level services are currently being imported into the region, and may offer some opportunities for import-substitution.
- These medium to higher-level service industries include financial services (banking, real estate, and insurance); legal services; as well as management and administrative services. These service industries support the driver industries of each cluster.
- Each cluster does have specialized needs related to its core industries – examples include the deficit in in-vitro diagnostic substance and pharmaceuticals manufacturing in the Biomed/Biotech cluster; engineering services in the energy cluster; organic dye and pigments manufacturing in the forestry and wood products cluster; and general warehousing and storage in the transportation and logistics cluster.
- The cluster gap analysis identifies the core industries of the four selected clusters as well as the prospects for future growth in those industries.

South Central Illinois Regional Planning and Development Commission Regional Industry Cluster Analysis

Introduction

This study was commissioned by the South Central Illinois Regional Planning and Development Commission (SCIRPDC) to assist the agency and its stakeholders in five south central Illinois counties in assessing the region's economic strengths and important assets; strengthening the region's capacity to conduct collaborative conversations about current and future needs for crucial infrastructure and human capital; and to develop plans and strategies for expanding the regional economy to its full potential.

SCIRPDC is a regional planning agency with responsibilities towards Clay, Effingham, Fayette, Jasper and Marion counties. These counties form a designated Economic Development District (EDD) of the US Economic Development Administration (EDA), a unit of the US Department of Commerce, making them eligible for certain planning and development grants. The agency was founded originally in 1972, with responsibility for three of the counties, but expanded to contain all five in 1997. The agency receives significant funding from the EDA, and from several other sources, and is governed by a Board of Commissioners consisting of six appointees from each county (3 county commissioners, 2 representatives from each county's largest city and 1 representative from the smaller villages in the county).

Section One: Industry Clusters and Regional Economic Development

The San Diego Association of Governments (SANDAG) developed a useful answer to the question "what is a cluster?" SANDAG was an early pioneer in using cluster analysis and cluster identification to boost regional economic development efforts during the 1990s:

"Clusters are groups of inter-related industries that drive wealth creation in a region, primarily through the export of goods and services. The use of clusters as a descriptive tool for regional economic relationships provides a richer, more meaningful representation of local industry drivers and regional dynamics than do traditional methods. An industry cluster is different from the classic definition of industry sectors because it represents the entire value chain of a broadly defined industry from suppliers to end products, including supporting services and specialized infrastructure. Cluster industries are geographically concentrated and inter-connected by the flow of goods and services.....Clusters include both high and low value-added employment."¹

¹ San Diego Association of Governments (SANDAG) *What Are Industrial Clusters?* 1998, p.1



Industry cluster analysis and cluster strategies as an important component of regional economic development have become more and more the norm over the last fifteen to twenty years. Today, most regional economic development plans are apt to contain strategies based on regional clusters of industries that offer – now, or in the future - a competitive advantage in the national and global economies.

The cluster approach to economic development undertakes a sequence of steps designed to:

- Identify and *locate* the clusters present in a region's economy
- Analyze the clusters' strength and weaknesses
- Create a framework for collaboration to
 - Maintain or increase the competitive strength of the clusters that are present, by strategic targeting of resources
 - Build new cluster strength in the area, through the identification and support of “emerging” clusters and cluster industries

The cluster approach differs from traditional economic development methods, which usually deal with one firm at a time, with attention to individual problems and needs. A cluster approach offers a comprehensive information foundation plus a framework for collaboration, providing additional opportunities to

- Solve groups of industry problems/needs
- Reveal groups of industries that have similar workforce needs
- Build sustained business-to-business connections
- Encourage and support innovations
- Invest and assist groups of firms to build synergy and economic impact
- Enable planning from strengths
- Create identity for the region, and improve marketing effectiveness

Cluster analysis takes into consideration the dynamic relationship between industries that form supply chains. Determination of the existence of relationships between firms is established usually through the use of input-output analysis (I-O analysis). Input-output analysis can identify interdependent industries through backward and forward linkages or purchasing and selling patterns. In other words, value chains as well as supply chains are embedded in the input-output tables. The I-O analysis can further be used for impact assessment to show how a change in one industry or industry cluster affects (or “ripples through”) other industries that are linked with it.



Figure 1: The Structure of Clusters

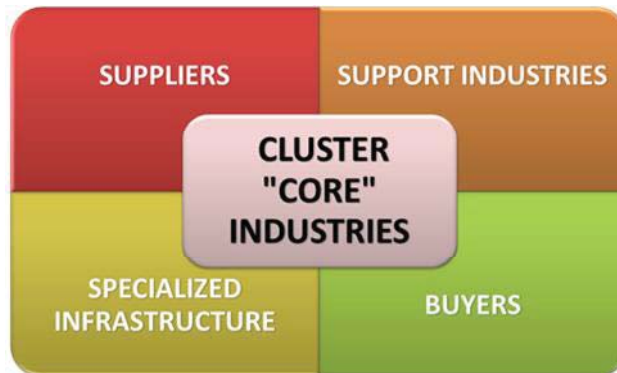
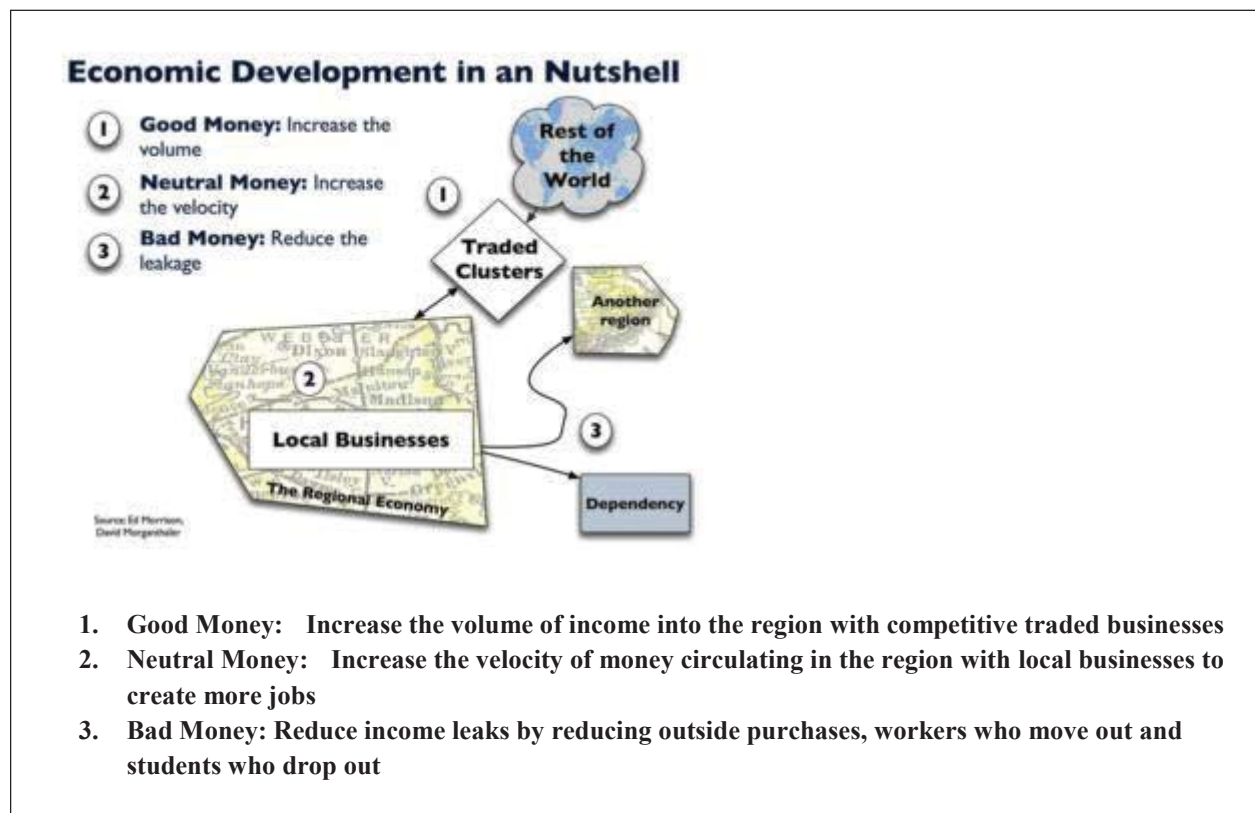


Figure 1 provides a conceptual model of how clusters are defined. The essential elements of clusters are their “core industries.” Core industries depend on suppliers, specialized infrastructure and support industries to support their functioning, production and *exporting* capacity. These industries produce services or manufactured products capable of being

exported out of the region. The importance of the export function in regional economies cannot be overstated: exports create what Morrison² calls “good money,” i.e. income that is new and additional to the region, and that is the basis for building the region’s wealth.

Figure 2: “Good Money”



The clustering method employed in this analysis is based on a set of 17 industry cluster definitions developed at the Purdue University Center for Regional Development (PCRD), and built upon

² Ed Morrison, Economic Policy Advisor, Purdue Center for Regional Development



during the course of a large research project funded by the US Economic Development Administration (EDA). The research team defined clusters that could be usefully applied to analysis of both rural and urban-metropolitan regions in the United States, using county-level data as a base. One of these clusters, the manufacturing "supercluster", was further subdivided into six sub-clusters. All of the clusters were broadly defined, so as to be as inclusive as possible of rural areas.³

Economic Modeling Specialists Inc. (EMSI) data is used in the cluster analysis part of this study. In order to capture a complete picture of industry employment, EMSI combines covered employment data from the Quarterly Census of Employment and Wages (QCEW) produced by the Department of Labor with total employment data from the Regional Economic Information System (REIS) published by the Bureau of Economic Analysis (BEA), augmented with County Business Patterns (CBP) and Nonemployer Statistics (NES) published by the U.S. Census Bureau.

Location quotients and shift share analysis are used to describe the relative importance of each cluster in the regional economy and how competitive those clusters have been in recent years.

³ For a detailed list of all industry sectors contained in each defined cluster, go to <http://www.statsamerica.org/innovation/data.html>



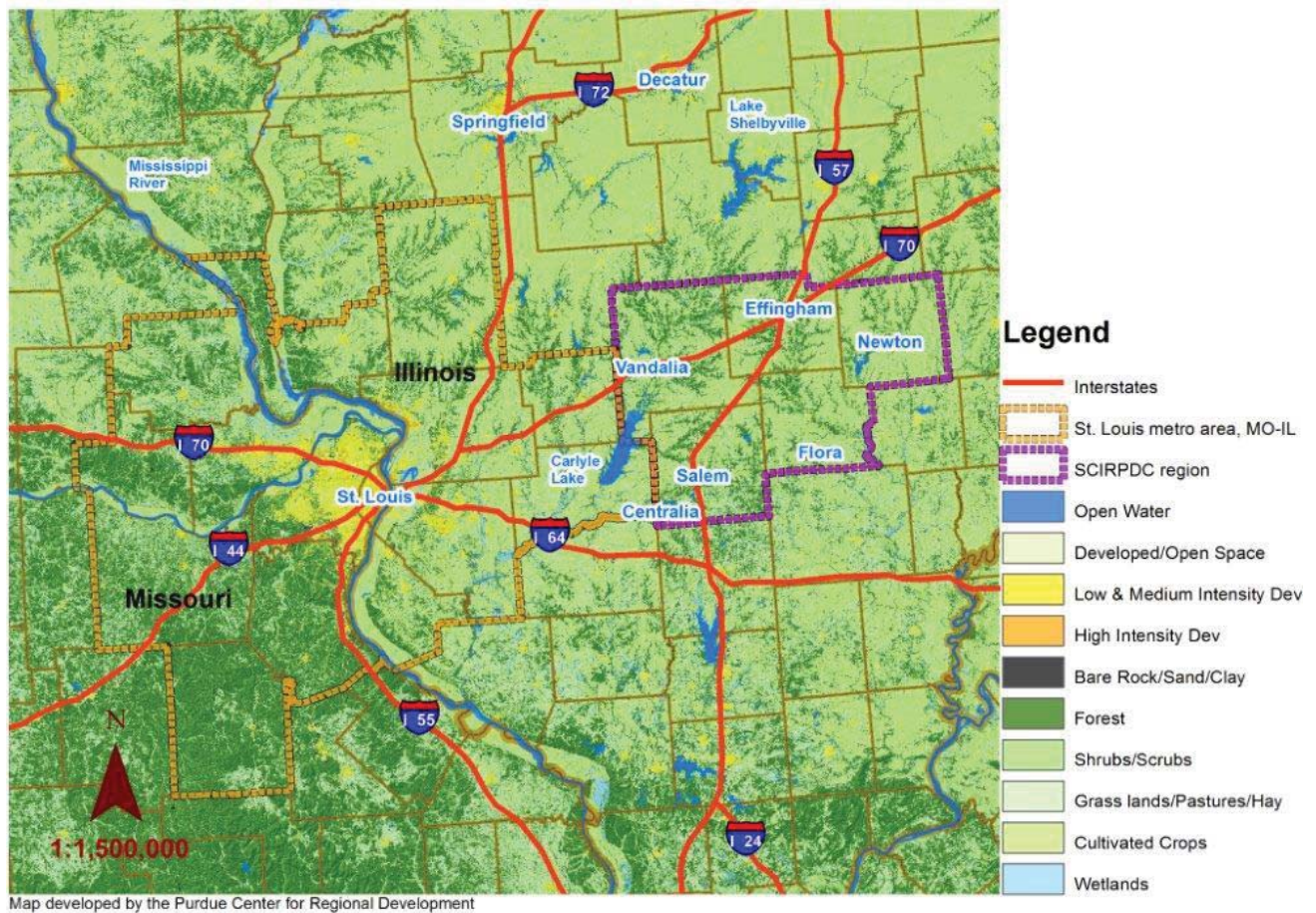
Section Two: Regional Profile

2.1 Physical Characteristics and Assets

A regional profile provides a context and background for the cluster analysis, focusing on key indicators benchmarked against the State of Illinois and the US, where appropriate.

Map 1: The South Central Region

South Central Illinois Regional Planning & Development Commission Location Map



The five counties of the South Central Illinois Regional Planning and Development Commission encompass a total land area of 2,744 square miles, according to the US Geological Survey (USGS). The region is contiguous with the sprawling St. Louis metro area on the east and within a 1.5 hour drive time of several other metro areas including Terre Haute IN, Champaign-Urbana, Decatur, and Springfield, IL.



Two of the five counties, Effingham and Marion, are classified as micropolitan⁴ statistical areas with Effingham and Centralia serving as the principal cities. There are 44 incorporated places in the region. Centralia (Marion County) and Effingham (Effingham County) are the only cities with a population over 10,000 (13,032 and 12,328 in 2010, respectively). The next largest urbanized areas in the region include Salem (7,485), Vandalia (7,042) and Flora (5,070) according to the 2010 census.

Despite the micropolitan status of Effingham and Marion counties, the region remains largely rural, but with some signs of increasing development and urbanization. Measurement using the Index of Relative Rurality (IRR), a tool developed during the execution of the PCRD/EDA industry cluster study, show that Effingham, Fayette and Marion counties continue to become slowly more urbanized, while Clay and Jasper counties' degree of "rurality" has moved only fractionally.

The IRR is based on four dimensions of rurality: population, population density, extent of urbanized area, and distance to the nearest metropolitan area. The index is scaled from 0 to 1, with 0 representing the most urban places and 1 representing the most rural places. Illinois counties have IRRs that vary between 0.02 in Cook to 0.719 in Pulaski. The SCIRPDC counties have IRRs varying between 0.46 in Marion and 0.57 in Clay and Jasper. All of the counties are classified either as Level F or D counties with a "High" degree of rurality (Figures 3 and 4).

Figure 3: Index of Relative Rurality, 1990-2000

Area Name	IRR 1990	IRR 2000	Change in IRR 1990-2000	Interpretation
Clay	0.570	0.569	-0.2%	Very little change
Effingham	0.513	0.497	-3.1%	Urbanization has increased
Fayette	0.568	0.544	-4.2%	Urbanization has increased
Jasper	0.575	0.569	-1.0%	Slight increase in urbanization
Marion	0.500	0.460	-8.0%	in other counties

Note: Between 1990 and 2000, the IRR decreased for every county indicating a relative increase in the urbanization of the SCIRPDC region

Source: B. Waldorf, Purdue College of Agriculture Department of Agricultural Economics; and PCRD

⁴ Micropolitan areas are defined by the OMB as an urban core of at least 10,000 but less than 50,000 population and may contain one or more counties, which includes the county containing the core urban area and any adjacent counties with significant social and economic integration, <http://www.census.gov/population/www/metroareas/metroarea.html>.



Figure 4: Definitions of the Rural-Metropolitan Interface Levels

Level	Definition	Location Relative to Metro Area	Degree of Rurality
Metropolitan Sphere			
A.	Metropolitan central counties with a population of at least 500,000.	Within	Low
B.	Metropolitan central counties with a population of less than 500,000.	Within	Low
C.	Outlying metropolitan counties with $IRR < 0.4$	Within	Low
Rural-Metropolitan Interface			
D.	Outlying metropolitan counties with $IRR \geq 0.4$	Within	High
E.	Non-metropolitan counties adjacent to a metropolitan area and $IRR < 0.4$	Adjacent	Low
F.	Non-metropolitan counties adjacent to a metropolitan area and $IRR \geq 0.4$	Adjacent	High
Rural Sphere			
G.	Non-metropolitan counties not adjacent to a metropolitan area	Remote	High

Source: Department of Agricultural Economics, Purdue University

Analysis of National Land Cover Data (NLCD) from the USGS shows that 54% of land area in the SCIRPDC region is cultivated crops, 12.3% is pasture and hay, 23% is deciduous forest, about 1% of land area is open water and 0.6% of land area is grasslands. The developed area (classified as developed open space; and low, medium, and high density development) covers 8.4% of the total land area. Developed open space (6.5% of total land area) includes mostly large-lot single family houses, golf courses, and parks with less than 20% impervious cover.

However, the region is also part of the oil and natural gas-rich geologic Illinois Basin where high prices for crude oil and demand for new sources of natural gas have led to a resurgence of the energy extraction industry in the SCIRPDC area and other parts of Illinois.

The Illinois basin is an oval depression covering approximately 60,000 square miles (155,000 km²) in Illinois, Indiana and Kentucky. Writing in 1990, Dennis Kolata noted that: “Since the initial discovery in 1886, approximately 4 billion bbl of oil and an estimated 4 trillion cubic feet of associated dissolved natural gas have been produced in the Illinois basin from Paleozoic rocks....Potential exists for increased reserves in the Illinois basin as a result of (1) strategic infill drilling to find bypassed mobile oil, estimated at more than 1 billion bbl; (2) secondary and tertiary methods to recover immobile oil, estimated at more than 4 billion bbl; (3) exploration for subtle traps; and (4) deep drilling into the thick, poorly known Cambro-Ordovician section.”



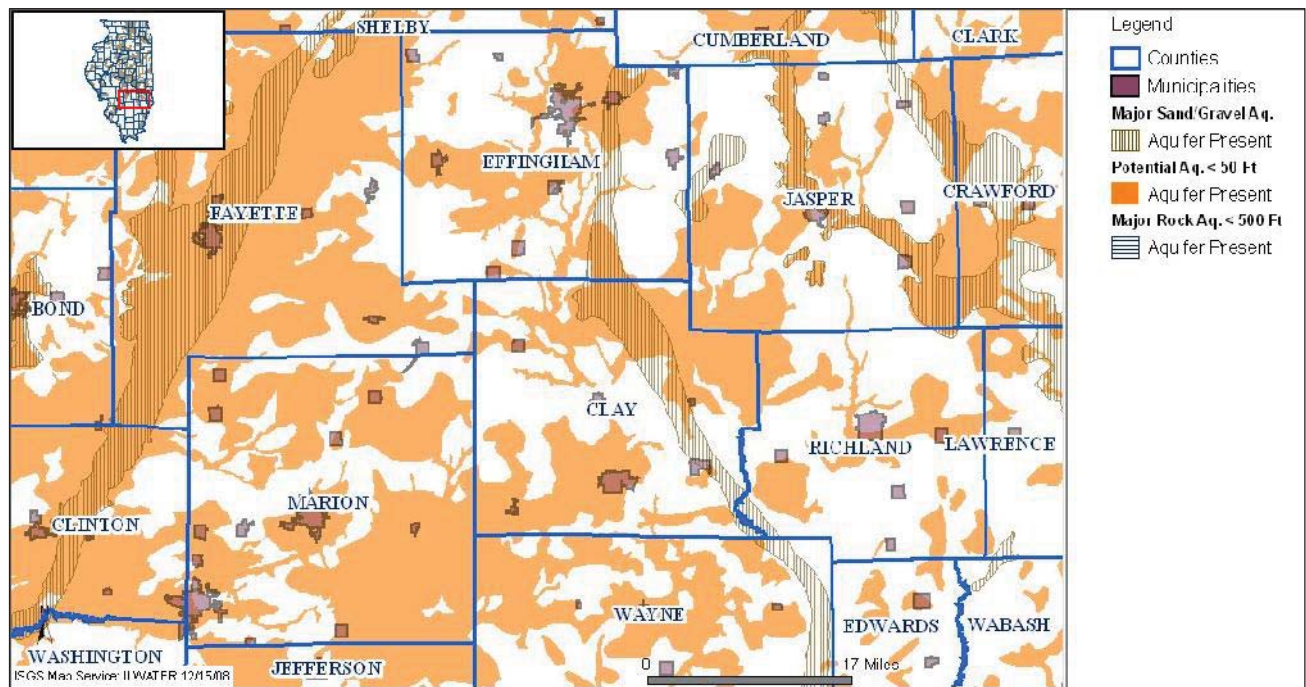
Map 2: Extent of the Illinois Basin in Illinois, Indiana, and Kentucky



In addition, the region also contains reserves of coal, which are currently unexploited. Water assets include several aquifers and three minor rivers: the Kaskaskia River which flows through Fayette County, the Little Wabash River which flows through Effingham and Clay counties, and the Embarrass River which flows through Jasper County. Map 3 shows aquifers present in the region with type of aquifer and depth.

Source: Kolata, Dennis R., Interior Cratonic Basins (Abstract), AAPG Memoir 51, 1990;
<http://sequestration.org/basin.htm>

Map 3: Aquifers in the SCIRPDC Region



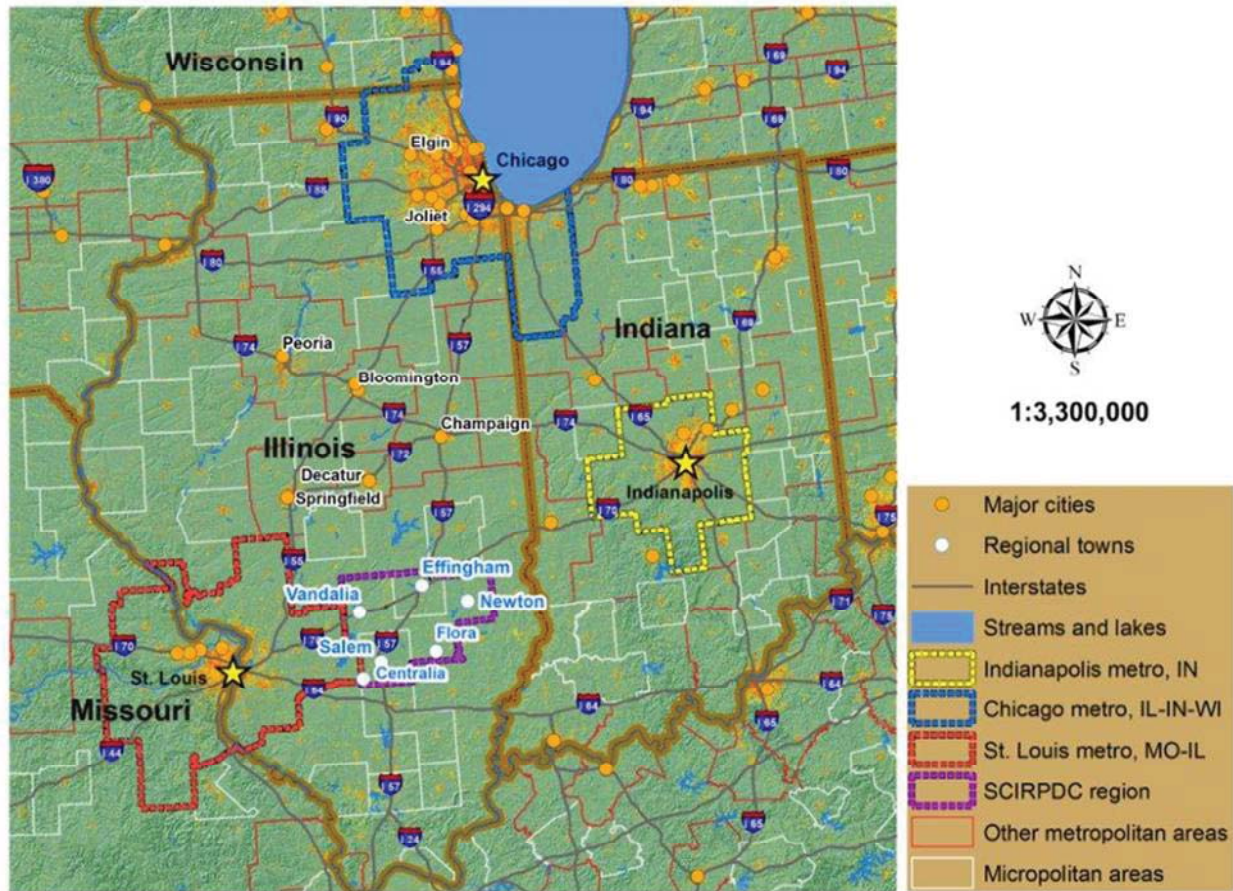
Source: Illinois State Geological Survey accessed at
<http://www.isgs.illinois.edu/maps-data-pub/wwdb/wwdb.shtml>



2.2 Regional Market Environment and Transportation Infrastructure

Map 4: SCIRPDC Region and Major Regional Markets

**South Central Illinois Regional Planning & Development Commission
Regional Markets**

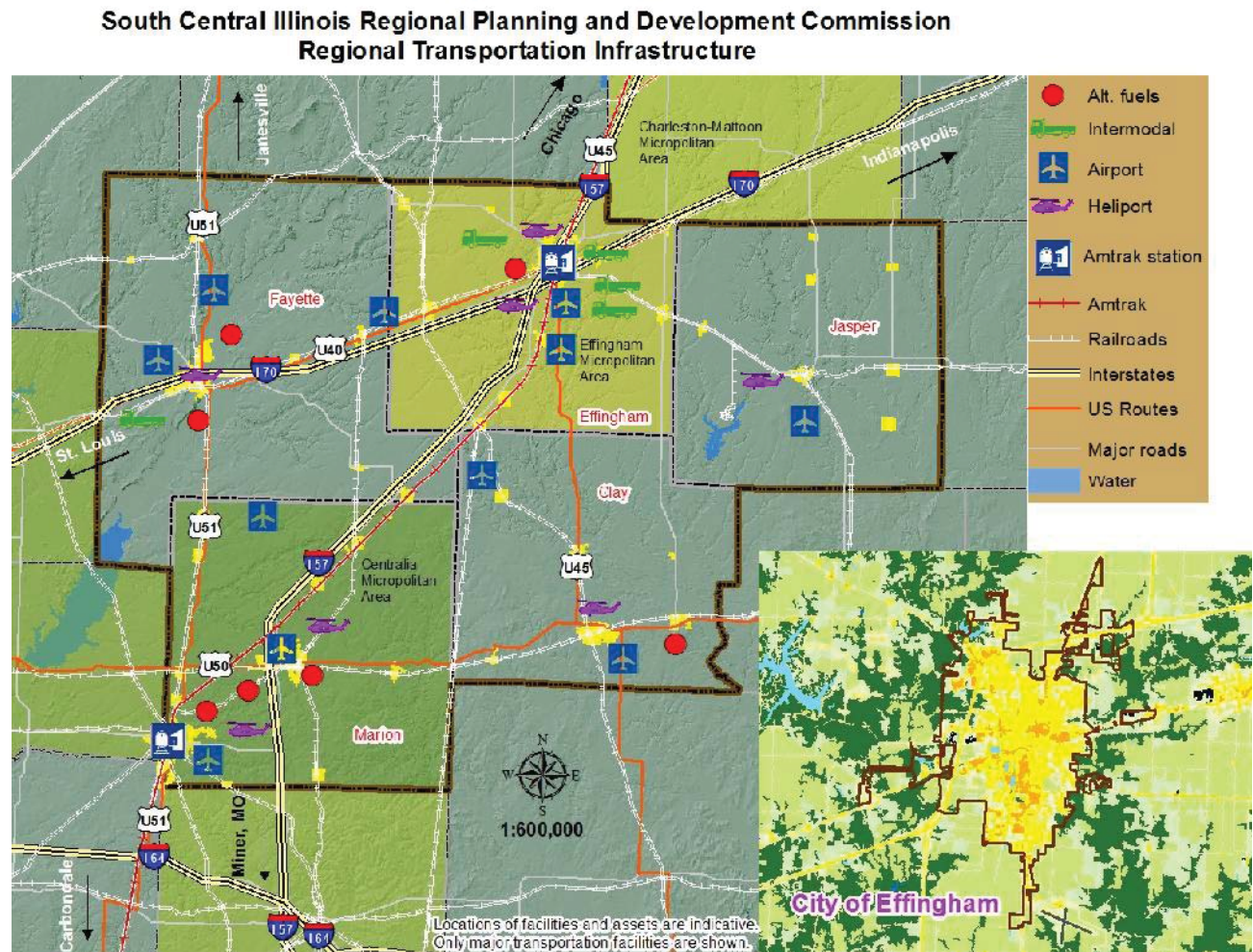


The SCIRPDC region lies within easy reach of three major metropolitan market areas (Map 4) which should be advantageous given regional transportation assets. The region has multi-modal transportation assets which include interstate highways, passenger and goods rail, and an aviation infrastructure. The region is the crossroads for two interstates – I-70 and I-57 providing both north-south and east-west connectivity with metropolitan areas in the Midwest.

Connecting Maryland to Utah through the Midwest, I-70 is a major freight corridor carrying grains and goods. Dedicated truck lanes on I-70 through Missouri to Ohio are proposed, which could become valuable assets for the SCIRPDC region in future. I-57 connects Sikeston, Missouri to Chicago, Illinois. I-57 and I-55 form the two major north-south interstate corridors for Illinois.



Map 5: Regional Transportation Infrastructure



The region has 11 airports of which 5 are public airports located in Centralia, Effingham, Flora, Salem, and Vandalia. There are 7 heliports, mostly serving the hospitals. Effingham County has four intermodals, all of which are transfer stations from rail to truck and vice versa. The region has a dense network of railroads, which is approximately 500 miles long and owned by major railroad companies, such as CSXT, BNSF, UP and CN. These are Class-I railroad companies and in fact four of the seven Class-I railroads are present in the SCIRPDC region. They operate long-haul high density freight corridor lines. The CSXT line connecting Effingham to St. Louis is part of the US Strategic Corridor Network (STRACNET)⁵. The SCIRPDC region also has some regional railroads which operate short haul routes.

⁵ The Strategic Rail Corridor Network (STRACNET) and its associated connector lines are the civil rail lines most important to national defense. These lines meet the readiness, maintenance and weight criteria for defense purposes and studies are undertaken under Congressional mandate to identify the lines/networks.



The SCIRPDC region is well served by the Amtrak passenger railroad with railway stations in Effingham and Centralia cities. The Amtrak service connecting Chicago-Memphis-New Orleans passes through Effingham and Centralia stations. Amtrak's Illinois Service has daily trains running between Chicago and St. Louis which pass through Effingham and Centralia stations.

According to the American Public Transportation Association (APTA), three of the region's counties are served by public transit. Clay and Fayette counties are served by Central Illinois Public Transit and Marion County is served by South Central Illinois Mass Transit district. Both transit agencies have demand-responsive routes, including door-to-door services. Intercity transportation is provided via a Greyhound Bus route connecting Terre Haute, IN, to St. Louis, MO, which passes through the city of Effingham.

2.3 Demographic Indicators

2.3.1 Population Size and Change

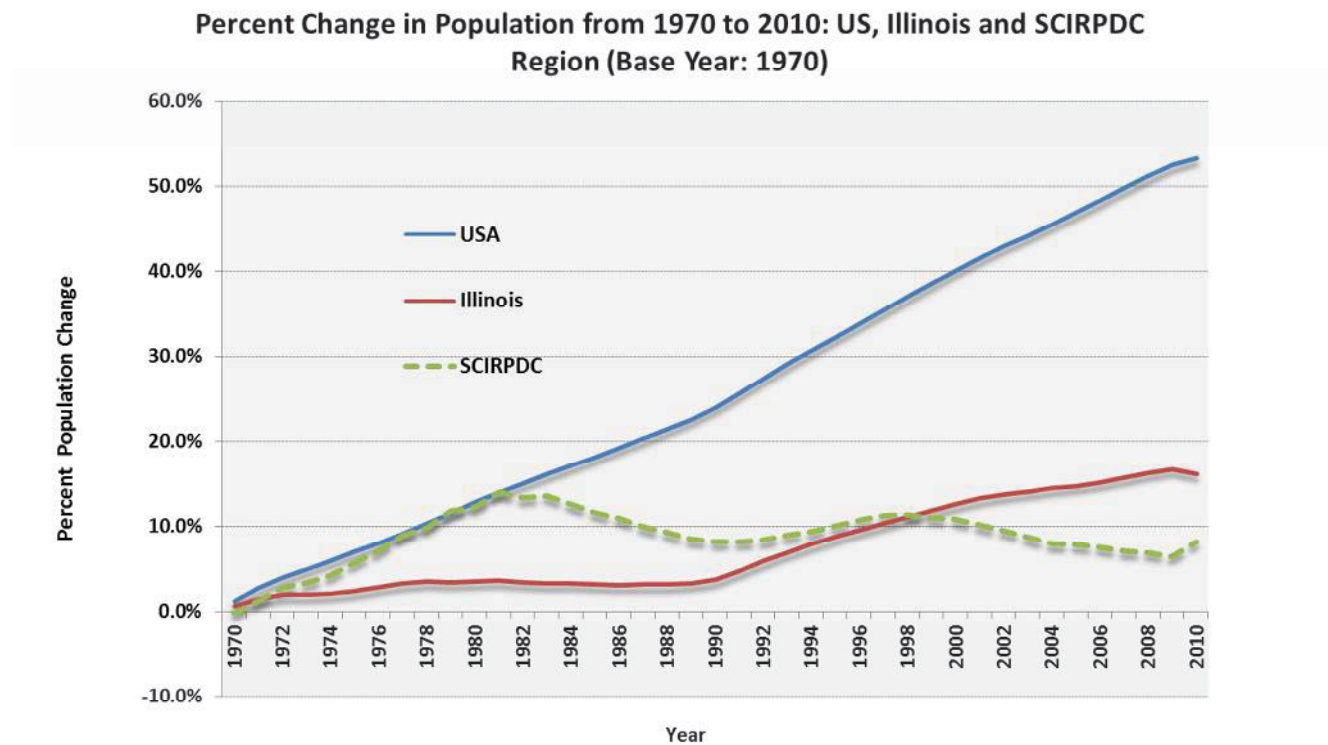
Population change and demographic characteristics of the population are important determinants of regional development. People are the entrepreneurs, labor force, business and political leaders who define the potential for economic development. The skills, knowledge and education of the regional workforce influence the region's potential for innovation and its competitiveness in the national and global marketplace.

The size, growth, concentration and age structure of the population likewise affect the likelihood that businesses will thrive, start-up, locate or expand in the region. The characteristics of the population, as well as the business environment, also drive marketing efforts. Focusing through a different lens, a healthy and growing economic environment helps to attract and retain population: a stable or growing population is a positive economic indicator; a declining population may signal trouble.

Long term population trends from 1970 through 2010 indicate the region's population grew, on average, at faster rate than the rest of Illinois until the late 1990s. The region's population surged in the 1970's reaching a peak of 125,781 in 1981, a 14.2% gain between 1970 and 1981, far outstripping the average for rural Illinois counties (5.9%), Illinois (2.8%), and the US (11.5%). Between 1980 and 2000 regional population growth dipped, rose slightly until 1996 and then began to fall again. At the state level, however, population has increased steadily (if slowly) until a slight downturn beginning 2010. By contrast, the region's population ticked up slightly in 2010 (Figure 5).



Figure 5: Long-Term Change in Total Population 1970 to 2010



Source: REIS, Bureau of Economic Analysis; U.S. Census Bureau, 2010

Figure 6: Forty-Year Total Population Change by County and Region

Area Name	1970	2010	Change 1970-2010	% Change 1970-2010
Marion	39,122	39,437	315	0.8%
Effingham	24,742	34,242	9,500	38.4%
Fayette	20,778	22,140	1,362	6.6%
Clay	14,725	13,815	-910	-6.2%
Jasper	10,730	9,698	-1,032	-9.6%
SCIRPDC Region	110097	119332	9,235	8.4%

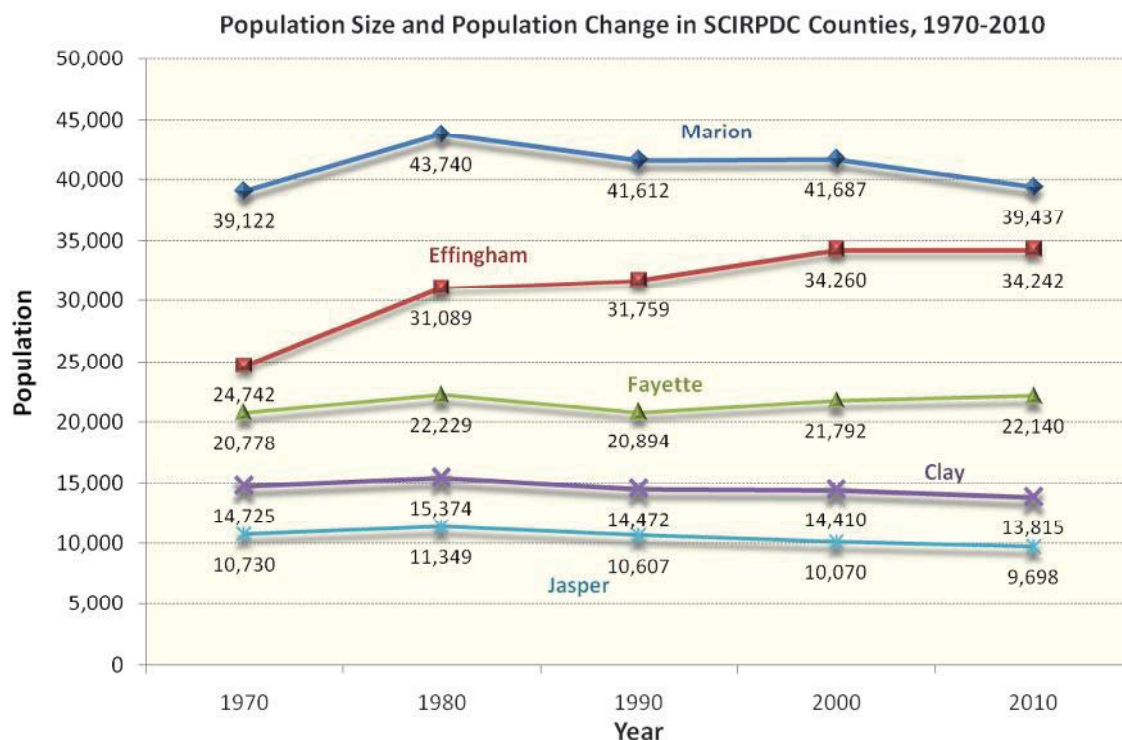
Source: BEA, REIS, Census 2000 and 2010

Total regional population increased by 8.4% from 1970 to 2010 – an annualized rate of only 0.2% (Figure 6). Total population of the region according to the US Census was 119,332 in 2010. During the period, only Effingham County posted any significant population growth (38.4%) and Fayette County grew by 6.6%. Marion County’s population had grown by just over 4,500 by 1980, but then began a period of decline and stagnation, returning to almost the same population in 2010 as it had in 1970 (Figure 7). Clay and Jasper counties’ population actually declined over the



period (6.2% and 9.6% respectively). Effingham County has clearly been the main driver of regional population growth for the last few decades.

Figure 7: Population Change by County 1970 to 2010



Source: REIS, Bureau of Economic Analysis; U.S. Census Bureau, 2010

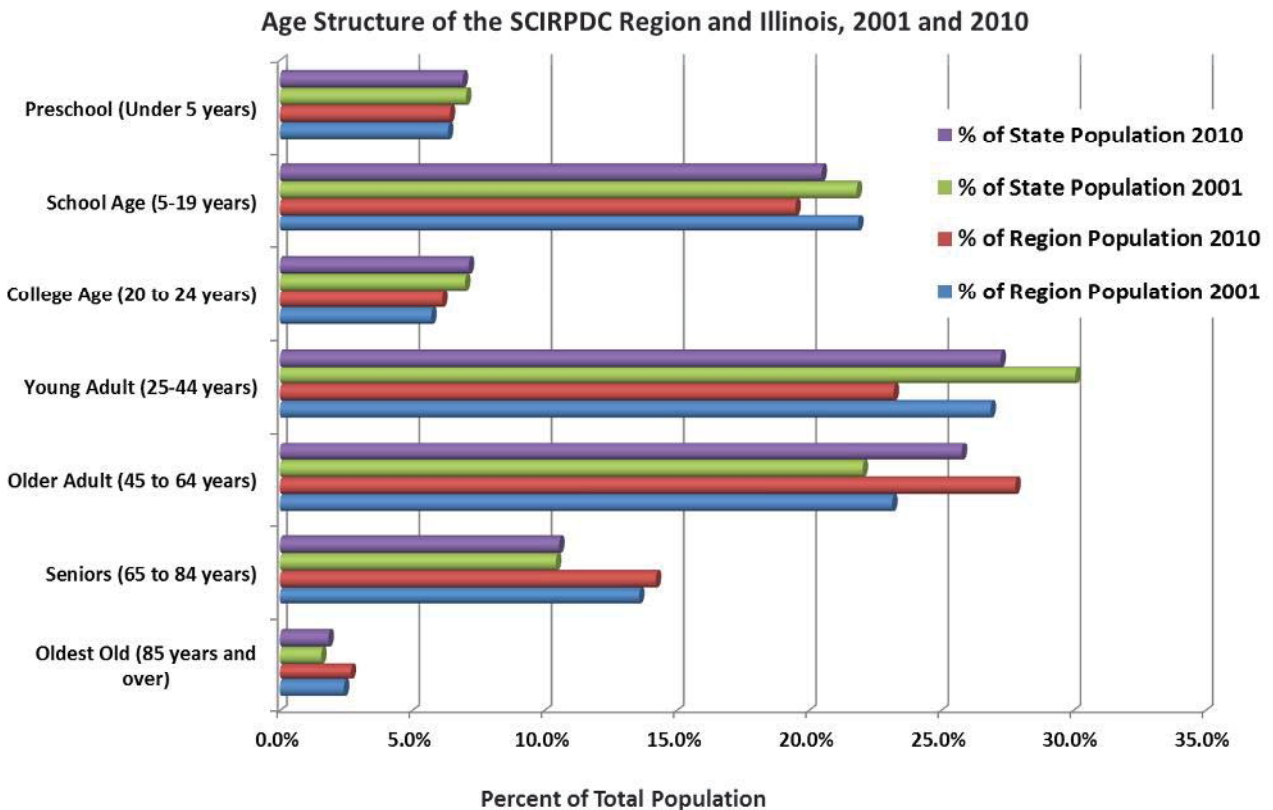
2.3.2 Age Structure of the Population

In Figure 8, the population of the SCIRPDC region is compared to the age structure of the State's population at two points in time – 2001 and 2010. While the proportion of the population aged under 5 years (pre-school age) has barely changed either at the regional or state levels, the proportion of the population that is school-age (5-19 years) in the SCIRPDC region has decreased since 2001 from about 22% to 19.5% in 2010, and is a smaller proportion than prevails in the state as a whole. Such changes have implications for public infrastructure such as schools. Again, while the proportion of the region's population that falls into the "college age" category in 2010 is slightly higher than it was in 2001, it is less than the prevailing state proportion.

It is also significant to note that the proportion of the "Young Adult" population (aged 25-44 years), who are so important in the composition of the workforce dropped from about 27% of the population to about 23% of the population in 2010. This change was reflected at the state level, but to a slightly lesser degree. By contrast, the regional population falling into the "Older Adult" age group increased by almost 5% to encompass almost 28% of the population. The number of persons over 65 years of age also increased, from 16% to almost 17% of the population



Figure 8: Age Structure of the Population, 2001 and 2010



Source: EMSI Complete Employment - 2011.2; Chart prepared by PCRD

In summary, the population of the SCIRPDC region as a whole is aging, while younger cohorts are shrinking in size. While an aging population coupled with declines in the size of younger cohorts can cause issues around workforce availability and replacement, the presence of an aging population also offers economic opportunity. Examples include providing for the special needs of older people, such as specially designed housing; medical and mobility equipment and other amenities. Additionally, retirement income and medical expenditures and reimbursements bring “new” money into the regional economy.

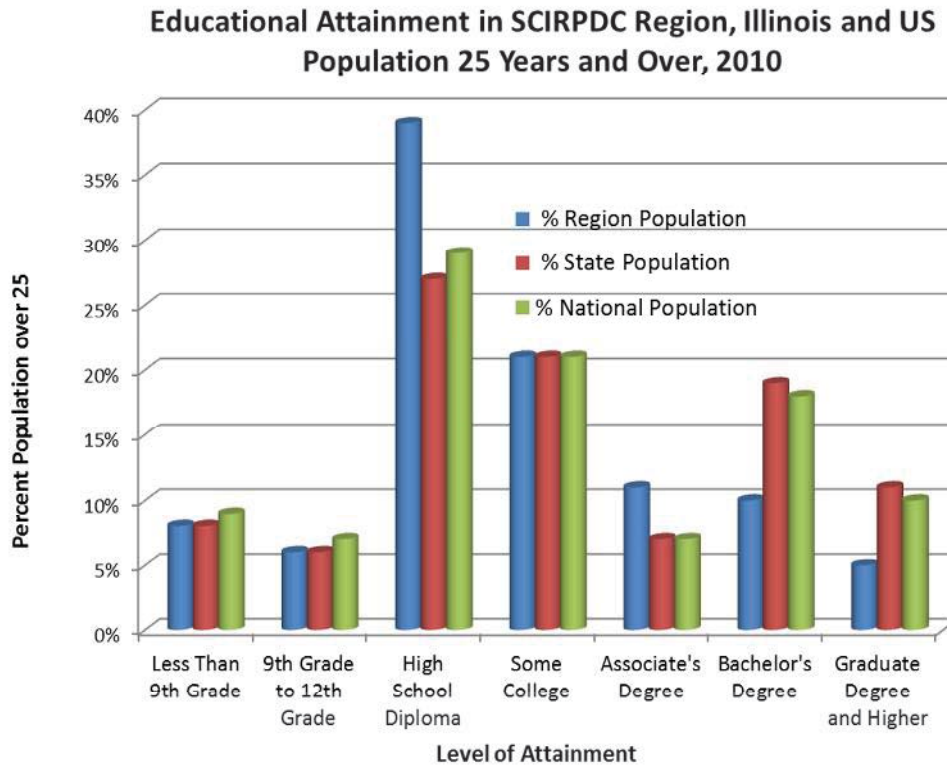
2.3.3 Educational Attainment of the Population

Figure 9 shows the levels of education attained in the SCIRPDC region compared to those prevailing in Illinois and the US in 2010.

By comparison with the US and the state of Illinois, the region has a much larger proportion of people whose education terminated with only a High School diploma, but it also has a larger proportion of people who have attained an Associate Degree. The proportion having attained “Some College” is basically the same as the national and state-wide percentages, however the percentage of regional population over the age of twenty-five years who have gained Bachelor’s or graduate degrees is much lower than in the general population.



Figure 9: Educational Attainment of the Population, 2010



Source: EMSI Complete Employment - 2011.2; Chart prepared by PCRD

Each of the region's five counties has at least one satellite office of a community college, but only one full-sized college is located in the region: Kaskaskia College in Marion County (this college is actually technically located in Clinton County, outside the region, but within the boundaries of the city of Centralia which spills over from Marion County into Clinton, Washington and Jefferson counties. About 81% of Centralia's population resides in Marion County).

Several universities are located in fairly close proximity to the region, for example the University of Illinois at Urbana-Champaign, Southern Illinois University in Carbondale and Edwardsville, Eastern Illinois University in Charleston as well as Indiana State University in Terre Haute, IN.

The relatively low educational attainment figures for the population in the SCIRPDC region offer an opportunity to begin a conversation about strengthening the structure and accessibility of the post-secondary education system and finding ways to encourage both adults and young people in the region to pursue further education, or at least a path of "life-long learning." Among other topics in such a conversation could be the development of arrangements between the community colleges and nearby universities to perhaps more easily accept transfer students from the community colleges into four-year university degree programs (if such arrangements are not already in place).



Section 3: Economic Structure, Employment, Income and Earnings

3.1 Income and Earnings

Income and earnings are strong indicators of economic well-being. Earnings – especially those that come from jobs in exporting industries, bringing in new money from outside the region – strengthen the multiplier effect as they get spent and circulate in the regional economy. This leads to the creation of yet more jobs in support and service industries. BEA data in Figure 10 show that the average wage per job in the SCIRPCD region remained well below the average for Illinois in 1990, 2000 and 2009, although wages (adjusted for inflation) have increased at a faster pace than in Illinois as a whole. Average wages in each county have not risen above 70% of the Illinois wage – with the exception of wages in Jasper County. In fact, regional earnings as a percentage of the state average were 68% as far back as 1970.

Figure 10: Average Wage per Job, 1990-2009 (in 2009 dollars, adjusted for inflation)

Area Name				% Change,		Percent of Illinois 2009
	1990	2000	2009	1990-2000	2000-2009	
Clay	\$ 25,695	\$ 29,828	\$ 32,879	16.1%	10.2%	66.9%
Effingham	\$ 29,115	\$ 30,403	\$ 33,285	4.4%	9.5%	67.8%
Fayette	\$ 24,829	\$ 27,109	\$ 29,967	9.2%	10.5%	61.0%
Jasper	\$ 27,081	\$ 29,963	\$ 35,882	10.6%	19.8%	73.0%
Marion	\$ 29,716	\$ 30,995	\$ 33,321	4.3%	7.5%	67.8%
Illinois	\$ 40,310	\$ 46,016	\$ 49,120	14.2%	6.7%	100.0%

Source: BEA, CA 34 Wage and Salary Summary, April 21, 2011

Note: This BEA estimate of the average wage per job is not the same as the average wage per person, since a person can hold more than one job.

Per capita personal income (PCPI) includes all types of income received by people residing in a particular area,⁶ not just wages from jobs. Total personal income from all sources in a region is divided by the total population to obtain per capita personal income. Figure 11 shows PCPI for each county, the region and the state of Illinois. PCPI for the region does not lag behind the state

⁶ Personal income consists of the income that is received by persons from participation in production, from government and business transfer payments, and from government interest (which is treated like a transfer payment). It is calculated as the sum of wage and salary disbursements, other labor income, proprietors' income with inventory valuation and capital consumption adjustments, rental income of persons with capital consumption adjustment, personal dividend income, personal interest income, and transfer payments to persons, less personal contributions for social insurance.

http://www.stats.indiana.edu/definitions/bea_glossary.asp



as much as do average wages, however there is still a considerable gap – particularly for Fayette County. Annual growth rates are generally under two percent.

Figure 11: Per Capita Personal Income SCIRPDC Counties, Region and Illinois, 1990-2009 (in \$ 2009 adjusted for inflation)

Area Name	1990	2000	2009	% Change, 1990-2000	% Change, 2000-2009	% of Illinois
Effingham	\$27,829	\$31,560	\$34,473	13.4%	9.2%	82.4%
Marion	\$24,743	\$28,369	\$32,105	14.7%	13.2%	76.7%
Jasper	\$24,379	\$28,063	\$31,416	15.1%	11.9%	75.1%
Clay	\$24,075	\$27,104	\$31,990	12.6%	18.0%	76.4%
Fayette	\$20,571	\$23,756	\$26,944	15.5%	13.4%	64.4%
Region	\$24,721	\$28,267	\$31,810	14.3%	12.5%	76.0%
Illinois	\$34,200	\$40,660	\$41,856	18.9%	2.9%	100.0%

Source: BEA, Per Capita Personal Income data, CA1-3

Total personal income helps to determine the type and number of amenities that exist in a region, and therefore impacts the quality of life that retains population and helps attract new in-migrants and businesses. Higher wages, of course, increase total personal income and wealth in an area.

3.2 Regional Employment Trends

Total full and part-time regional employment growth outpaced Illinois until the recession that started in 2000. Regional employment grew 56.1% between 1970 and 2000 (just under 2% per annum) compared with a 44.2% overall gain for the State. More than half (57%) of the regional growth occurred in Effingham County. Employment growth in other counties lagged behind the average annual employment growth rate in Illinois (1.5%), with Jasper County experiencing the slowest growth between 1970 and 2000.

Since 2000 all counties in the region have lost employment. Effingham County continued to show some resilience with the smallest percentage loss of jobs followed by Fayette County, as shown in Figure 13. Marion County lost approximately 1 in every 8 jobs during the period. Illinois also lost employment, but by a surprisingly small amount considering the expected effects of the recession beginning in 2007. Figure 12 shows all sources of employment, including farm- and non-farm proprietors.



Figure 12: Change in Total Employment (Full-time and Part-time, including Proprietors)

Area Name	2001	2009	2001-2009	
			Change	% Change
Illinois	7,317,418	7,269,581	-47,837	-0.7%
Clay	8,912	8,185	-727	-8.2%
Effingham	26,399	25,702	-697	-2.6%
Fayette	10,191	9,721	-470	-4.6%
Jasper	4,740	4,289	-451	-9.5%
Marion	20,472	17,777	-2,695	-13.2%
Region	70,714	65,674	-5,040	-7.1%

Source: BEA, total employment by industry data, CA25

When considering only wage and salary employment, employment loss is greater for all geographies – state, region and counties – at the end of the study period (Figure 13). The State lost 5.3% of all wage and salary jobs from 2001 to 2009, and the rate of loss for Effingham and Fayette counties jumps to 5.1% each. Marion County is seen to have lost 17% of its wage and salary jobs and Clay County about the same, while Jasper County lost about 15% of this type of employment.

Figure 13: Change in Wage and Salary (Full-time and Part-time) Employment

Area Name	2001	2009	2001-2009	
			Change	% Change
Illinois	6,188,623	5,861,229	-327,394	-5.3%
Clay	6,168	5,128	-1,040	-16.9%
Effingham	21,646	20,552	-1,094	-5.1%
Fayette	6,799	6,451	-348	-5.1%
Jasper	2,869	2,447	-422	-14.7%
Marion	17,193	14,263	-2,930	-17.0%
Region	54,675	48,841	-5,834	-10.7%

Source: BEA, total employment by industry, CA25



The rate of loss for wage and salary jobs in the region as a whole is also greater – 10.7% rather than 7.1% when all types of work are considered (Fig.13).

Figure 14 shows that while wage and salary jobs declined quite steeply between 2001 and 2010, non-farm proprietors' employment increased markedly both in the SCIRPDC region and the State of Illinois. In fact, the number of proprietor-owned small businesses increased by almost 2,000 in the region. This may be due to an increased tendency towards entrepreneurialism in the region, which in turn may be due at least partly to the fact that people cannot find wage or salary jobs. However, small business creation is usually good news for economic development and eventual job creation. Unfortunately, this growth has to be balanced against an almost 22% decline (-1,118 proprietors) in farm proprietors' employment, bringing down the overall regional growth in self-employed proprietors of small businesses.

Nevertheless, any increase in the number of entrepreneurs and the small business they start up in a region presents an opportunity for discussion about how to support and grow such businesses, and to create still more. Many colleges and universities now offer business courses to support and develop an entrepreneurial spirit and know-how; local and regional branches of the Small Business Development Centers offer free advice and assistance in business development, and in some areas even secondary school students have opportunities to develop their knowledge and innovative ideas for starting up a business.

Figure 14: Employment by Type, and Change in Employment by Type, 2001-2010

Description	Region			Region	Illinois
	2001	2009	Change 2001-2009	Percent Change 2001-2009	Percent Change 2001-2009
Total employment by place of work (number of jobs)	70,714	65,674	-5,040	-7.1%	-0.7%
By type					
Wage and salary employment	54,675	48,841	-5,834	-10.7%	-5.3%
Proprietors employment	16,039	16,833	794	5.0%	24.8%
Farm proprietors employment	5,128	4,010	-1,118	-21.8%	-19.8%
Nonfarm proprietors employment 2/	10,911	12,823	1,912	17.5%	28.0%
By industry					
Farm employment	5,917	4,569	-1,348	-22.8%	-20.0%
Nonfarm employment	64,797	61,105	-3,692	-5.7%	-0.4%
Private employment	56,616	53,386	-3,230	-5.7%	-0.6%
Government	8,181	7,719	-462	-5.6%	1.1%

Source: BEA, Total Employment by Industry Data, CA25

Given the effects of one fairly major, and another severe recession in just one decade, together with steep declines in manufacturing industries owing to global competition and American outsourcing and offshoring, high unemployment rates might be expected in a region that has traditionally relied quite heavily on manufacturing and the auto industry in its economic base.



What accounts for the wide variation between these five counties in terms of economic performance as measured by employment levels and types of employment? The answer lies at least partially in the varying distribution of assets and economic activities in each county. In the following sections, and the remaining parts of this study, the economic structure of the region is discussed and may help to cast some light on potential strategies for improved performance.

3.3 Economic Structure of the SCIRPDC Region, 2001 to 2010

Every region's particular configuration of economic activity is unique, and each region usually has a few areas of activity where it is more specialized than other regions, or even the nation. It is most often in these areas of specialization that the region's comparative advantages are found. This is as true of economic sectors as it is of industry clusters. Figure 15 clearly illustrates that five major sectors -

- Agriculture, Forestry, Fishing and Hunting;
- Mining, Quarrying, and Oil and Gas Extraction;
- Manufacturing
- Transportation and Warehousing
- Health and Social Assistance

in the SCIRPDC region have a significantly greater share of the economy than they do in the State of Illinois, or the US as a whole (sectors with major differences in percent share of the regional, state and US economies are shown highlighted in red). In the region, the large Health and Human Assistance sector is about evenly split between the several sub-sectors:

- Hospitals and ambulatory health care;
- Social assistance; and
- Nursing and residential facilities.

Conversely, the region is less specialized than the state or nation in a large number of higher-level service industries including Information; Finance and Insurance; Real Estate, Rental and Leasing; Professional, Scientific and Technical services; Management of Companies and Enterprises; Administrative, Support, Waste Management and Remediation Services; Educational Services; and Arts, Entertainment, and Recreation. In the regional economy, all of these sectors hold roughly half (or less) of the percent share that they occupy in the state and national economies.



**Figure 15: Economic Structure - Percent Share of Employment by Industry Sectors
SCIRPDC Region, Illinois and the US, 2010**

NAICS	Description	SCIRPDC Region		Illinois	US
		2010 Jobs	% of Total	% of Total	% of Total
11	Agriculture, Forestry, Fishing and Hunting	4,877	7.5%	1.2%	2.0%
21	Mining, Quarrying, and Oil and Gas Extraction	4,161	6.4%	0.4%	0.8%
22	Utilities	393	0.6%	0.3%	0.3%
23	Construction	3,123	4.8%	4.5%	5.3%
31-33	Manufacturing	7,918	12.2%	8.0%	7.0%
42	Wholesale Trade	2,638	4.1%	4.3%	3.5%
44-45	Retail Trade	6,653	10.3%	9.6%	10.2%
48-49	Transportation and Warehousing	3,244	5.0%	4.4%	3.6%
51	Information	693	1.1%	1.7%	1.9%
52	Finance and Insurance	2,554	4.0%	6.9%	5.4%
53	Real Estate and Rental and Leasing	1,178	1.8%	3.9%	4.3%
54	Professional, Scientific, and Technical Services	1,239	1.9%	7.1%	6.9%
55	Management of Companies and Enterprises	280	0.4%	1.4%	1.1%
56	Administrative and Support and Waste Management and Remediation Services	1,796	2.8%	6.4%	5.8%
61	Educational Services	347	0.5%	2.7%	2.4%
62	Health Care and Social Assistance	8,209	12.7%	11.3%	11.1%
71	Arts, Entertainment, and Recreation	590	0.9%	2.0%	2.2%
72	Accommodation and Food Services	4,154	6.4%	6.4%	6.9%
81	Other Services (except Public Administration)	3,062	4.7%	5.2%	5.2%
90	Government	7,538	11.7%	12.1%	14.0%
	Total	64,648	100.0%	100.0%	100.0%

Source: EMSI Complete Employment- 2nd Quarter, 2011

Figure 16 shows employment and changes in employment by major sector for the SCIRPDC region. During the 2001-2010 study period some important changes took place in the regional economy. The Mining, Quarrying and Oil and Gas Extraction sector grew by 124%, gaining 2,305 jobs. This large growth is driven by the expansion of oil and gas extraction operations in the area (pp. 9-10), made attractive by higher prices for these commodities and periods of scarcity due to natural disasters such as Hurricane Katrina, and international disruptions. The Health Care and Social Assistance sector, another large sector in the region, added 554 jobs (7%). Four other



sectors added between 100 and 300 jobs, including Finance and Insurance; and Management of Companies and Enterprises – sectors whose presence in the region has been relatively weak compared to the state and the nation (Figure 15).

Figure 16: SCIRPDC Region Change in Employment by Major Sectors, 2001-2010

NAICS	Description	2001 Jobs	2010 Jobs	Change	% Change
21	Mining, Quarrying, and Oil and Gas Extraction	1,856	4,161	2,305	124%
62	Health Care and Social Assistance	7,655	8,209	554	7%
72	Accommodation and Food Services	3,867	4,154	287	7%
52	Finance and Insurance	2,276	2,554	278	12%
55	Management of Companies and Enterprises	125	280	155	124%
22	Utilities	259	393	134	52%
48-49	Transportation and Warehousing	3,166	3,244	78	2%
61	Educational Services	305	347	42	14%
56	Administrative and Support and Waste Management and Remediation Services	1,779	1,796	17	1%
53	Real Estate and Rental and Leasing	1,167	1,178	11	1%
42	Wholesale Trade	2,694	2,638	-56	-2%
71	Arts, Entertainment, and Recreation	656	590	-66	-10%
90	Government	7,715	7,538	-177	-2%
23	Construction	3,450	3,123	-327	-9%
81	Other Services (except Public Administration)	3,399	3,062	-337	-10%
54	Professional, Scientific, and Technical Services	1,631	1,239	-392	-24%
44-45	Retail Trade	7,181	6,653	-528	-7%
11	Agriculture, Forestry, Fishing and Hunting	6,228	4,877	-1,351	-22%
51	Information	2,786	693	-2,093	-75%
31-33	Manufacturing	11,802	7,918	-3,884	-33%
	Total	69,997	64,648	-5,349	-7.64%

Source: EMSI Complete Employment- 2nd Quarter, 2011

The Manufacturing, Information, and Agriculture, Forestry, Fishing and Hunting sectors all experienced quite heavy employment loss, between 1,000 and 4,000 each; Retail lost over 500 positions, while Construction, Other Services, and Professional, Scientific and Technical Services each lost between three and four hundred jobs. Losses in the Information sector were due to the closure of publishing establishments during this period, while manufacturing sector losses were principally due to shrinkage in printing and paper manufacturing; apparel; machinery manufacturing; plastics; and transportation equipment manufacturing. Overall, the region lost 5,349 jobs from 2001 through 2010, or 7.6% of all jobs according to EMSI data. It is to be



expected that sectoral losses will be reflected in the growth trajectories of the relevant industry clusters.

Section 4: Cluster Analysis

4.1 Methods and Techniques of Cluster Analysis

Cluster analysis uses location quotients and shift-share analysis to evaluate the relative importance of the industry clusters in a regional economy. Location quotients (LQs) are a ratio formed by comparing the share of any cluster in the regional economy with the share of the same cluster in the national or the state economy.⁷ The national economy is used as the reference point in this study. Location Quotients provide a preliminary idea of which clusters are important in a region, and which might have a comparative advantage in comparison to the nation, state or other regions. This study computed LQs based on employment, however other indicators such as business establishments could be used, if desired. In this study, a location quotient of 1.2 or more is taken as an indicator of specialization in the economy; a location quotient of 1 means that a cluster's share of the regional economy is the same as that of the national economy; and a location quotient of less than one means that the cluster has a smaller share of the regional economy than it has at the national level (i.e. it is not specialized).

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 seeks to explain changes in an economy by decomposing actual changes that have occurred into three main sources:

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 2010, total employment in the United States as measured by EMSI data grew by 4% percent. The national share factor applies this 4% 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.

7

$$(R1/R2)$$

$$\text{Location Quotient} = (N1/N2)$$

Where:

R1 = Regional Employment In Industry X

R2 = Total Regional Employment

N1 = National Employment In Industry X

N2 = Total National Employment

If L.Q. < 1, Region is less specialized in industry X, and needs to import goods to satisfy local demand

If L.Q. = 1, Region produces just enough in industry X to satisfy local demand

If L.Q. > 1, Region is more specialized in industry X and exports goods to other regions



2. The influence of Industry Share (also known as “Industry Mix”) 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 2010. The industry share indicates how much of a local change in employment can be attributed to national growth or decline of 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.
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 shows which clusters or industries might have a competitive advantage in 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.

In addition to the size of location quotients and their direction of growth, and a positive regional share effect, other factors that should be considered when evaluating the relative strength and potential of industry clusters include: the size of the cluster (number of employees); the average rate of pay in the cluster, its performance over time, and any available forecasts as to future demand for the goods and services that the cluster supplies. More recently, the levels of skill and knowledge embedded in industry clusters by reason of the occupational mix they utilize and the levels of training and education required from employees is becoming important for estimating capacity for innovation in the clusters.

4.2 Cluster Employment

Figure 17 shows the relative size of each cluster in the SCIRPDC region, and the county maps in Appendix D show the relative size of cluster industries in each county of the region.⁸ Figure 18 details the number of jobs in each regional cluster in 2001 and again in 2010, together with changes that have occurred over the period.

The two largest clusters as of 2010 are the agribusiness, food processing & technology cluster and the energy cluster; followed by biomedical/biotechnical (life sciences), manufacturing, business

⁸ Most counties do not have a sufficient number or concentration of cluster industries within their boundaries to enable it to be said that there is a “cluster.” Instead, most counties will have a larger or smaller number of jobs and establishments that *belong* to a particular cluster at the regional level. Clusters are a regional phenomenon, not so much a county phenomenon. The exception might be in very large metropolitan counties that have a very large concentration of jobs and business establishments – Chicago metropolitan counties, for example.



and financial services and the transportation & logistics cluster. Not all of these larger clusters have experienced growth, however.

Figure 17: Cluster Employment in the SCIRPDC Region



Jobs in the energy cluster increased by 28% over the period (1,447 jobs), whereas the number of jobs in the agribusiness cluster decreased by 13%. Jobs in the Biomed/Biotech cluster increased by 12% (and could reasonably be expected to continue to grow because of demographic trends such as the aging of the baby boom generation) while manufacturing jobs decreased by 36% (1,846 jobs). Among the six sub-clusters of the manufacturing supercluster, transportation equipment manufacturing (i.e. automotive-related industries) and machinery manufacturing declined precipitously by 42% and 51% respectively.

It is possible that these two sub-clusters may revive as the US auto industry continues to turn itself around and innovate with new fuel-efficiency systems, such as hybrid electric vehicles. The electrical equipment, appliance and components sub-cluster effectively disappeared from the regional economy with job losses of almost 100% owing to closure of activity in the switchgear and switchboard apparatus and current-carrying wiring device manufacturing sectors. The primary metals sub-cluster remained effectively static, with the small uptick of employment (10 jobs) being due to new activities in aluminum foundries.



Figure 18: SCIRPDC Regional Clusters - Employment Size and Change in Employment 2001-2010

Cluster Name	2001 Jobs	2010 Jobs	Change	Percent Change in Jobs
Energy (Fossil & Renewable)	5,079	6,526	1,447	28.0%
Biomedical/Biotechnical (Life Sciences)	4,646	5,184	538	12.0%
<i>Computer & Electronic Products</i>	12	324	312	2600.0%
<i>Fabricated Metal Products</i>	299	399	100	33.0%
Transportation & Logistics	2,660	2,732	72	3.0%
<i>Primary Metals</i>	181	191	10	6.0%
Mining	403	370	-33	-8.0%
Business & Financial Services	3,129	3,044	-85	-3.0%
Arts, Entertainment, Recreation & Visitor Industries	1,544	1,434	-110	-7.0%
Glass & Ceramics	131	16	-115	-88.0%
Apparel & Textiles	615	369	-246	-40.0%
Forest & Wood Products	2,024	1,768	-256	-13.0%
Defense & Security	1,014	750	-264	-26.0%
<i>Electrical Equipment, Appliance & Components</i>	436	10	-426	-97.7%
<i>Machinery</i>	907	446	-461	-51.0%
Information Technology & Telecommunications	1,487	898	-589	-40.0%
Advanced Materials	2,325	1,627	-698	-30.0%
Agribusiness, Food Processing & Technology	7,574	6,616	-958	-13.0%
Chemicals & Chemical Based Products	2,663	1,563	-1,100	-41.0%
<i>Transportation Equipment</i>	3,267	1,893	-1,374	-42.0%
Manufacturing Supercluster	5,102	3,256	-1,846	-36.0%
Education & Knowledge Creation	2,326	347	-1,979	-85.0%
Printing & Publishing	4,277	1,752	-2,525	-59.0%

Source: EMSI Complete Employment - 2011.2

On the other hand, the fabricated metal products sub-cluster expanded by 33% (100 jobs) and computer and electronic products grew by 2,600% (312 jobs). The computer and electronic products sub-cluster expansion was driven by an increase in the Software Reproducing sector, while the expansion in fabricated metals is being driven by a recent revival of activity in machine shops. However, both of these sub-clusters are currently small (300-400 jobs). The only other regional cluster to expand during the study period was the transportation and logistics cluster, by a modest 3%.

The Printing & Publishing cluster experienced the largest employment losses (-2,525 jobs) followed by the Education and Knowledge Creation cluster (-1,979 jobs). As these two clusters overlap somewhat, a large part of the decline in each cluster was due to closures or severely



diminished activities in book, newspaper and periodical publishing. In the case of the printing and publishing cluster, shrinkage in commercial lithographic printing also contributed to the loss of jobs.

In all, eight important clusters with over 1,000 employees each lost between 500 and 3,000 jobs over the study period. Nine other clusters (four of them with over 1,000 employees) also lost jobs during the period.

4.3 Cluster Estimated Earnings

Because individual industries can belong to more than one cluster (that is, some of the clusters overlap) it is not possible to estimate the average pay per worker for all clusters in the region. Average pay must be assessed on a cluster by cluster basis. Within clusters too, average pay will vary according to the cluster's component sectors and the skill levels required for their work.

The mining cluster has the highest average earnings per worker at \$86,489 per annum in 2011 (second quarter estimate; Figure 19). This is followed by advanced materials, energy, the manufacturing supercluster, chemicals and chemical-based products, and transportation and logistics. Also among these top ten high-paying clusters are four sub-clusters of the manufacturing supercluster (transportation equipment, fabricated metal products, machinery and primary metals).

The energy cluster currently has by far the largest economic output in terms of total annual regional earnings (\$458,183,934), followed by agribusiness, food processing and technology; the manufacturing supercluster; the biomedical/biotechnical cluster; and the transportation and logistics cluster.



Figure 19: Cluster Jobs, 2010, Average Earnings Per Worker and Total Earnings, 2011

Cluster Name	2011 Average		
	2010 Jobs	Earnings per Worker	Total Earnings
Mining	370	\$86,489	\$32,000,930
Advanced Materials	1,627	\$74,092	\$120,547,684
Energy (Fossil & Renewable)	6,526	\$70,209	\$458,183,934
<i>Transportation Equipment</i>	1,893	\$69,510	\$131,582,430
Manufacturing Supercluster	3,256	\$61,950	\$201,709,200
<i>Fabricated Metal Products</i>	399	\$56,176	\$22,414,224
<i>Machinery</i>	446	\$55,436	\$24,724,456
Chemicals & Chemical Based Products	1,563	\$51,635	\$80,705,505
Transportation & Logistics	2,732	\$51,359	\$140,312,788
<i>Primary Metals</i>	191	\$49,038	\$9,366,258
Information Technology & Telecommunications	898	\$46,019	\$41,325,062
Forest & Wood Products	1,768	\$44,875	\$79,339,000
Defense & Security	750	\$43,563	\$32,672,250
Printing & Publishing	1,752	\$43,112	\$75,532,224
<i>Computer & Electronic Products</i>	324	\$43,031	\$13,942,044
Agribusiness, Food Processing & Technology	6,616	\$43,018	\$284,607,088
Apparel & Textiles	369	\$40,111	\$14,800,959
Glass & Ceramics	16	\$35,800	\$572,800
Biomedical/Biotechnical (Life Sciences)	5,184	\$34,516	\$178,930,944
Business & Financial Services	3,044	\$32,755	\$99,706,220
<i>Electrical Equipment, Appliance & Components</i>	10	\$28,865	\$288,650
Education & Knowledge Creation	347	\$18,672	\$6,479,184
Arts, Entertainment, Recreation & Visitor Industries	1,434	\$16,050	\$23,015,700

Source: EMSI Complete Employment - 2011.2

Note: Clusters with names in italics are the six sub-clusters of the manufacturing supercluster.

4.4 Location Quotients, Change in LQs, and Competitive Advantage

Figures 20 and 21 are bubble charts based on the Boston Consulting Group matrix which enables a view of the region's industry cluster location quotients and cluster size, as well as the kind of change that has occurred in the size of cluster location quotients over the study period. The bubble charts are useful for a quick visual scan of the relative strength of a region's clusters. The vertical axis shows the size of the location quotients, and the horizontal axis shows the percent change in LQ size over time. The size of the bubbles indicates the size of each cluster.

Figure 20

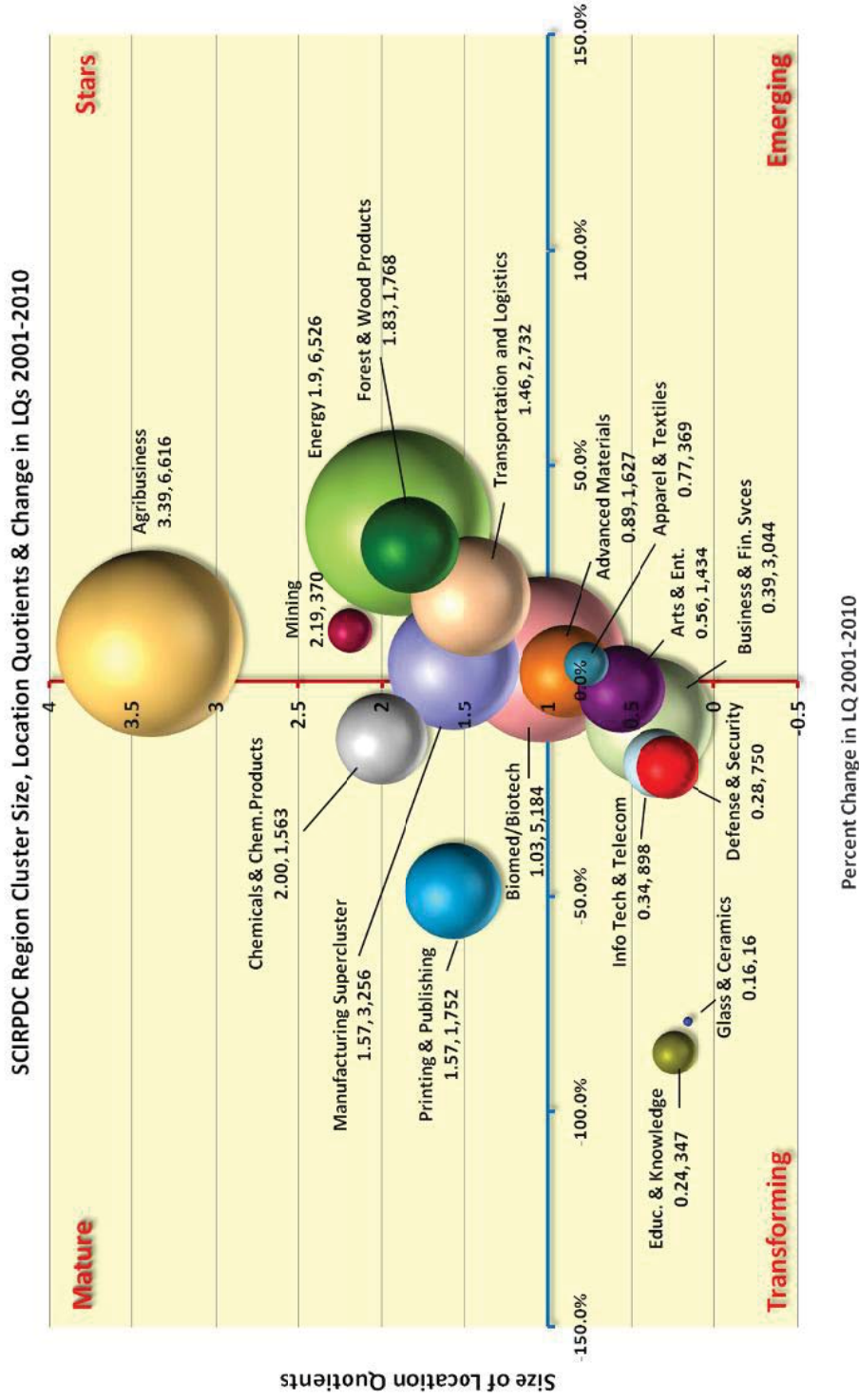


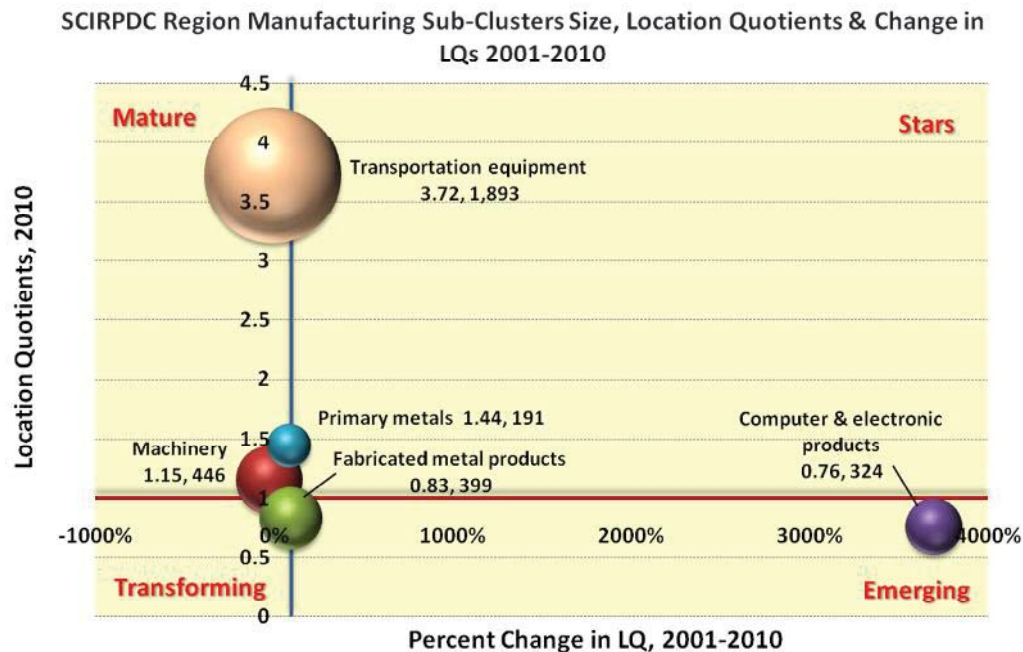
Chart Note 1: There are six subclusters in the Manufacturing Supercluster.

Chart Note 2: In this chart, the first number after the cluster name is the cluster location quotient in 2010. The second number is the size of the cluster (number of jobs). The bubble size denotes the size of cluster employment.

Source: EMSI Complete Employment - 2nd Quarter 2011



Figure 21



Source: EMSI Complete Employment - 2nd Quarter 2011

Note 1: There are six sub-clusters in the Manufacturing Supercluster. The Electrical Equipment, Appliances and Components sub-cluster does not appear on this chart because it barely exists in the region.

Note 2: In this chart, the first number after the cluster name is the cluster location quotient in 2010. The second number is the size of the cluster (number of jobs). The bubble size denotes the size of cluster employment. SCIRPDC Region comprises Marion, Effingham, Jasper, Clay and Fayette counties.

Figure 20 shows the 17 main clusters, while Figure 21 shows a breakout of the Manufacturing Supercluster into 5 of its 6 component sub-clusters.

Figure 22 is provided to show in detail the number of jobs in each cluster in 2001 and 2010, the size of the location quotients in 2010 and the percent change in the location quotients of each cluster from 2001 to 2010.

Eight clusters and two of the manufacturing sub-clusters in the SCIRPDC region have location quotients greater than 1.2. These ten industry clusters are further divided by the direction of change in their LQs, which are either increasing or decreasing over time: these two subsets of highly specialized clusters form the right and left quadrants of the matrix which is the basis of Bubble Charts in Figures 20 and 21, as well as Figure 22. On the right are shown specialized clusters whose LQs are increasing compared to the US (“stars”); to the left are specialized clusters whose LQs are decreasing (“mature”) relative to the nation.



While decreasing LQs are always a negative indicator, increasing LQs are not necessarily always a positive indicator as they may be increasing only because the national share of the cluster industries has decreased faster than the regional share of the cluster.

Figure 22: Industry Cluster Location Quotients, Strength and Direction of Growth

Cluster Name	2010 Jobs	2001 LQ	2010 LQ	Percent Change LQ
Stars (LQ >1.2 and increasing)				
<i>Primary Metals</i>	191	0.76	1.44	89.5%
Energy (Fossil & Renewable)	6,526	1.39	1.90	36.7%
Forest & Wood Products	1,768	1.39	1.83	31.7%
Transportation & Logistics	2,732	1.22	1.46	19.7%
Mining	370	1.96	2.19	11.7%
Agribusiness, Food Processing & Technology	6,616	3.12	3.39	8.7%
Manufacturing Supercluster	3,256	1.51	1.57	4.0%
Emerging (LQ <1.2 and increasing)				
<i>Computer & Electronic Products</i>	324	0.02	0.76	3700.0%
<i>Fabricated Metal Products</i>	399	0.42	0.83	97.6%
Biomedical/Biotechnical (Life Sciences)	5,184	0.98	1.03	5.1%
Apparel & Textiles	369	0.74	0.77	4.1%
Advanced Materials	1,627	0.87	0.89	2.3%
Mature (LQ >1.2 and decreasing)				
<i>Transportation Equipment</i>	1,893	3.95	3.72	-5.8%
Chemicals & Chemical Based Products	1,563	2.31	2.00	-13.4%
Printing & Publishing	1,752	3.06	1.57	-48.7%
Transforming Clusters (LQ <1.2 and decreasing)				
Arts, Entertainment, Recreation & Visitor Industries	1,434	0.57	0.56	-1.8%
Business & Financial Services	3,044	0.43	0.39	-9.3%
Information Technology & Telecommunications	898	0.42	0.34	-19.0%
Defense & Security	750	0.35	0.28	-20.0%
<i>Machinery</i>	446	1.52	1.15	-24.3%
Glass & Ceramics	16	0.76	0.16	-78.9%
Education & Knowledge Creation	347	1.74	0.24	-86.2%
<i>Electrical Equipment, Appliance & Components</i>	10	1.81	0.02	-98.9%

Source: EMSI Complete Employment - 2011.2



The SCIRPDC region's "star" clusters as of 2010 are energy, forest and wood products, transportation and logistics, mining, agribusiness and manufacturing (total cluster). The primary metals sub-cluster also falls into this category. The mining cluster is very small, however.

Two clusters and one sub-cluster fall into the "mature" category. In the SCIRPDC region, these clusters include Chemicals, and the Printing and Publishing clusters, as well as the transportation equipment manufacturing sub-cluster. At times, clusters will fall into this status due to "life-cycle" effects. For example, a company offering a new product or service will likely go through a period where its product is in very high demand due to its novelty and relative scarcity. This is the "super-profit" period. Gradually, this high-demand period diminishes and smooths out and other companies join in the competition to sell the product. Prices even out and the industry becomes "mature." The cluster may go into decline and die after a while, as demand for its products and services dwindles because of changes in taste or technology. Life-cycle effects also apply to individual industries.

Nine clusters and four sub-clusters have location quotients less than 1.2, and fall into the lower right and left-hand quadrants of the bubble chart matrix. In the lower right-hand quadrant are found clusters with lower LQs (not big enough to be termed specialized, or concentrated) which nevertheless are increasing in size compared to the nation. These can be seen as "emerging" or at least potentially emerging clusters which may eventually become specialized in the region. In the SCIRPDC region, these clusters include the biomedical/biotechnical, advanced materials and apparel and textiles clusters, as well as the computer and electronic products and the fabricated metal products sub-clusters. Again, caution must be used in targeting emerging clusters based on changes in location quotients relative to the nation.

Finally, 6 clusters and 2 sub-clusters fall into the "transforming" category in the left-hand quadrant of the bubble chart. "Transforming," in this case, generally means that the cluster is in decline. In the SCIRPDC region these 6 transforming clusters are all high-level service-based clusters with the exception of glass and ceramics. The two sub-clusters are manufacturing clusters – machinery, and electrical equipment, appliances and components (for the purposes of the analysis, 10 jobs have been assumed to be left in this cluster, based on EMSI estimates).

Policies and strategies developed for clusters that fall into any of these four categories will obviously vary, depending not only upon the location quotient position but also upon several other indicators (Figure 24) as well as such not-so-easily measured factors as business, government and public support, sentiment and ideas.



4.5 Cluster Shift Share Analysis

Shift share analysis is a useful addition to location quotient analysis as it can help determine how much of regional job change can be attributed to national trends and how much is due to unique regional factors. The “Competitive Effect” column in Figure 23, which is equal to the difference between the “Expected Change” in employment based on industry and national trends and the total actual “Job Change” in the regional economy, is the focal point of the shift-share analysis. A positive “Competitive Effect” may indicate a unique competitive advantage for regional clusters. It is important to note that a cluster can lose jobs and still have a positive “Competitive Effect” if the loss is less than the “Expected Change.”

Three clusters and three sub-clusters had a positive competitive effect at the end of the study period. The energy cluster was by far the largest of these, followed by the forest and wood products and the transportation and logistics clusters. The region’s oil and natural gas assets, as well as its transportation infrastructure advantages have already been noted. The competitive advantage in the forest and wood products cluster seems to be driven by production of wood kitchen cabinets and countertops, butcher block and various types of wood furniture, as well as production of paints, coatings and abrasive products. Hardwoods are available in the region, for example, via selective logging in the Shawnee National Forest, and local sawmills process the wood. The forest and wood products cluster was the only cluster to lose employment and still post a positive competitive effect. Wood furniture manufacturing in the US has been impacted by competition from China in recent years, however the rise in the cost of fuel has made shipping costs more expensive and some regions (for example in Southern Indiana) have more recently been experiencing something of a revival.

Manufacturing sub-clusters having a positive competitive effect include computer and electronic products, fabricated metal products and primary metals. The location quotient analysis showed the enormous percent increase in the size of the computer and electronic products LQ during the study period, driven by the software reproducing sub-sector. Further investigation into the nature of this sub-sector might reveal possibilities for synergies with other clusters in the region, for example electronic publishing.



Figure 23: Industry Clusters Sorted by Competitive Effect, 2001-2010

Cluster Name	Job Change	Industry Mix Effect	National Growth Effect	Expected Change	Competitive Effect
Energy (Fossil & Renewable)	1,447	66	213	279	1,168
Computer & Electronic Products	313	-5	0	-5	317
Forest & Wood Products	-255	-593	85	-508	253
Fabricated Metal Products	100	-86	13	-73	173
Transportation & Logistics	71	-184	111	-73	144
Primary Metals	11	-74	8	-66	77
Mining	-32	-46	17	-29	-3
Apparel & Textiles	-246	-240	26	-214	-32
Glass & Ceramics	-115	-50	5	-45	-71
Advanced Materials	-698	-614	97	-517	-182
Machinery	-461	-282	38	-244	-217
Arts, Entertainment, Recreation & Visitor Industries	-110	44	65	109	-219
Agribusiness, Food Processing & Technology	-958	-1,032	317	-715	-243
Electrical Equipment, Appliance & Components	-434	-174	18	-156	-278
Manufacturing Supercluster	-1,846	-1,781	214	-1,567	-278
Defense & Security	-264	5	42	47	-311
Information Technology & Telecommunications	-588	-310	62	-248	-340
Transportation Equipment	-1,374	-1,137	137	-1,000	-374
Biomedical/Biotechnical (Life Sciences)	538	734	195	929	-391
Chemicals & Chemical Based Products	-1,100	-742	111	-631	-469
Business & Financial Services	-85	531	131	662	-747
Printing & Publishing	-2,525	-620	179	-441	-2,084
Education & Knowledge Creation	-1,979	384	97	481	-2,460

Source: EMSI Complete Employment - 2011.2

4.6 Cluster Selection and Prioritization

It has been noted (p.38) that several indicators should be considered when selecting the clusters upon which to build a regional strategy. Figure 24 shows several indicators that can be usefully considered together when selecting or targeting particular clusters in a regional economic development strategy.



Figure 24: Indicators for Selecting and Prioritizing Clusters

Cluster Name	2010 Cluster Jobs	% Change in Regional Employment	% Change in National Employment	2010 LQ	Percent Change in LQ	Competitive Effect	2011 EPW
<i>Transportation Equipment</i>	1,893	-42.0%	-31.0%	3.72	-5.8%	-374	\$69,510
Agribusiness, Food Processing & Technology	6,616	-13.0%	-9.0%	3.39	8.7%	-243	\$43,018
Mining	370	-8.0%	-7.0%	2.19	11.7%	-3	\$86,489
Chemicals & Chemical Based Products	1,563	-41.0%	-24.0%	2.00	-13.4%	-469	\$51,635
Energy (Fossil & Renewable)	6,526	28.0%	5.0%	1.90	36.7%	1,168	\$70,209
Forest & Wood Products	1,768	-13.0%	-25.0%	1.83	31.7%	253	\$44,875
Manufacturing Supercluster	3,256	-36.0%	-31.0%	1.57	4.0%	-278	\$61,950
Printing & Publishing	1,752	-59.0%	-10.0%	1.57	-48.7%	-2,084	\$43,112
Transportation & Logistics	2,732	3.0%	-3.0%	1.46	19.7%	144	\$51,359
Primary Metals	191	6.0%	-37.0%	1.44	89.5%	77	\$49,038
<i>Machinery</i>	446	-51.0%	-27.0%	1.15	-24.3%	-217	\$55,436
Biomedical/Biotechnical (Life Sciences)	5,184	12.0%	20.0%	1.03	5.1%	-391	\$34,516
Advanced Materials	1,627	-30.0%	-22.0%	0.89	2.3%	-182	\$74,092
Fabricated Metal Products	399	33.0%	-25.0%	0.83	97.6%	173	\$56,176
Apparel & Textiles	369	-40.0%	-35.0%	0.77	4.1%	-32	\$40,111
Computer & Electronic Products	324	2600.0%	-36.0%	0.76	3700.0%	317	\$43,031
Arts, Entertainment, Recreation & Visitor Industries	1,434	-7.0%	7.0%	0.56	-1.8%	-219	\$16,050
Business & Financial Services	3,044	-3.0%	21.0%	0.39	-9.3%	-747	\$32,755
Information Technology & Telecommunications	898	-40.0%	-17.0%	0.34	-19.0%	-340	\$46,019
Defense & Security	750	-26.0%	5.0%	0.28	-20.0%	-311	\$43,563
Education & Knowledge Creation	347	-85.0%	21.0%	0.24	-86.2%	-2,460	\$18,672
Glass & Ceramics	16	-88.0%	-34.0%	0.16	-78.9%	-71	\$35,800
<i>Electrical Equipment, Appliance & Components</i>	<10	-98.0%	-36.0%	0.02	-98.9%	-278	\$28,865

Source: EMSI Complete Employment - 2011.2

As shown in Figure 24, 4 major clusters and 3 sub-clusters have location quotients that are increasing over time: Energy, Forest and Wood Products, Transportation and Logistics, Biomed/Biotech and Primary Metals, Fabricated Metal Products and Computer and Electronic Products. All of these clusters and sub-clusters, with the exception of the biomed/biotech cluster have positive numbers in the competitive effect column; all, with the exception of the forest and wood products cluster have experienced positive growth in the study period. The sub-clusters currently have rather small numbers of employees, but they are growing; the major clusters are all fairly large, with employment ranging between 1,000 and 7,000. Their economic impact on the region is considerable. On the negative side, only two of the regional clusters are growing at the national level – energy and biomed/biotech. Regional economic development strategists will need to use careful judgment and possibly further research to determine if patterns of decline at the national level are likely to eventually affect regional clusters.



Section 5: Cluster Gap Analysis

5.1 Gap Analysis

The central “driver” (i.e. exporting) industries at the heart of every cluster need other industries to support and supply them. These other industries, which may be numerous, can be very diverse. Not all of them can be expected to be found located in a particular geographic region, which means that some services, materials or products will have to be imported into the region. Even if – for example – a supply industry *is* present, it may not be capable of filling regional demand completely and the supply industry itself may need to import goods and services to fill the *gaps* in the supply chain.

Additionally, while a supply industry in the region might actually be capable of supplying *all* of the regional demand from local companies that require its input, it may choose rather to exploit other markets and export its service or product out of the region – for example, if it can gain a better price externally. Conversely, other exporting businesses in the region may choose not to supply themselves from within-region businesses and industries, but prefer to import from other suppliers with whom they may have advantageous ties.

This trading pattern of simultaneously importing and exporting is normal and occurs continuously everywhere, however when the same good or service is constantly both imported and exported, the activity is called “cross hauling.” This concept of cross-hauling is important for regional planning because too much cross hauling can lead to inefficient trade patterns – for example, goods and services exported at cheaper prices than those charged within the region. It is, however, relatively difficult to measure interregional cross hauling activities without doing a trade survey. Regional scientists have also used the term “disconnect” to explain this phenomenon.⁹ While the term “gap” means a good or service is not present in the region, “disconnect” means goods and services are being imported even if they are available within the region. One of the strategies used to handle “disconnect” is import-substitution, which includes attracting needed cluster industries or businesses to locate in a region; assisting companies that *could* produce needed regional inputs to increase their capacity, or to add to the range of their products; and/or by assisting and supporting the establishment of new businesses to supply regional demand (i.e. fill the gaps).

Regional development requires increasing both export *capacity* and the *volume* of exports in regional cluster industries as well as strengthening and promoting growth in the support and supply industries so as to decrease their dependency on imports. At a very basic level, the overall

⁹ Steven Deller, http://nercrd.psu.edu/Industry_Targeting/ResearchPapersandSlides/IndCluster.DellerIMPLANSslides.pdf, accessed on November 30th, 2011.



aim is to reduce, as far as possible, the leakage of wealth out of the region that occurs when goods and services are purchased from outside, while at the same time increasing sales of the region's own goods and services to external customers (Figure 2, page 7).

While there is no way to compel any of a region's industries to purchase their inputs solely within the local region, the idea of *activating* the region's clusters by facilitating and encouraging the creation of intra- and inter-cluster networks can be a useful and productive strategy. Many cluster industries in many regions are in fact "unaware" that they are in fact part of a geographically located industry cluster. It may take special efforts to gather the major stakeholders – business and industry leaders, local and regional government, chambers of commerce and other interested parties – together to demonstrate the potential synergies of collaboration to increase cluster strength.

In many cases cluster self-awareness will not occur without facilitation by someone or some group that can be seen as "disinterested" and neutral. Many industries and businesses, for example, believe that sharing information weakens their own competitive advantages rather than providing opportunities for synergy and innovation, and they may be suspicious of any effort to get them talking with other competitor industries.

The gap analysis presented in this report examines six indicators (Figures 25-28) for each selected cluster:

1. Total requirements or demand in the region ;
2. Percent of regional demand that is satisfied from sources within the region;
3. Percent of regional demand that is satisfied from outside the region (i.e. proportion of demand satisfied by imports);
4. Exports (outside of the region) by industry;
5. Exports as a percentage of sales by industry;
6. Average value of exports per job.

The first three indicators are related to regional demand and capacity of the industry to fulfill the demand. The remaining three indicators are related to export potential. Industries that are not found in the region but whose products are needed may become candidates for recruiting or start-up. However, additional marketing studies will be needed to ascertain if the region can provide the appropriate conditions for candidate industries to grow and thrive.

This report uses EMSI's input-output framework to provide information on industries within a selected cluster with the highest regional demand and how much is fulfilled inside or outside the



region. This will provide some insights for industry targeting to strengthen the high performing industry clusters in the region.

In this analysis, the best industry “needs” for the energy, forest and wood products, transportation and logistics, and the biomedical/biotechnical clusters are compared to determine whether there are common needs between the clusters and if so, what synergies could be obtained for use in an economic development cluster strategy. This abbreviated gap analysis is given as an example of the type of insights that can be obtained through the use of this tool. It is appropriate to carry out a full gap analysis after clusters have been selected for targeting as part of a strategic planning process.

5.2 Energy Cluster Gap Analysis

Figure 25 shows the top ten industries in the energy cluster in terms of demand from within the region. Four of these industries

- NAICS 533110, Lessors of Nonfinancial Intangible Assets
- NAICS 212112, Bituminous Coal Underground Mining
- NAICS 212111, Bituminous Coal and Lignite Surface Mining; and
- NAICS 541330, Engineering Services

are not found in the region, therefore it must be assumed that regional needs for these products and services are being supplied by imports from outside. Amongst these industries, the Engineering Services sector might be a candidate for recruitment or start-up businesses: according to IBISWorld¹⁰ market report, revenues for engineering services declined during the recession but are expected to grow in the next five years, while there is only a medium barrier to entry into the market.

For the remaining six industries (Figure 25), regional needs are being supplied from within the region in varying degrees: at the top of the list are Natural Petroleum and Gas Extraction, Rail Transportation, Support Activities for Oil and Gas Operations and Petroleum Refineries. The first three of these industries are capable of supplying over 90% of regional demand. The Petroleum Refineries sector is capable of supplying 85% of regional demand, which is high but suggests a possibility for expansion.

Industries which are present in the region, but which are – for whatever reason - unable to fully meet regional demand include NAICS 551114, (Corporate, Subsidiary, and Regional Managing Offices industry), for which 89% of the regional demand is imported, and also NAICS 522110 (Commercial Banking) which imports 65% of services used in the region. The effect of this is

¹⁰ IBISWorld, <http://clients.ibisworld.com/launch.aspx?>



dollars leaking out of the regional system, but the region may be able to do little to stem the flow if most of the companies involved have their headquarters elsewhere (which is likely in both the oil and gas and banking industries, for example).

Exporting industries present in the region are good candidates for growth because they have the potential to bring outside dollars into the region. Candidate industries will have a high proportion of exports in total sales and high export value (dollars) per job. A simple rank-score¹¹ analysis is conducted for the six highest-value energy cluster industries present in the region, by using the following five variables - total regional demand; percent of total demand satisfied out of region; value of industry exports; exports as a percentage of total sales, and average value of exports per job.

These variables are ranked on two scales (together, i.e. either/or) “higher the better” or the “lower the better.” Only one variable, “percent of total demand satisfied from outside the region,” falls into the “lower the better” scale, the remaining four fall into the “higher the better” scale (Appendix C demonstrates the method) . The rank-score analysis is shown in the last column of each table.

Crude petroleum and natural gas extraction, followed by rail transportation and commercial banking are the top three ranked industries. All three are capital intensive industries with higher levels of regulation, since they are related to the areas of mining, freight, and banking. However, according to IBISWorld market reports the outlook for all the three industries is good in the coming years. These are export oriented industries as seen from the high exports (\$) per job indicator. While further market analysis may be needed to determine the feasibility of an industry in a region, the analysis presents a potential candidate group of target-industries for the energy cluster in the SCIRPDC region.

¹¹ Rank-score method ranks the values of the variables either in an ascending or descending order. It assumes that weights of the variables are the same.



Figure 25: Energy Cluster Gap Analysis

NAICS Code	Description	Total Regional Demand (\$'000)	% of Total Demand Satisfied in Region	% of Total Demand Satisfied from Outside the Region	Industry Exports (\$'000), 2011	Industry Exports as % of Total Industry Sales	Exports per Job (\$'000), 2011	Rank Order
211111	Crude Petroleum and Natural Gas Extraction	\$64,859	95%	5%	\$640,009	90%	\$157.1	1
533110	Lessors of Nonfinancial Intangible Assets (except Copyrighted Works)	\$25,050	0%	100%				
482110	Rail transportation	\$12,582	95%	5%	\$54,394	60%	\$174.9	2
213112	Support Activities for Oil and Gas Operations	\$11,564	91%	9%	\$2,340	9%	\$13.9	5
324110	Petroleum Refineries	\$11,553	85%	15%	\$8,364	7%	\$278.8	4
551114	Corporate, Subsidiary, and Regional Managing Offices	\$9,573	11%	89%	\$12,591	51%	\$44.5	6
522110	Commercial Banking	\$8,076	35%	65%	\$106,881	66%	\$157.6	3
212112	Bituminous Coal Underground Mining	\$7,731	0%	100%				
212111	Bituminous Coal and Lignite Surface Mining	\$6,775	0%	100%				
541330	Engineering Services	\$6,177	0%	100%				

Source: EMSI Complete Employment- 2011.



5.3 Forestry and Wood Products Cluster Gap Analysis

Figure 26 shows the top ten industries demanded regionally in the forestry and wood products cluster. Three industries,

(NAICS 533110), Lessors of Nonfinancial Intangible Assets
(NAICS 325211), Plastics material and Resin Manufacturing and
(NAICS 325131), Inorganic Dye and Pigment Manufacturing

are not available within the region. According to IBISWorld, plastics and resin manufacturing declined in tandem with US automotive manufacturing, and is currently recovering. Inorganic dye and pigment manufacturing is expected to perform comparatively better in future, however this industry comprises only about 1% of total chemical manufacturing. “Lessors of nonfinancial intangible assets” is a specialized service-oriented industry concentrated in major metropolitan areas. It includes franchise agreements, leasing, selling or licensing, without providing other services, oil royalty companies, oil royalty leasing and patent leasing, among others. This seems to provide a little more evidence that the oil and gas industries in the region may be externally controlled.

Of the remaining seven industries present in the region, the Rail Transportation, and Paint and Coating Manufacturing industries are capable of supplying more than 90% of regional demand. However, the paint and coating industries export about \$ 75 million, with the highest export dollars per job. This industry could be a candidate for growth, particularly for its export potential. Additionally, according to IBISWorld, after decline during the recession period, paint and coating manufacturing is expected to grow in the coming years. Another chemical industry, “All Other Basic Organic Chemical Manufacturing” is 98% supplied from outside the region. This is a broad industry group, but industries manufacturing organic dye and pigments could be candidates for recruiting.

The traditional forestry related industries such as Sawmills and Logging are importing a portion of their requirements with smaller amounts of exports. In the case of logging, 43% of regional demand is met by importing. Consequently, considering the forestry resources available in the region, this industry could be considered for growth and expansion. According to IBISWorld, sawmills and logging took a hit during the recession because of the decline in new housing construction. However, the outlook is for growth in future years with sawmills and wood production expected to have an annual growth of more than 7% nationally. Again, further national and regional market studies would be needed to determine feasibility of the new industries or expansion of existing industries.



Figure 26: Forestry and Wood Products Cluster Gap Analysis

NAICS Code	Description	Total Regional Demand (\$'000)	% Satisfied in Region	% Satisfied out of Region	Exports (\$'000), 2011	Exports as % of Sales	Exports (\$'000) /Job, 2011	Rank Order
551114	Corporate, Subsidiary, and Regional Managing Offices	\$9,094	11%	89%	\$12,591	50.7%	\$44.5	3
321113	Sawmills	\$7,404	81%	19%	\$1,598	15.3%	\$25.4	4
325211	Plastics Material and Resin Manufacturing	\$6,540	0%	100%	\$0	0.0%	\$0.0	
325199	All Other Basic Organic Chemical Manufacturing	\$4,856	2%	98%	\$20	5.0%	\$2.0	7
113310	Logging	\$4,753	57%	43%	\$144	5.0%	\$2.9	5
325510	Paint and Coating Manufacturing	\$4,221	92%	8%	\$75,093	87.7%	\$494.0	1
221210	Natural Gas Distribution	\$3,729	3%	97%	\$54	5.0%	\$5.4	6
325131	Inorganic Dye and Pigment Manufacturing	\$3,011	0%	100%	\$0	0.0%	\$0.0	
482110	Rail transportation	\$2,862	95%	5%	\$54,394	60.2%	\$174.9	2
533110	Lessors of Nonfinancial Intangible Assets (except Copyrighted Works)	\$2,720	0%	100%	\$0	0.0%	\$0.0	

Source: EMSI Complete Employment, 2011.2



5.4 Biomedical and Biotechnology Cluster Gap Analysis

Within the top ten industries with the highest regional demand for this cluster, only one industry “Pharmaceutical Preparation Manufacturing (NAICS 325412)” is related to the health sector. Administrative Management and General Management Consulting Services (NAICS 541611) is an example of the “disconnect” mentioned previously (p. 49). This industry is present in the region but all of the regional demand (100%) is being imported and at the same time existing regional industries are exporting. Another notable aspect of this cluster is that less than 40% of the regional demand is met internally for each of nine industries excluding pharmaceuticals manufacturing (NAICS 325412) and hence strategies for import substitution as a way to help lessen regional “leakage” are highly applicable in this cluster.

Five industries which include Lessors of Residential Buildings and Dwellings (NAICS 531110), Lessors of Nonresidential Buildings except mini-warehouses (NAICS 531120), Offices of Real Estate Agents and Brokers (NAICS 531210), Residential Property Managers (NAICS 531311), and Other Activities Related to Real Estate (NAICS 531390) – all services needed by the biomedical and biotechnical cluster – are also related to construction industries. These industries have been hit by the recent recession and decline of the property market (especially housing). However as the economy and jobs recover, the rental housing and rental commercial-space markets and related services are expected to come back. One industry which could be a likely candidate for growth is direct property, casualty and insurance carriers for which 73% of the demand is met outside the region. According to IBISWorld, this industry is also expected to grow from 2011 onwards, after declining during the recession. While this industry has high levels of competition which include insurance sold through the internet, it is relatively less capital intensive and does not have high barriers to entry. Pharmaceutical industries are also expected to grow in future years, but these are high capital intensive industries and limited regional demand (\$ 2.5 million) may be an insufficient incentive for investment.



Figure 27: Biomedical and Biotechnology Cluster Gap Analysis

NAICS Code	Description	Total Regional Demand (\$'000)	% Satisfied in Region	% Satisfied out of Region	Exports (\$'000), 2011	Exports as % of Sales	Exports (\$'000) /Job, 2011	Rank Order
551114	Corporate, Subsidiary, and Regional Managing Offices	\$8,499	11%	89%	\$12,591	50.71%	\$44.5	1
531110	Lessors of Residential Buildings and Dwellings	\$7,204	34%	66%	\$1,147	5.00%	\$4.3	3
531120	Lessors of Nonresidential Buildings (except Miniwarehouses)	\$6,900	35%	65%	\$1,129	5.00%	\$12.4	2
531210	Offices of Real Estate Agents and Brokers	\$6,313	35%	65%	\$1,046	5.00%	\$3.5	6
531311	Residential Property Managers	\$3,248	9%	91%	\$138	5.00%	\$3.9	9
561320	Temporary Help Services	\$3,179	26%	74%	\$1,156	19.19%	\$5.5	5
531390	Other Activities Related to Real Estate	\$3,122	38%	62%	\$575	5.00%	\$3.6	8
524126	Direct Property and Casualty Insurance Carriers	\$2,822	27%	73%	\$716	5.00%	\$11.9	7
541611	Administrative Management and General Management Consulting Services	\$2,690	0%	100%	\$6,657	98.87%	\$96.5	4
325412	Pharmaceutical Preparation Manufacturing	\$2,529	0%	100%	0	0		
Source: EMSI Complete Employment- 2011.2								



5.5 Transportation and Logistics Cluster Gap Analysis

In this cluster, all of the ten industries with the highest regional demand are present in the SCIRPDC region and five of these industries are directly related to transportation and logistics (petroleum refineries, courier and express delivery, general freight trucking, postal service, rail transportation and general warehousing and storage). For general freight trucking, rail transportation, and postal service, 95% of regional demand is met within the region, while the percentage of demand met in the region for couriers and express delivery is 70% and for warehousing and storage it is 67%.

The remaining five, which include

- (NAICS 324110) Petroleum Refineries,
- (NAICS 522110) Commercial Banking
- (NAICS 524126) Direct Property and Casualty Insurance Carriers
- (NAICS 551114) Corporate, Subsidiary, and Regional Managing Offices and
- (NAICS 561320) Temporary Help Services

are supporting industries to the transportation and logistics cluster.

General Freight Trucking, Long-distance, Truckload (NAICS 484121) is an industry with a medium level of capital intensity, low barriers to entry, and a medium level of regulations according to IBISWorld. This industry is expected to grow, and the SCIRPDC region has interstates and rail corridors passing through the area. Currently, this industry is exporting \$10 million (twice the regional demand outside of region) and could be a likely candidate for growth. Couriers and Express Delivery Services (NAICS 492110) is another industry where 30% of the demand is satisfied outside the region and existing regional industries could be encouraged to tap the unmet regional demand. This industry has a medium level of capital intensity, a low regulation level, and low barriers to entry. However the industry has major players, such as UPS and FedEx, which make competition levels high, so that growth strategies developed need to be more cautious. General Warehousing and Storage (NAICS 493110) could be encouraged to grow to tap the unmet 33% of regional demand. According to IBIS, this is a low capital intensive industry, with low entry barriers, and a lighter level of regulations. This industry is also expected to grow.

As shown in Figure 28, Rail Transportation (NAICS 482110) meets 95% of the regional demand while at the same time making \$ 54 million in exported services. This industry has exports of \$ 175,000 per job in the SCIRPDC region, which is quite high. Rail transportation has high barriers to entry as there are several major Class I railroads in USA, but in future this industry is expected to grow as rising fuel prices boost this industry as a competitor against truck transportation. It may be worthwhile to look into the feasibility of growth in the existing railroad network.



Figure 28: Transportation and Logistics Cluster Gap Analysis

NAICS Code	Description	Total Regional Demand (\$'000)	% Satisfied in Region	% Satisfied out of Region	Exports (\$'000), 2011	Exports as % of Sales	Exports (\$'000) /Job, 2011	Rank Order
324110	Petroleum Refineries	\$25,372	85%	15%	\$8,364	6.55%	\$278.8	3
492110	Couriers and Express Delivery Services	\$7,632	70%	30%	\$580	5.00%	\$3.4	7
484121	General Freight Trucking, Long-Distance, Truckload	\$5,292	95%	5%	\$10,989	23.14%	\$28.0	5
491110	Postal Service	\$4,808	95%	5%	\$15,406	41.58%	\$36.9	2
561320	Temporary Help Services	\$3,727	26%	74%	\$1,156	19.19%	\$5.5	8
524126	Direct Property and Casualty Insurance Carriers	\$3,079	27%	73%	\$716	5.00%	\$11.9	9
522110	Commercial Banking	\$2,931	35%	65%	\$106,881	65.62%	\$157.6	4
482110	Rail transportation	\$2,927	95%	5%	\$54,394	60.17%	\$174.9	1
493110	General Warehousing and Storage	\$2,623	67%	33%	\$637	5.00%	\$2.1	10
551114	Corporate, Subsidiary, and Regional Managing Offices	\$2,572	11%	89%	\$12,591	50.71%	\$44.5	6

Source: EMSI Complete Employment - 2011.2



Summary and Conclusions

This study has revealed four important major clusters and three sub-clusters with location quotients that are increasing over time:

MAJOR CLUSTERS	SUB-CLUSTERS
Energy	Primary Metals
Forest and Wood Products	Fabricated Metal Products
Transportation and Logistics	Computer and Electronic Products
Biomed/Biotech	

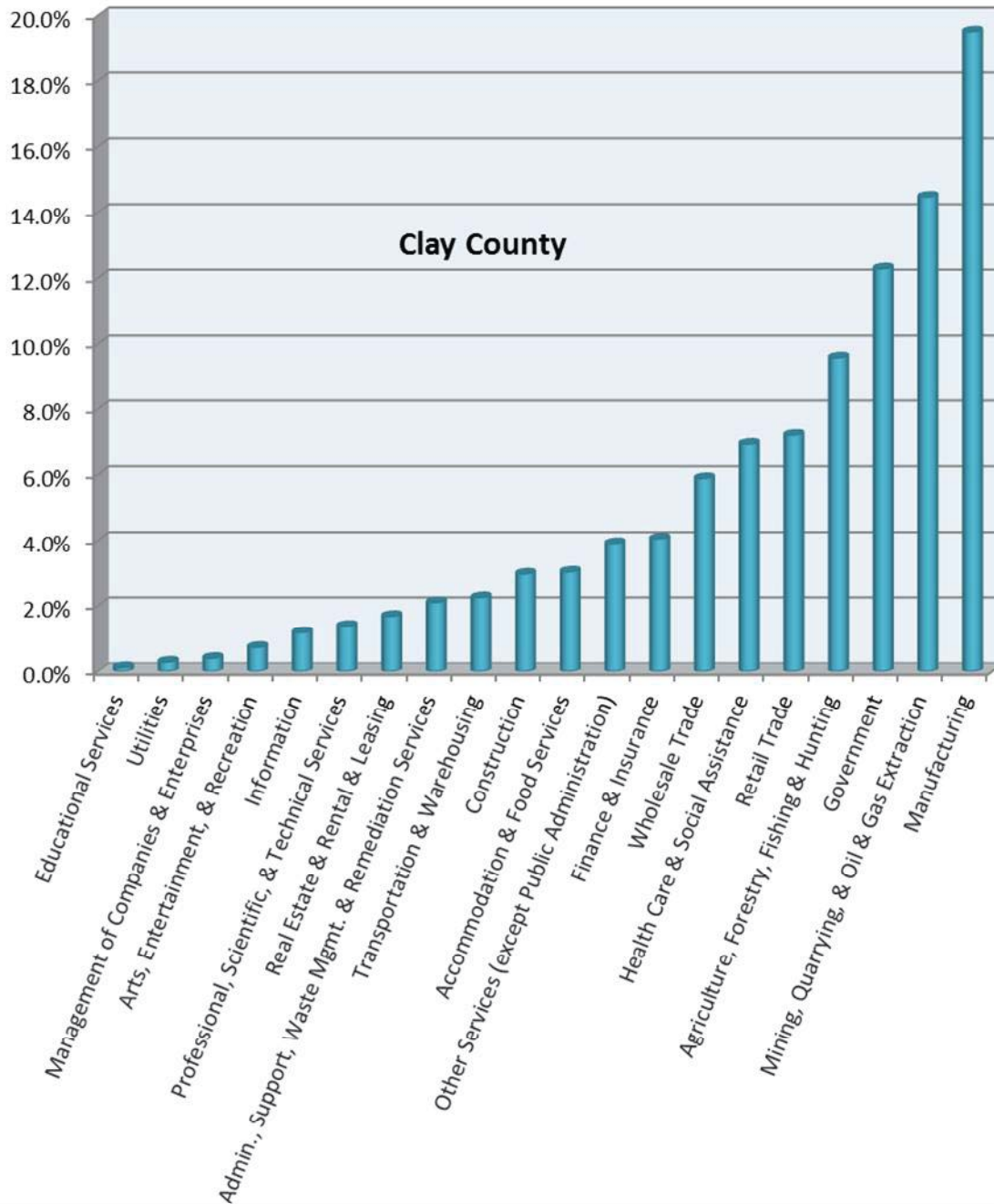
All of these clusters and sub-clusters, with the exception of the biomed/biotech cluster have a positive competitive effect result; all, with the exception of the forest and wood products cluster have experienced positive growth in the study period. The sub-clusters currently have rather small numbers of employees, but they are growing. The major clusters are all fairly large, with employment ranging between 1,000 and 7,000. Their economic impact on the region is considerable. On the negative side, only two of the regional clusters are growing at the national level – energy and biomed/biotech. Regional economic development strategists will need to use careful judgment and possibly further research to determine if patterns of decline at the national level are likely to eventually affect regional clusters.

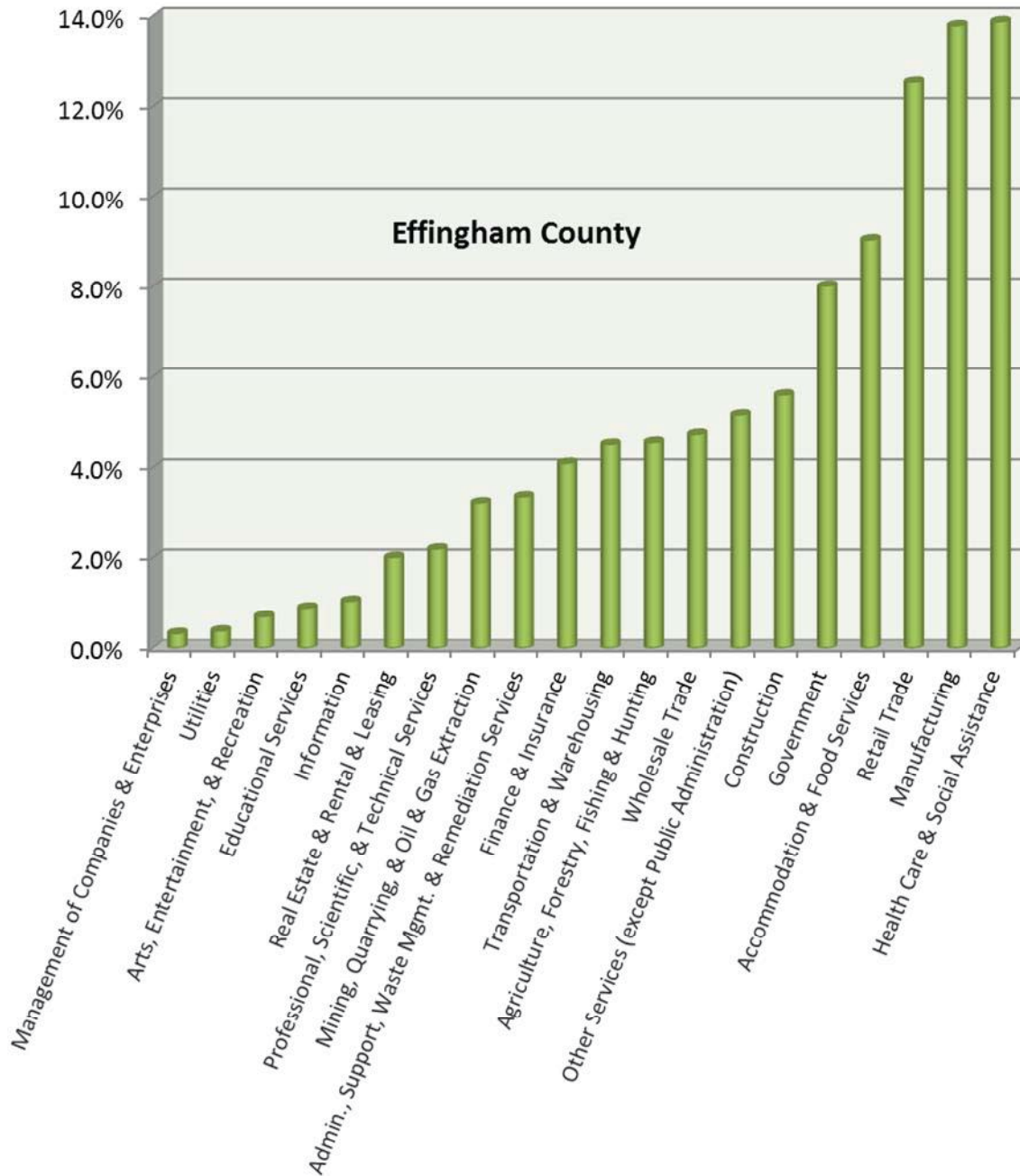
The cluster gap analysis of four selected clusters shows opportunities for expansion of exports in some of the top driver industries in the clusters, as well as opportunities for start-ups, attraction and growth in several of the cluster support industries. These opportunities are detailed in Section 5. One of the clearest findings of the cluster gap analysis is that all four of the selected clusters could likely do a better job of filling regional demand if the presence of several higher-level service industries could be increased or brought into the region. This could help to expand export opportunities too. Regarding the current “booming” state of the oil and gas industry in the region, strategists and policy-makers may wish to consider consultations for developing policies to retain more of the profits of these businesses in the region – especially since oil and gas are finite resources.

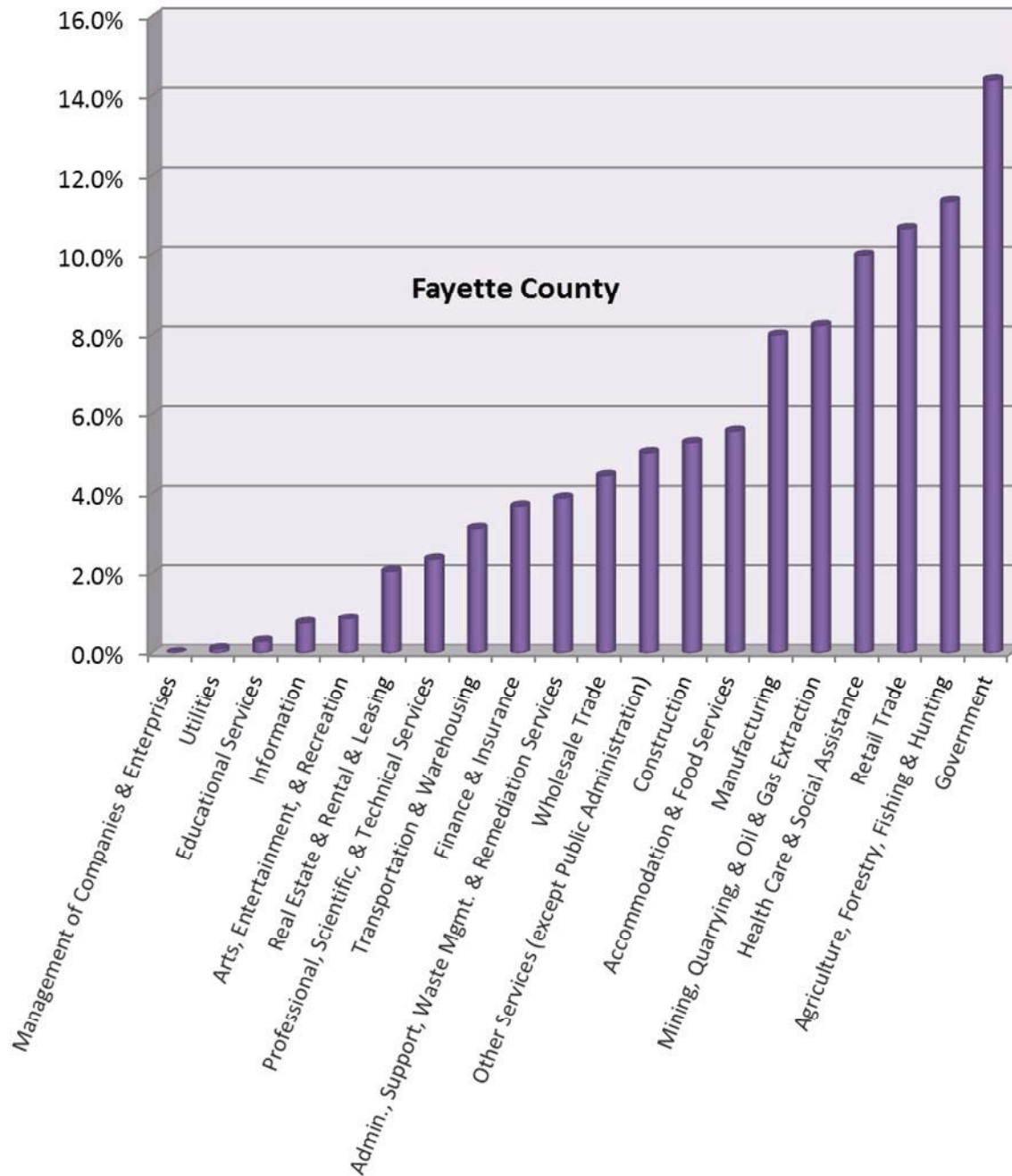
The SCIRPDC counties have considerable natural resource assets in the form of crude oil, natural gas, coal deposits, hardwood forests and agricultural land. Other important assets include a large and diverse transportation network (roads, railroads and airports) and proximity to several major metropolitan markets (St Louis, Chicago and Indianapolis). The region also lies within fairly close reach of several universities – however, regional development strategists may also want to consider boosting higher education capacity within the region itself.

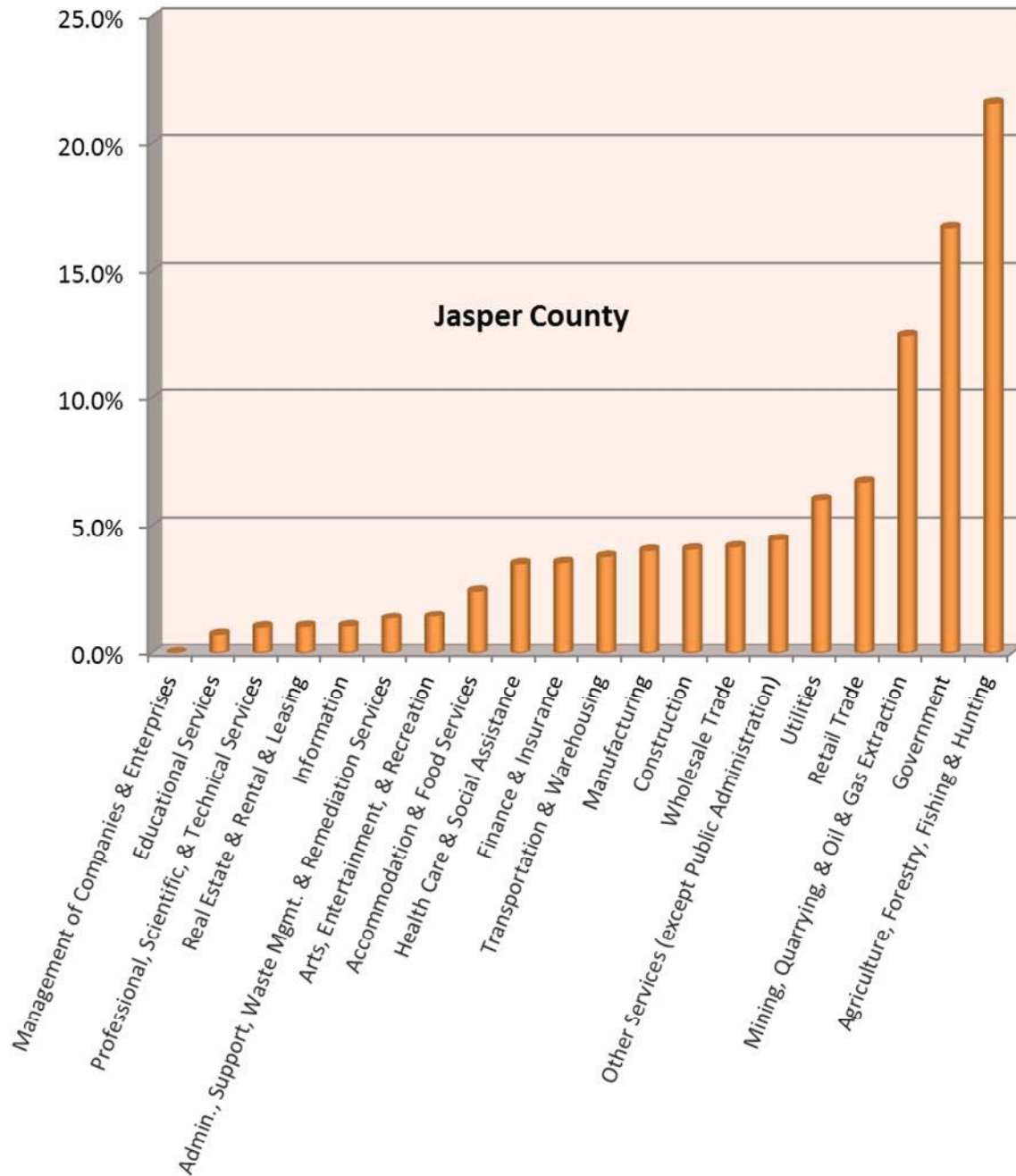


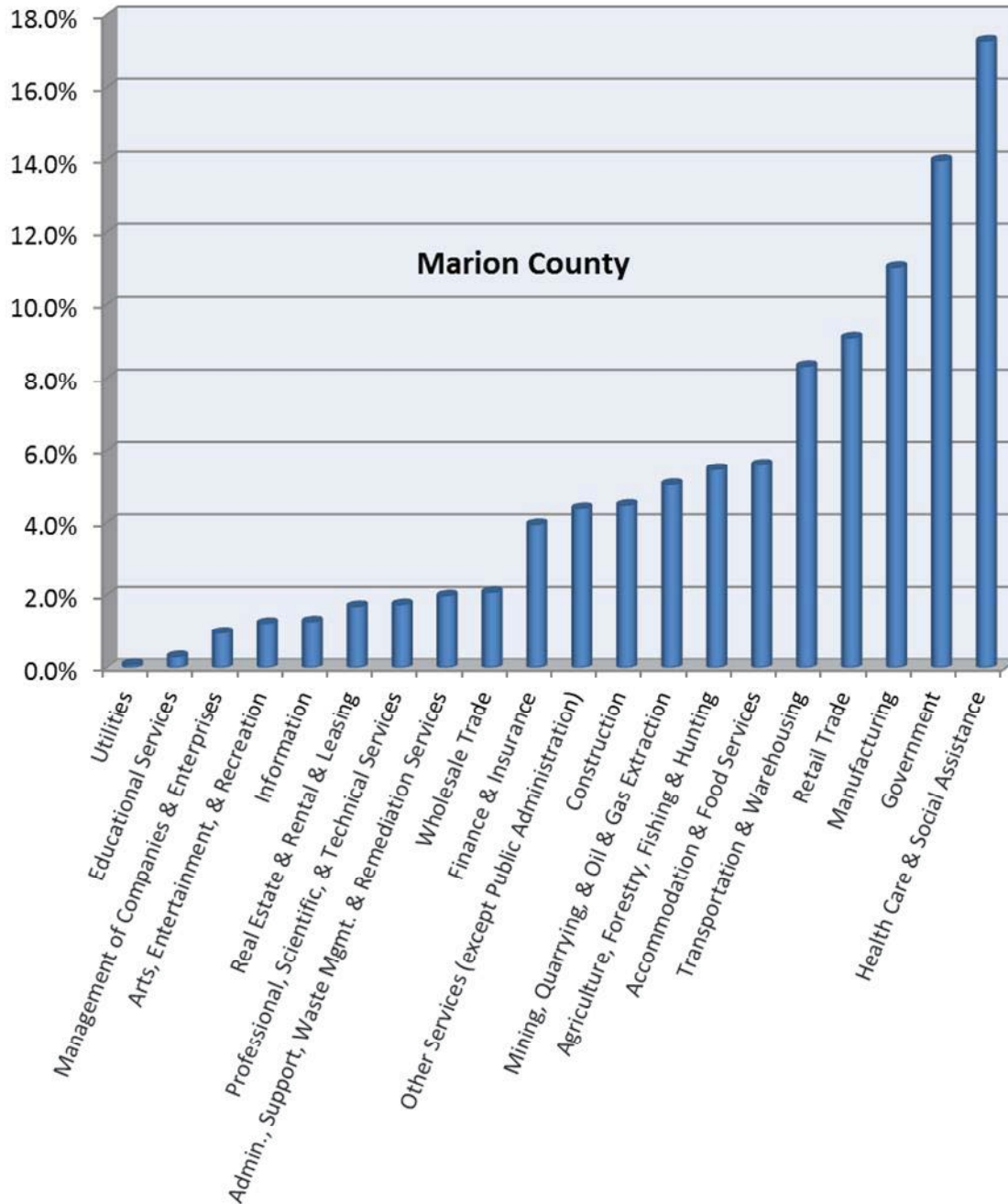
APPENDIX A: SCIRPDC Counties and Region 2010 Employment by NAICS Major Sector

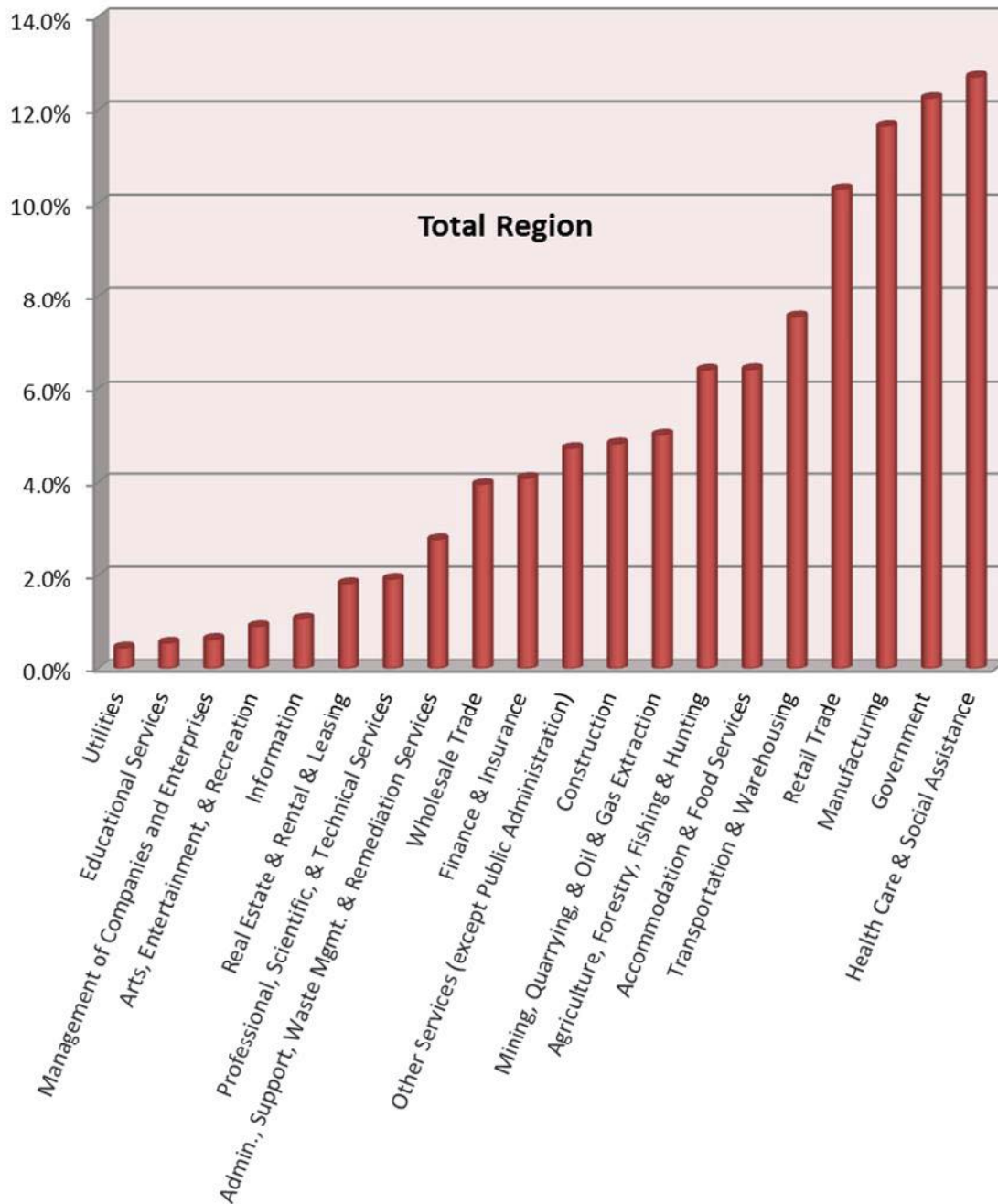














APPENDIX B: SCIRPDC Counties and Region 2010 Industry Cluster Employment Size and Concentration by County

The industry cluster bubble chart in this report identifies agribusiness, mining, energy, forest and wood products, transportation and logistics, and the manufacturing supercluster as “stars.” The primary metal subcluster within the manufacturing supercluster also falls into this category. “Star” industry clusters have location quotients of 1.2 or greater and the size of these LQs has increased between 2001 and 2010. Employment in these industry clusters has also increased between 2001-2010. These clusters are drivers of the regional economy.

Appendix D maps county level distribution of employment and LQs in all the industry clusters, including “star” clusters. Caution should be exercised, however, when speaking of “county level” clusters. It is rare (except in heavily populated metropolitan counties) that there is a critical mass of activities and jobs sufficient to sustain a full cluster at the county level. For that reason (critical mass) it is more usual to consider clusters at a regional level comprising several counties. County “clusters” therefore really describe smaller or larger concentration of jobs in a larger regional industry cluster.

All five counties of the SCIRPDC region are specialized in the agribusiness, food processing, and technology industry cluster, each having an LQ of 1.2 or more, as well as more than 10% of the total employment in each of the five counties. Almost every county in this cluster has crop and animal production, farming machinery and equipment wholesalers, farm supplies merchant wholesalers as dominant industries. Marion County has quite a few jobs in food product manufacturing (mayonnaise dressing & sauce) and food product machinery manufacturing as well.

The energy cluster is also specialized in all the five counties with an LQ of 1.2 or higher and more than 10% of total employment. In Marion County, IL, crude petroleum and natural gas extraction, oil and gas pipeline construction, etc. are leading industries in this cluster. Effingham County has quite a few jobs in residential and nonresidential contractors, gasoline stations, consulting and engineering services, and electric power generation in addition to crude petroleum and natural gas extraction jobs. In Clay County, crude petroleum and natural gas extraction is the leading industry sector with 1,065 out of 1,496 total jobs in this industry cluster.

In Marion County, the mining cluster is specialized with an LQ of 1.2 or more, however apart from some very small mining activities in stone, construction sand and gravel mining, and some support activities for these, there is no real mining industry as such. The major component of the mining cluster in Marion County is actually rail transportation, a necessary part of the cluster infrastructure, and this is the source of the high LQ.



Effingham, Marion, and Clay counties all have high LQs in the forest and wood products cluster. Effingham County has at least 10% of its total employment in this cluster. Leading industry sectors in this cluster in Effingham County are wood kitchen cabinet and countertop manufacturing, institutional furniture and wood office furniture manufacturing with more than two-thirds of cluster jobs. Marion County has paperboard and abrasive product manufacturing as the lead industry sectors. Clay County has paint and coating manufacturing as the largest industry sector.

Clay and Marion counties are specialized in the manufacturing supercluster, which also has 10% or higher share of total employment in those two counties. More than two thirds of jobs in this cluster in Clay County are in vehicular lighting equipment and other motor vehicle electrical and electronic equipment manufacturing sectors. Following the downward trend in automobile industry both the sectors had a decrease from 2001 to 2010; nevertheless they still retain high numbers of employment in 2010 in Clay County. Another industry sector with large employment is the aluminum rolling and drawing sector. Marion County has vehicular lighting equipment manufacturing as the leading industry sector with more than 50% of the cluster jobs. It also has a large amount of employment in various machinery manufacturing industry sectors, such as food products, pumping equipment, and machine shops.

Effingham and Marion counties are specialized with 1.2 or higher LQ in the transportation and logistics cluster as well. It is evident from the transportation infrastructure map (page 11) that both the counties have multimodal assets. Effingham in particular, has several intermodal transfer centers to transfer goods between different modes of transportation. These are logistics assets and there is high employment in general freight and trucking for local, long distance, and specialized freight. About 30% of jobs in this cluster are in the general warehousing and storage industry sector. Marion has a high number of jobs in the general freight and trucking industry sectors, but a high number of jobs are also present in rail transportation, support activities for rail transportation, as well as courier and express delivery services.

Clay and Jasper counties are specialized in the primary metals subcluster of the manufacturing supercluster. Similar to the manufacturing supercluster, the aluminum rolling and drawing sector is the lead industry sector in Clay County. This subcluster is part of the manufacturing supercluster and hence, the same industry sector can appear as leading sector in both, in the same county. In case of Jasper County, iron and steel pipe and tube manufacturing is the only industry sector in this cluster.

Within emerging clusters, biomedical/biotechnical and advanced materials have quite a high number of jobs in 2010 for the SCIRPDC region. At the county level, Marion County is specialized in the biomedical/biotechnical cluster in 2010. At the industry sector level, there are jobs in various sectors related to human health services, such as general medical and surgical hospitals, ambulance services, home health care, pharmaceuticals stores, medical laboratories,



kidney dialysis centers and mental health and substance abuse centers. In the SCIRPDC region this cluster does not have pharmaceutical, electro-medical and electro-therapeutic appliances, or surgical appliances manufacturing sectors.

Clay County is specialized in the advanced materials cluster. Paint and coating manufacturing, aluminum rolling and drawing, and other motor vehicle electrical and electronic equipment manufacturing are the sectors with a significant number of jobs. The other two sectors (excluding paint manufacturing) are also part of the manufacturing supercluster, as the clusters, by definition, overlap with each other and the same industry sector may be dominant in more than one cluster.

Within mature clusters, the chemical and chemical-based products cluster observed a large decrease in employment between 2001 and 2010, although it has a high LQ. At a county level, four counties, Fayette, Marion, Clay, and Jasper, are specialized in this cluster. In Fayette County, plastic bottle manufacturing is the leading industry sector whereas Marion has plastic plumbing, abrasive products and other concrete product manufacturing as the leading industry sectors. Clay County has paint and coating manufacturing, chemical and allied product wholesalers, and petroleum and petroleum products merchant wholesaling as the leading industry sectors. For Jasper County, petroleum and petroleum products merchant wholesaling is the leading industry sector.

The county maps in Appendix D show LQs and percent share of employment only for the year 2010, hence they represent a snapshot of the industry clusters and not past trends or future projections.



APPENDIX C: Gap Analysis Rank-Score Analysis Methodology

The five variables included in the rank-score analysis are: Total Regional Demand (\$'000); % of Total Demand Satisfied from Outside the Region; Industry Exports (\$'000); Industry Exports as % of Total Industry Sales; and Exports per Job (\$'000). The variables are ranked on two scales. Either they are the “higher the better” or the “lower the better” and each are counted equally. The rank score for the Energy cluster is used to provide an example of the methodology for ranking.

Only one variable, “% of total demand satisfied from outside the region,” falls into the “lower the better” scale. The remaining four variables fall into the “higher the better” scale. For example, “total regional demand (\$'000)” for crude petroleum and natural gas extraction is the highest and hence it receives score “1”. In case of “% of total demand satisfied from outside of region”, it has the lowest value of 5% and hence it receives score “1”.

The scores of all the five variables are added to get a total score. The total score is ranked in ascending order with industry having the lowest total score getting rank “1” and so on. Since this method uses export variables, only the industries present in the region are included in the analysis. In case of the energy cluster, the analysis is done for seven industries because bituminous coal underground mining (NAICS 212112); bituminous coal and lignite surface mining (NAICS 212111); and engineering services (NAICS 541330) are not present in the region. Figure 29 (p.64) shows the rank-score analysis for the energy cluster.



Figure 29: Rank-score Analysis of Energy Cluster

NAICS Code	Description	Total Regional Demand (\$'000)	% of Total Demand Satisfied out of Region	Industry Exports (\$'000), 2011	Industry Exports as % of Total Sales	Exports per Job (\$'000), 2011	Rank (export variables); {sum of columns E, F, and G}	Total Rank {sum of columns C, D, and H}	Rank Order
211111	Crude Petroleum and Natural Gas Extraction	1	1	1	1	4	6	8	1
482110	Rail transportation	2	1	3	3	2	8	11	2
522110	Commercial Banking	6	5	2	2	3	7	18	3
324110	Petroleum Refineries	4	4	5	6	1	12	20	4
213112	Support Activities for Oil and Gas Operations	3	3	6	5	6	17	23	5
551114	Corporate, Subsidiary, and Regional Managing Offices	5	6	4	4	5	13	24	6

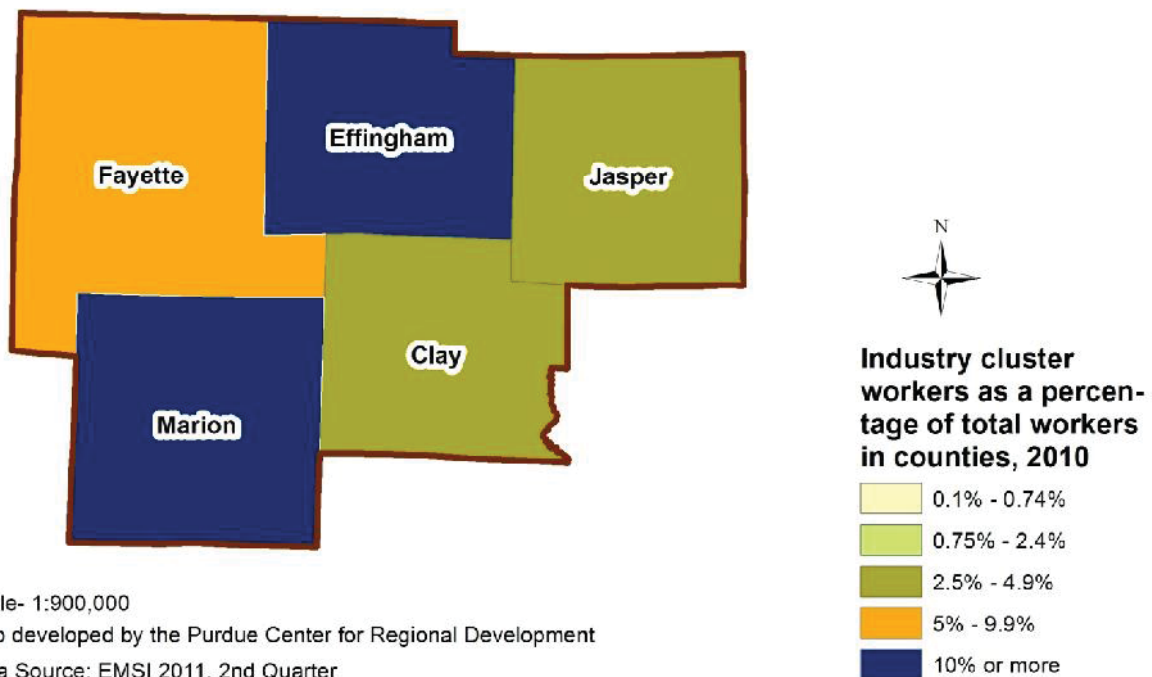
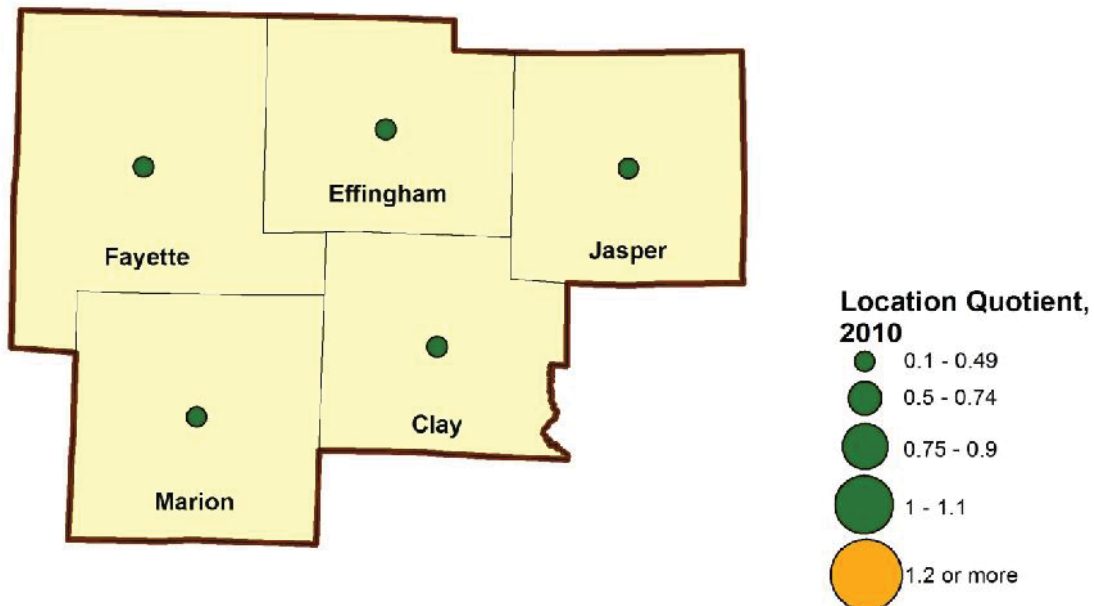


Appendix D: County Industry Cluster Maps

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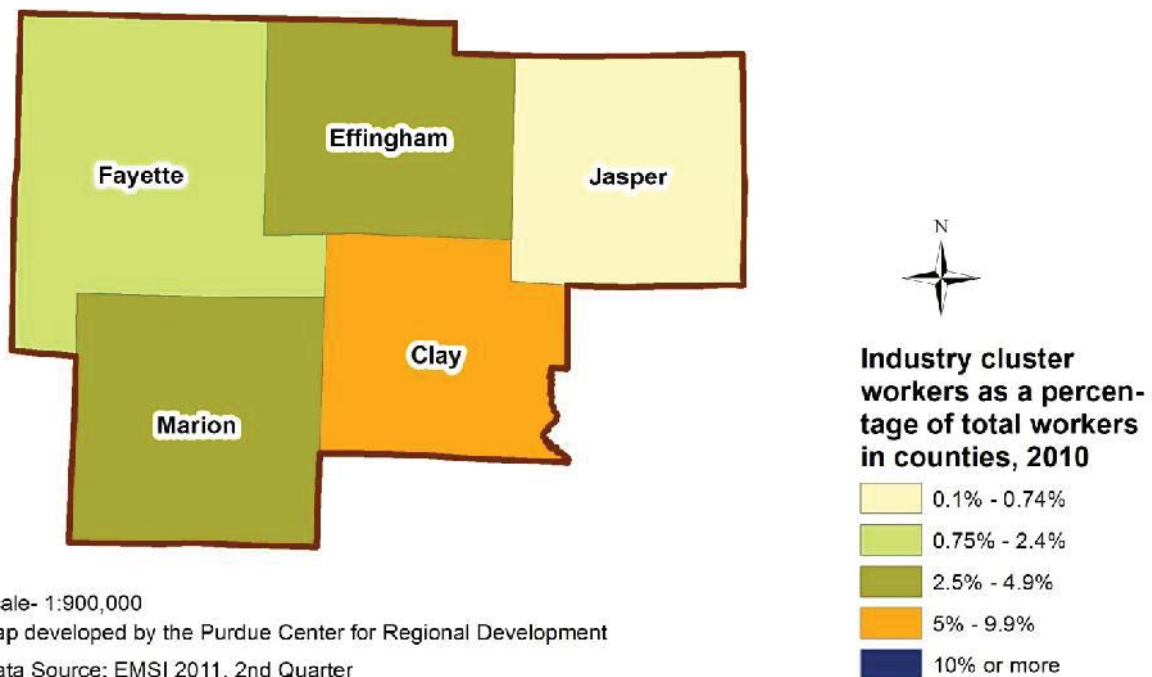
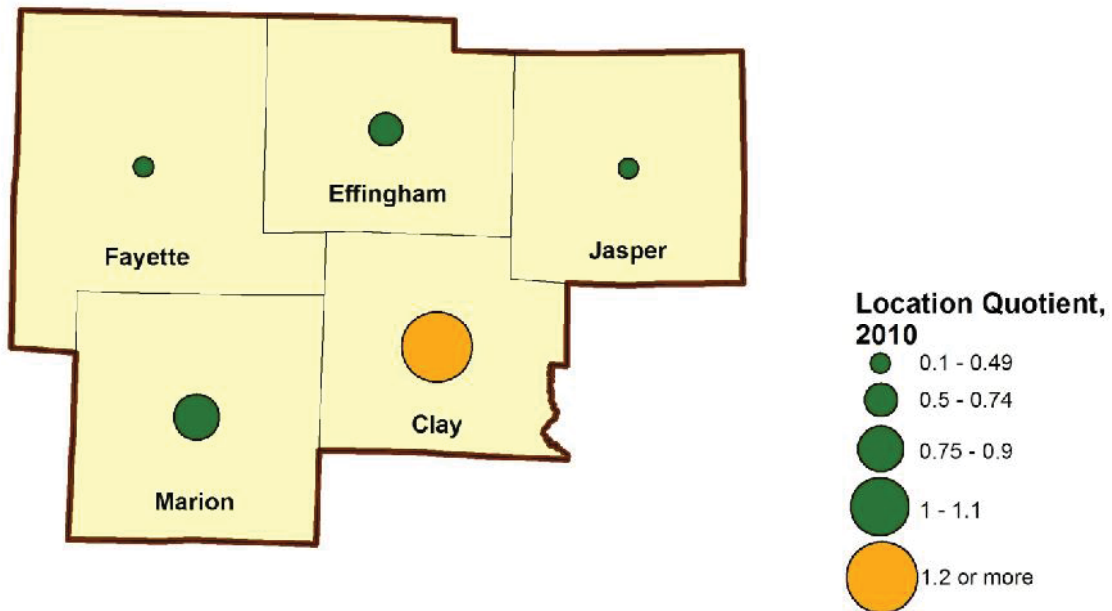
South Central Illinois Regional Planning and Development Commission, Industry Clusters, 2010

Business and Financial Services



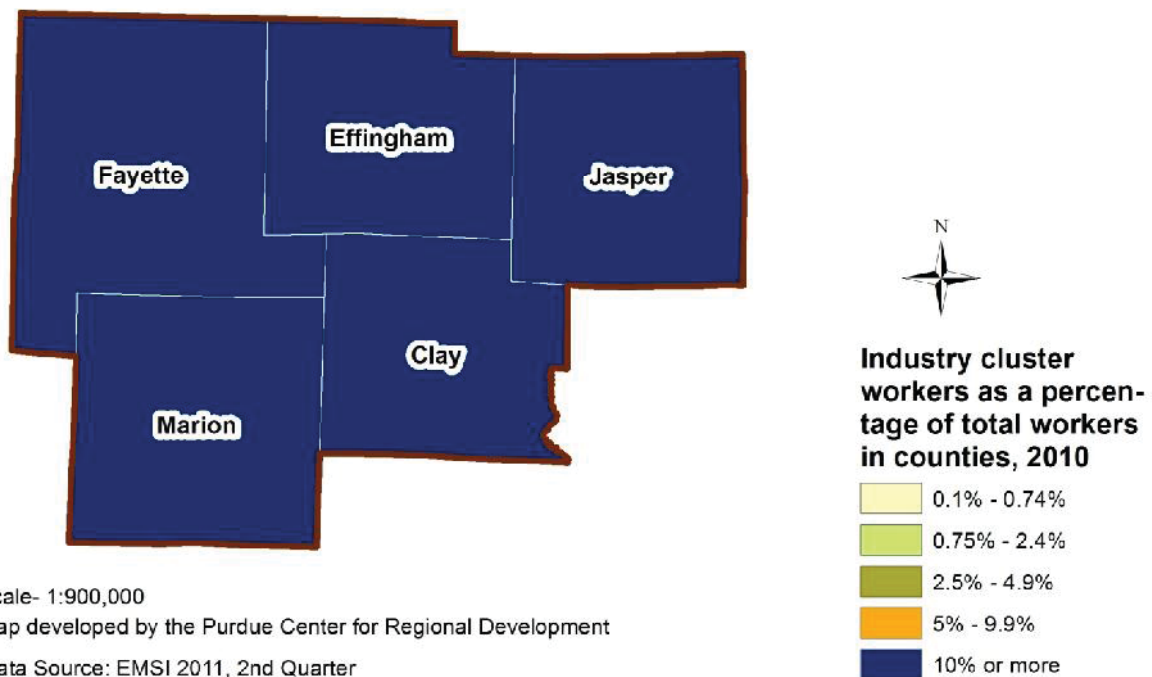
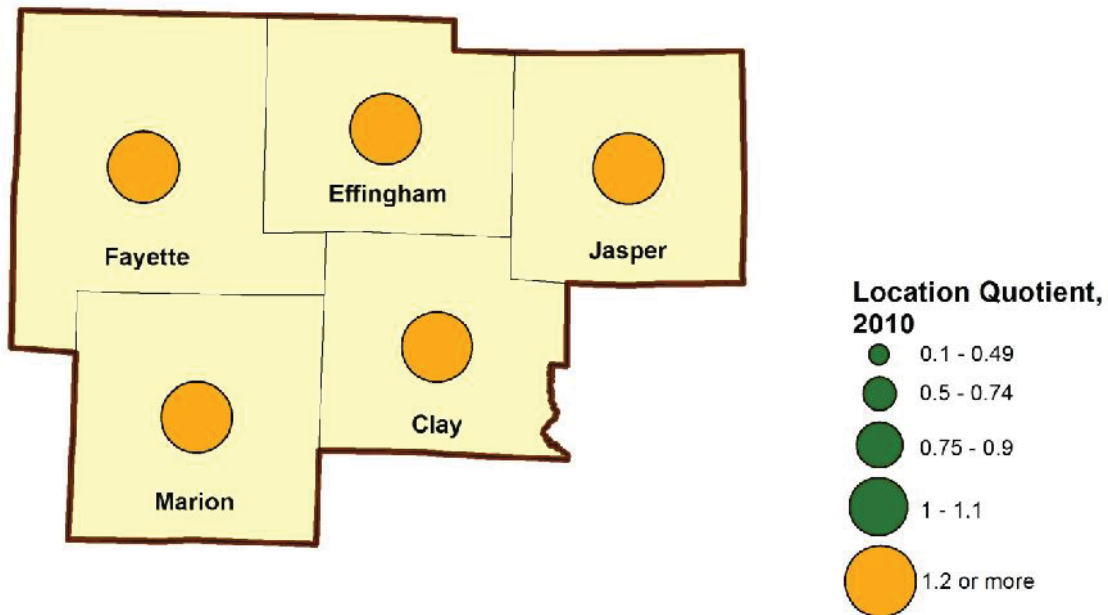
South Central Illinois Regional Planning and Development Commission, Industry Clusters, 2010

Advanced Materials

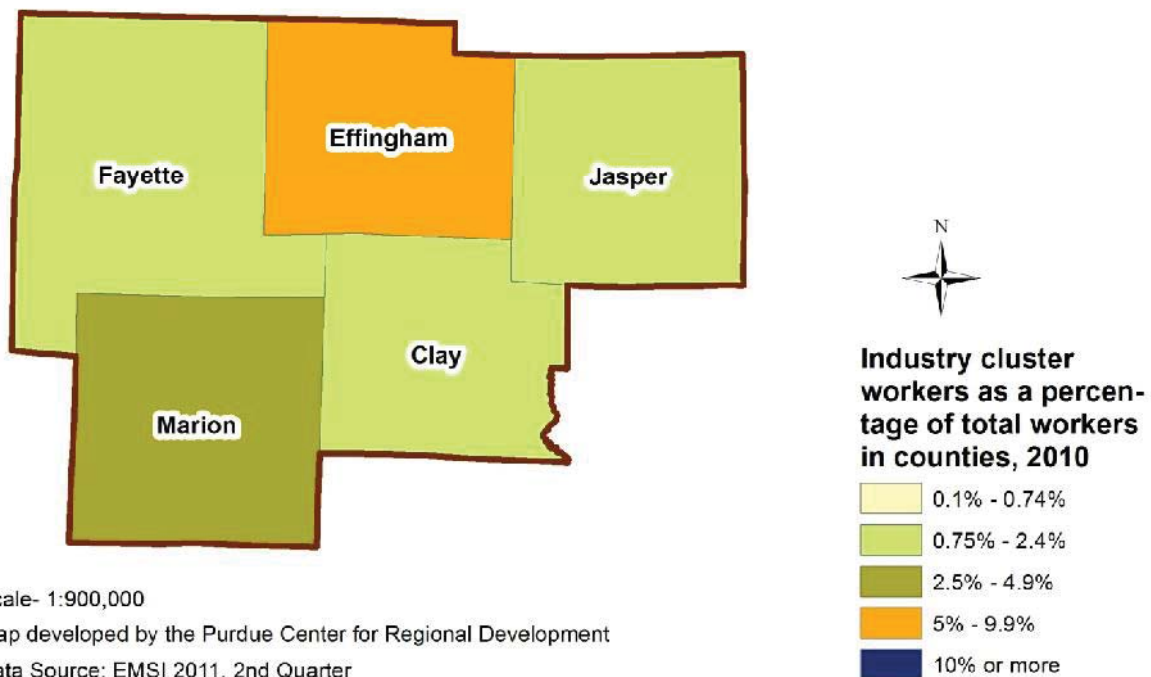
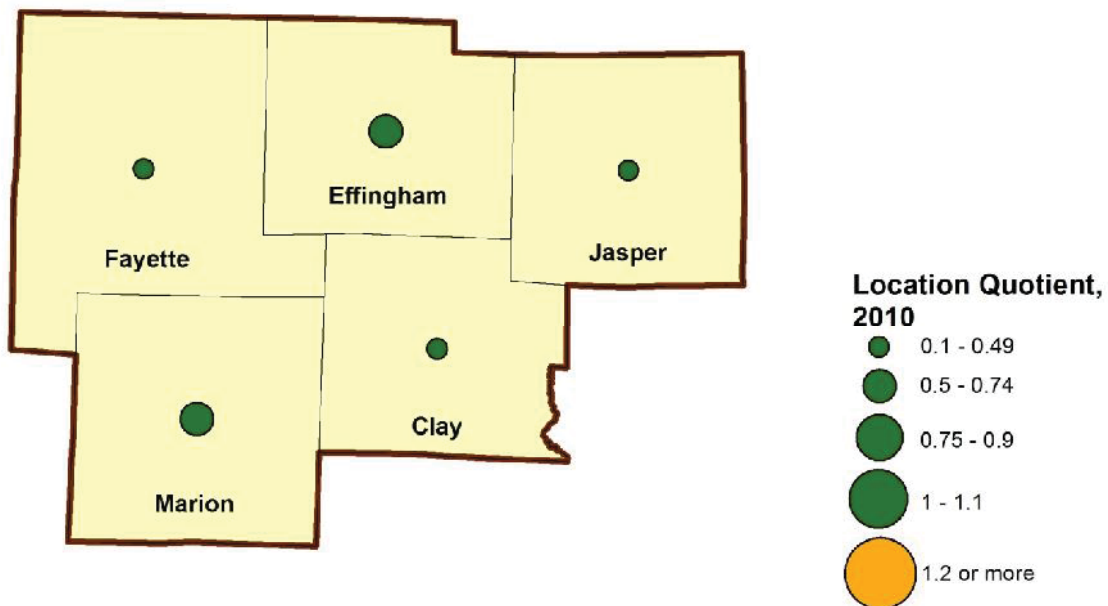


South Central Illinois Regional Planning and Development Commission, Industry Clusters, 2010

Agribusiness, Food Processing and Technology

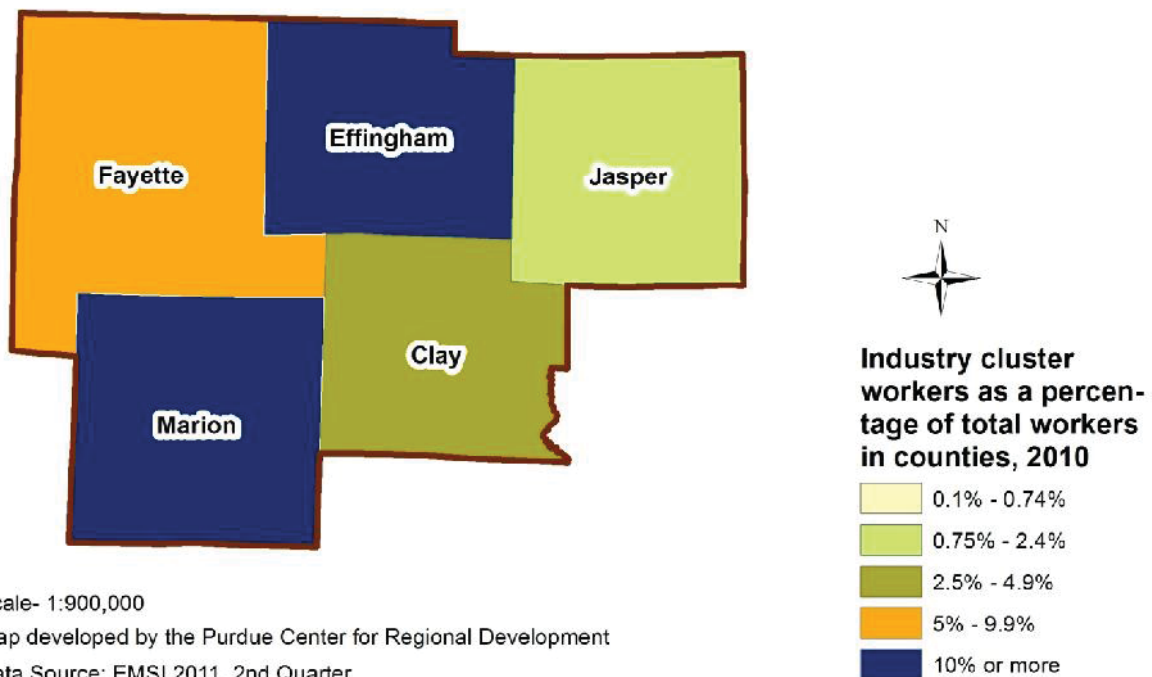
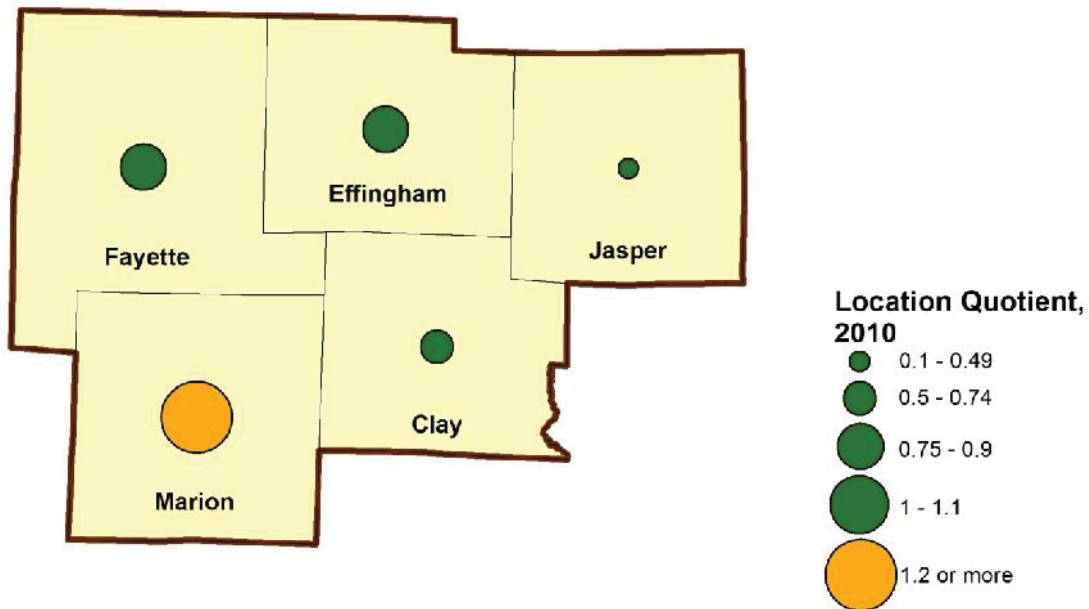


South Central Illinois Regional Planning and Development Commission, Industry Clusters, 2010 Arts, Entertainment, Recreation and Visitor Industries



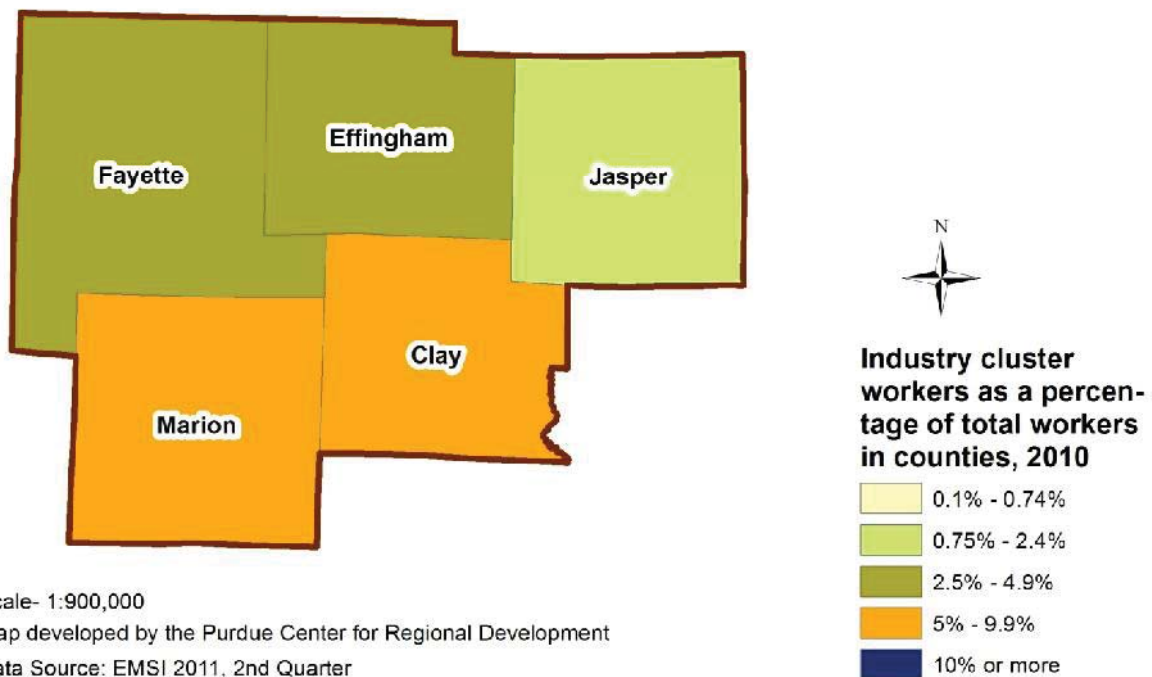
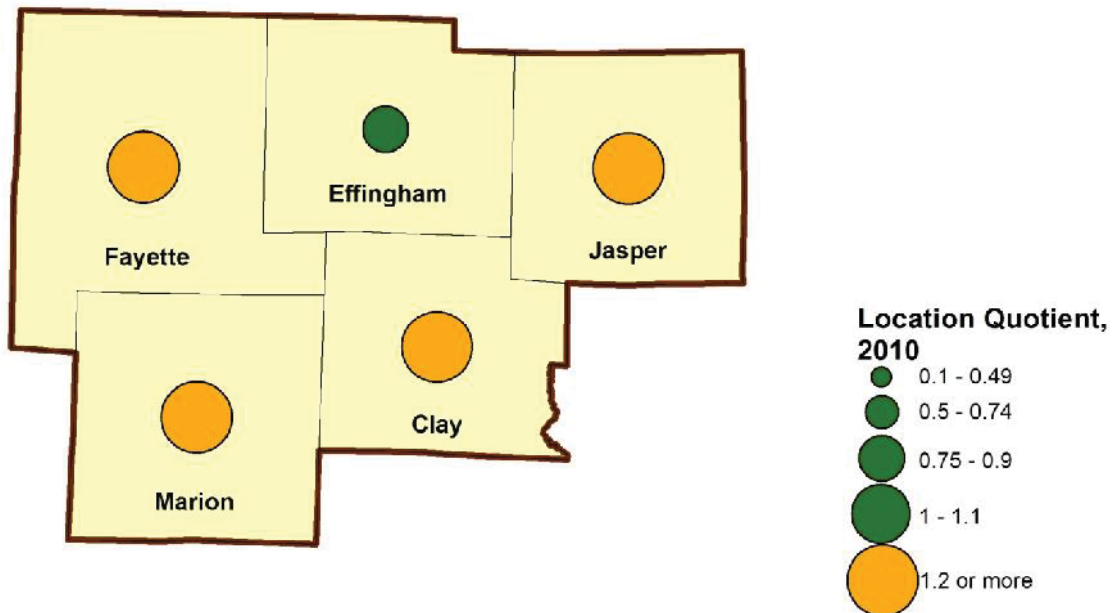
South Central Illinois Regional Planning and Development Commission, Industry Clusters, 2010

Biomedical/Biotechnical (Life Sciences)



South Central Illinois Regional Planning and Development Commission, Industry Clusters, 2010

Chemicals and Chemical Based Products



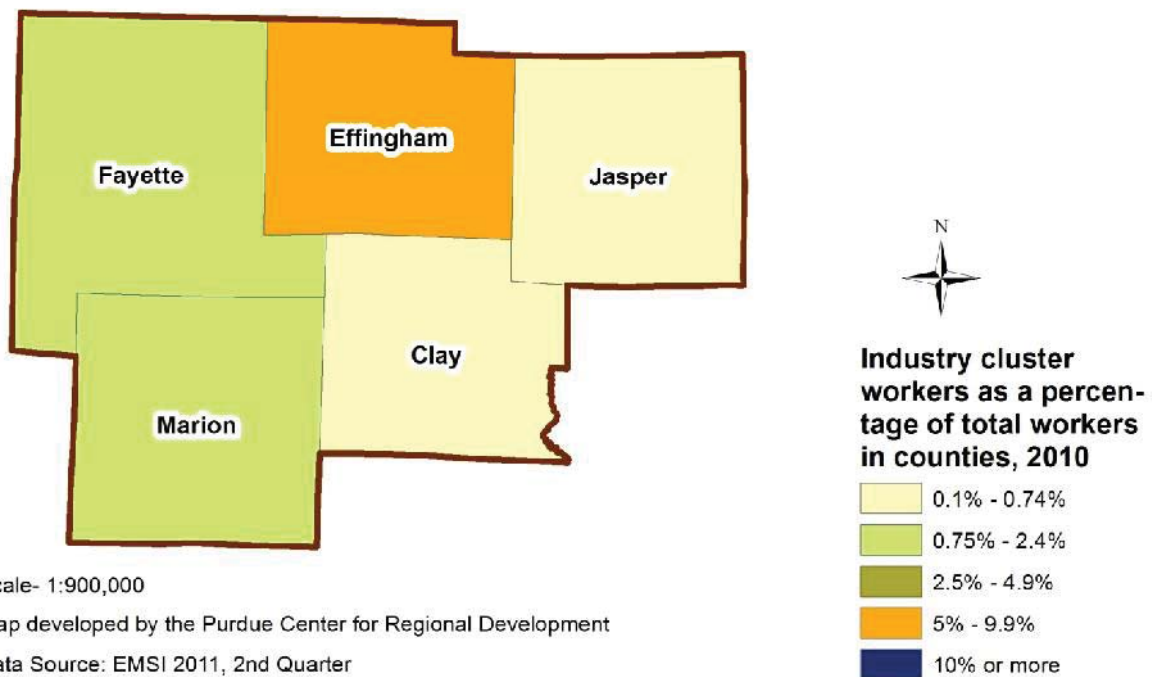
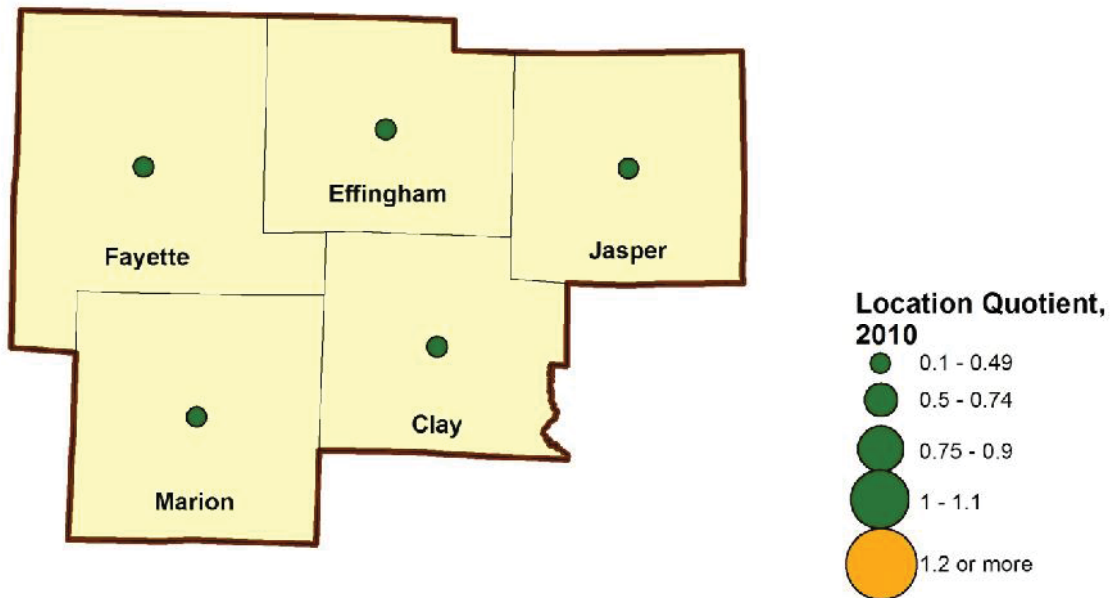
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Map developed by the Purdue Center for Regional Development

Data Source: EMSI 2011, 2nd Quarter

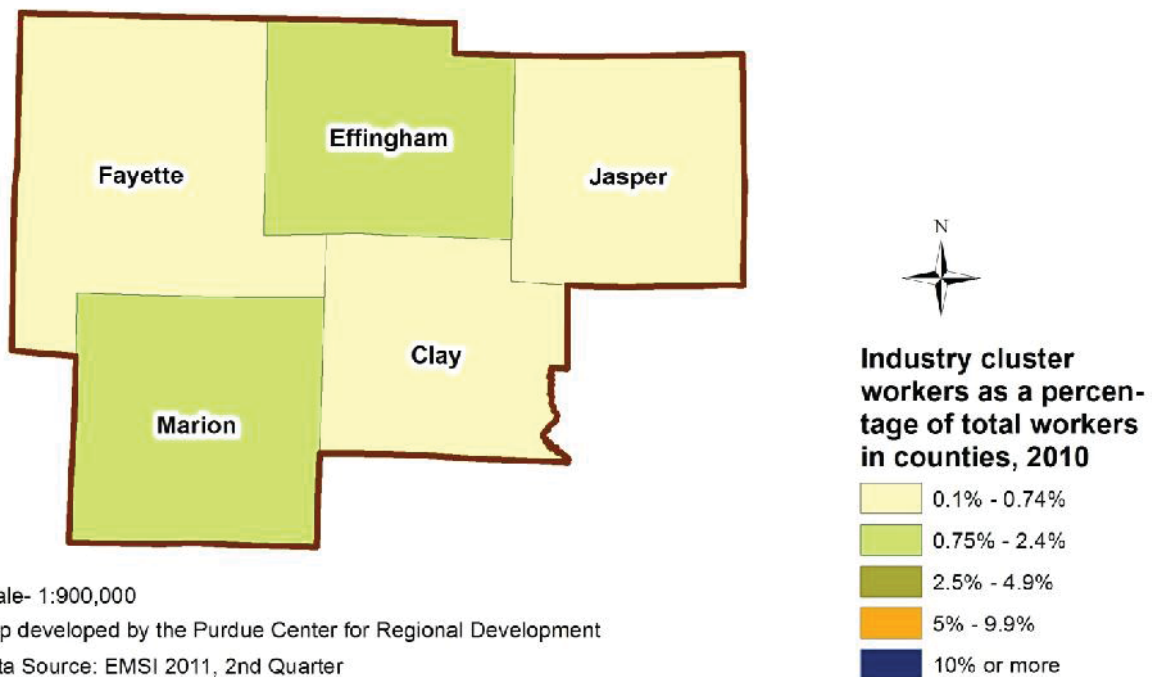
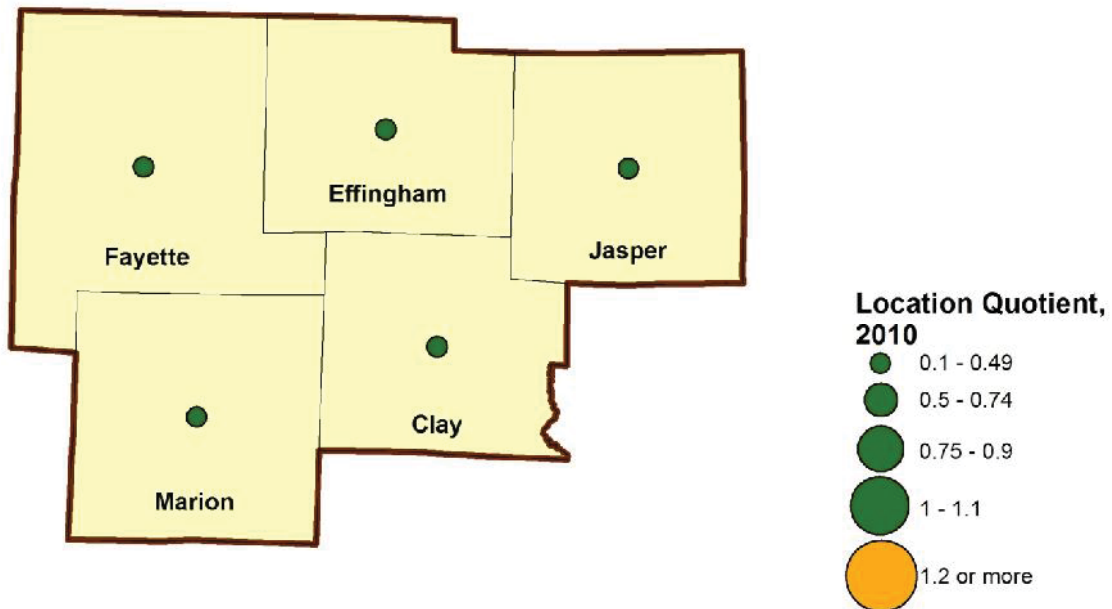
South Central Illinois Regional Planning and Development Commission, Industry Clusters, 2010

Defense and Security



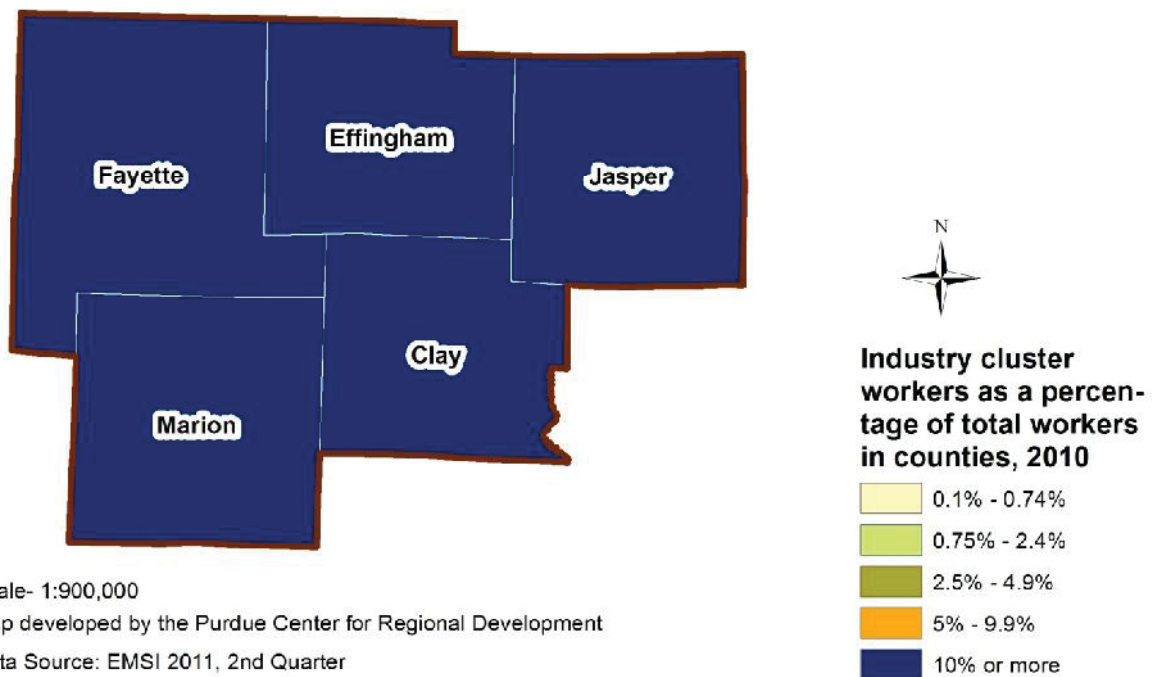
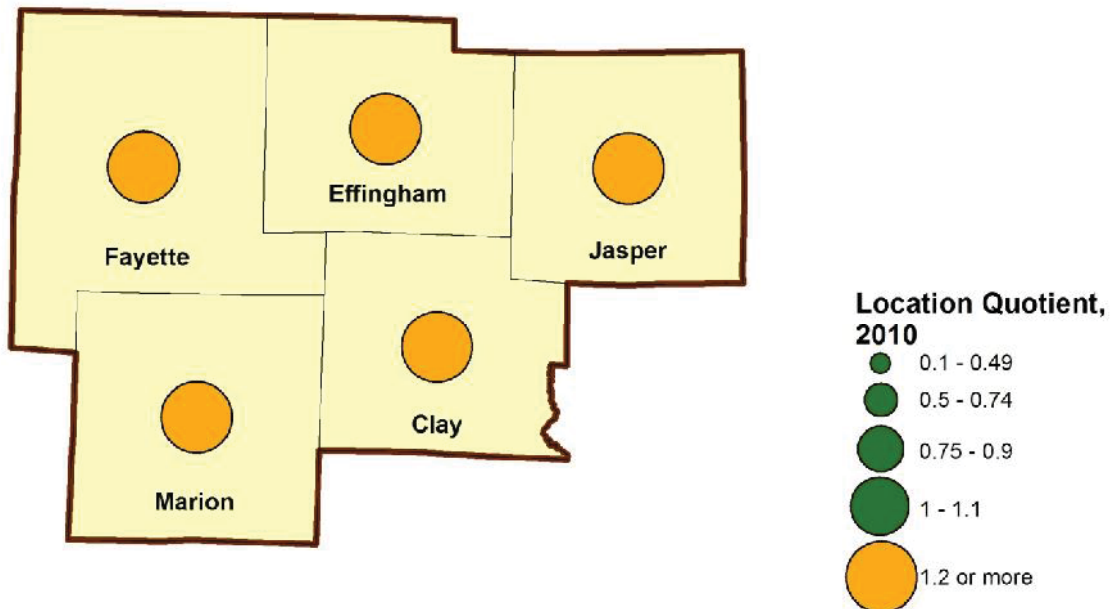
South Central Illinois Regional Planning and Development Commission, Industry Clusters, 2010

Education and Knowledge Creation



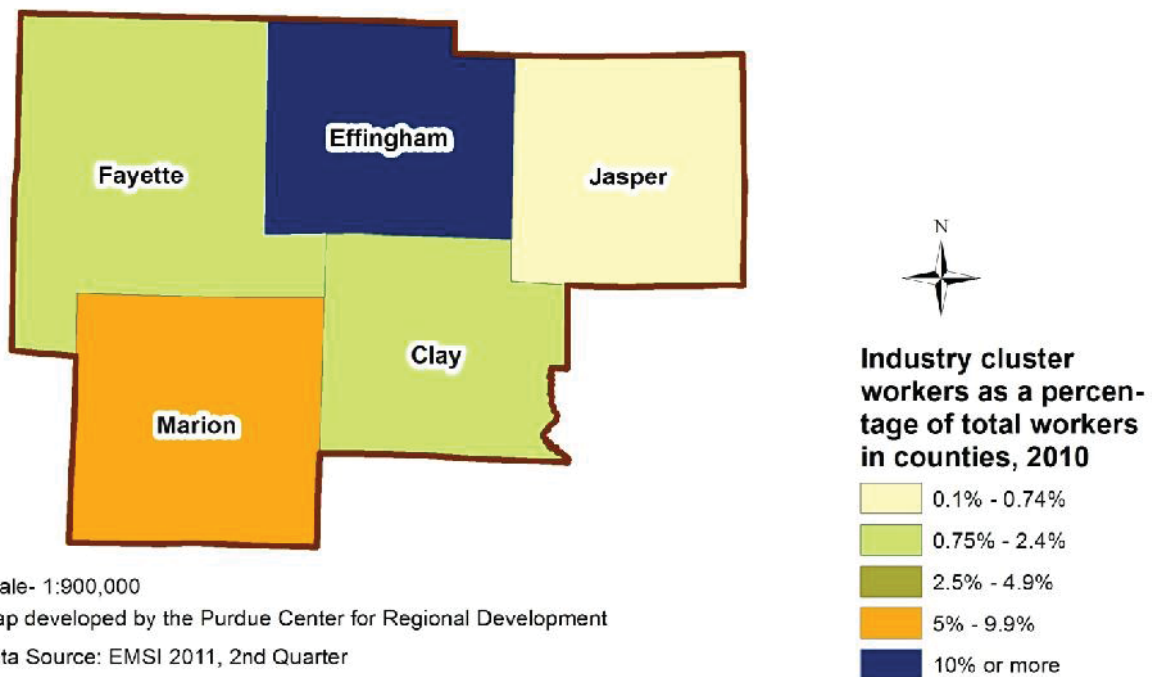
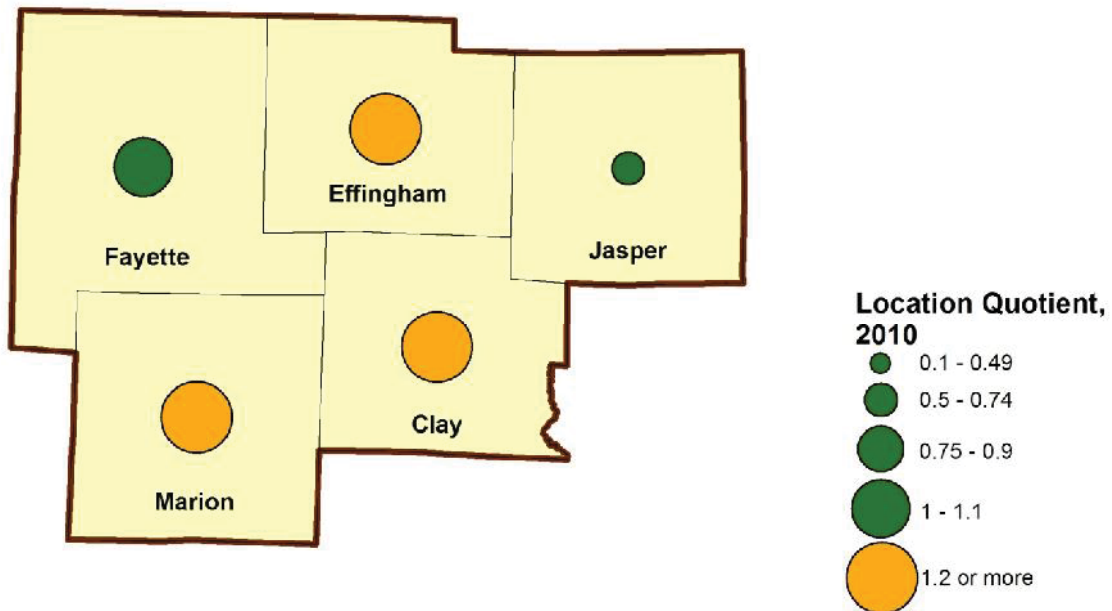
South Central Illinois Regional Planning and Development Commission, Industry Clusters, 2010

Energy (Fossil and Renewable)



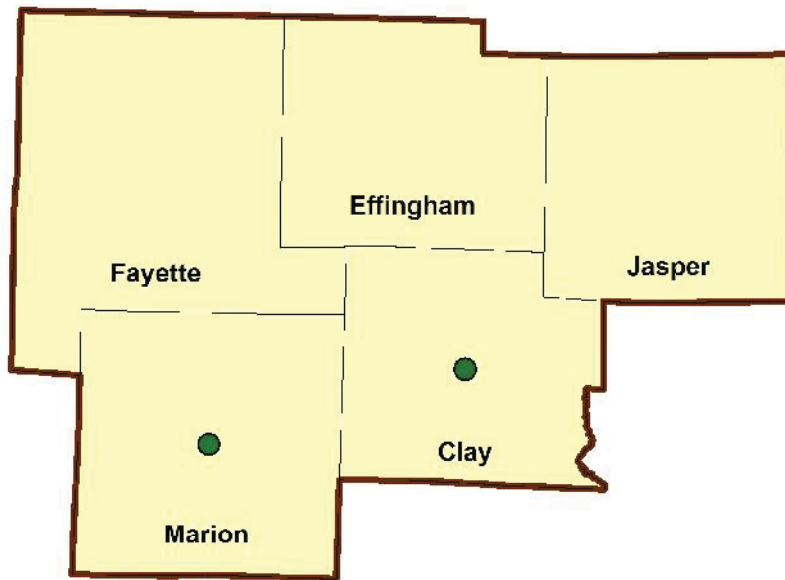
South Central Illinois Regional Planning and Development Commission, Industry Clusters, 2010

Forest and Wood Products

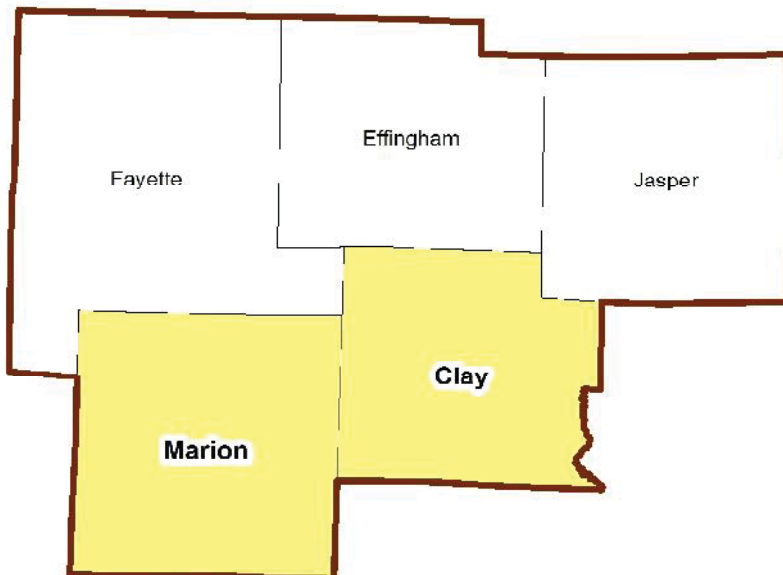
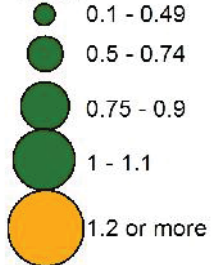


South Central Illinois Regional Planning and Development Commission, Industry Clusters, 2010

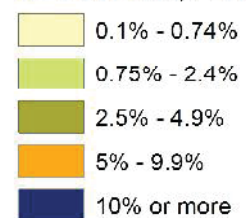
Glass and Ceramics



Location Quotient, 2010



Industry cluster workers as a percentage of total workers in counties, 2010

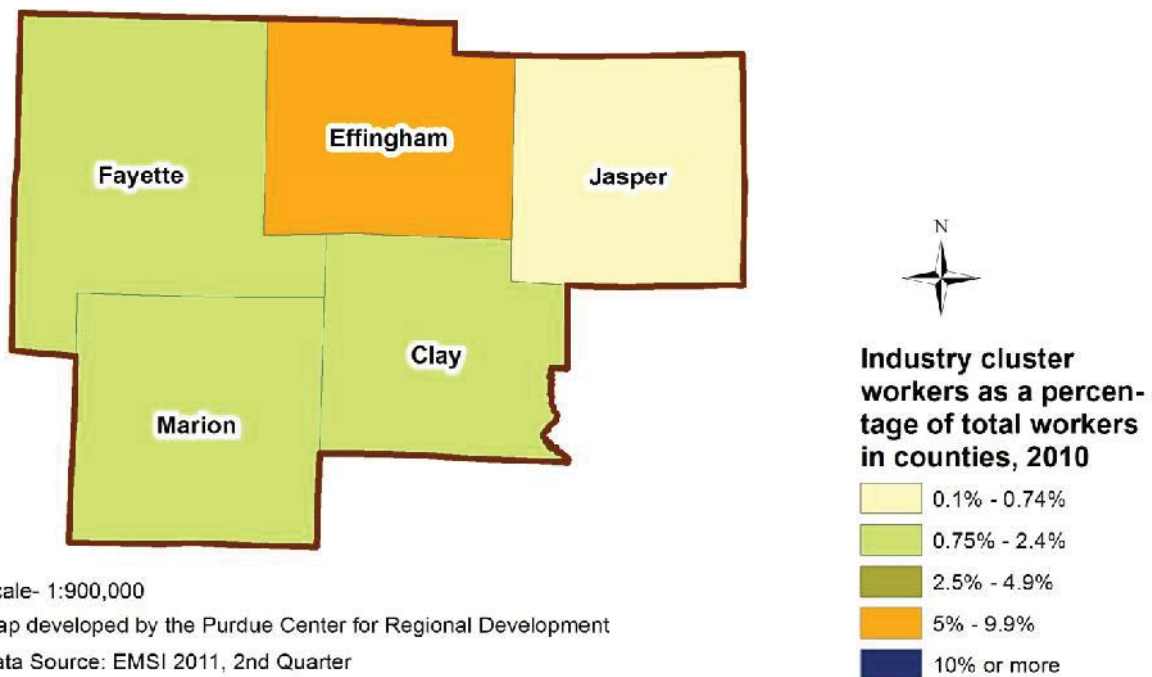
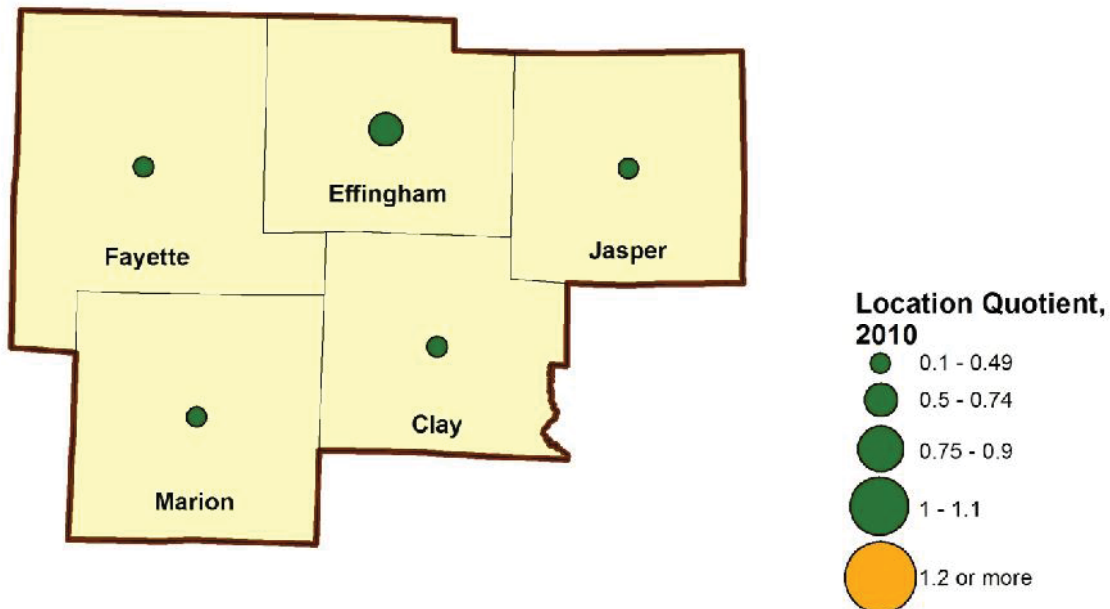


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Map developed by the Purdue Center for Regional Development

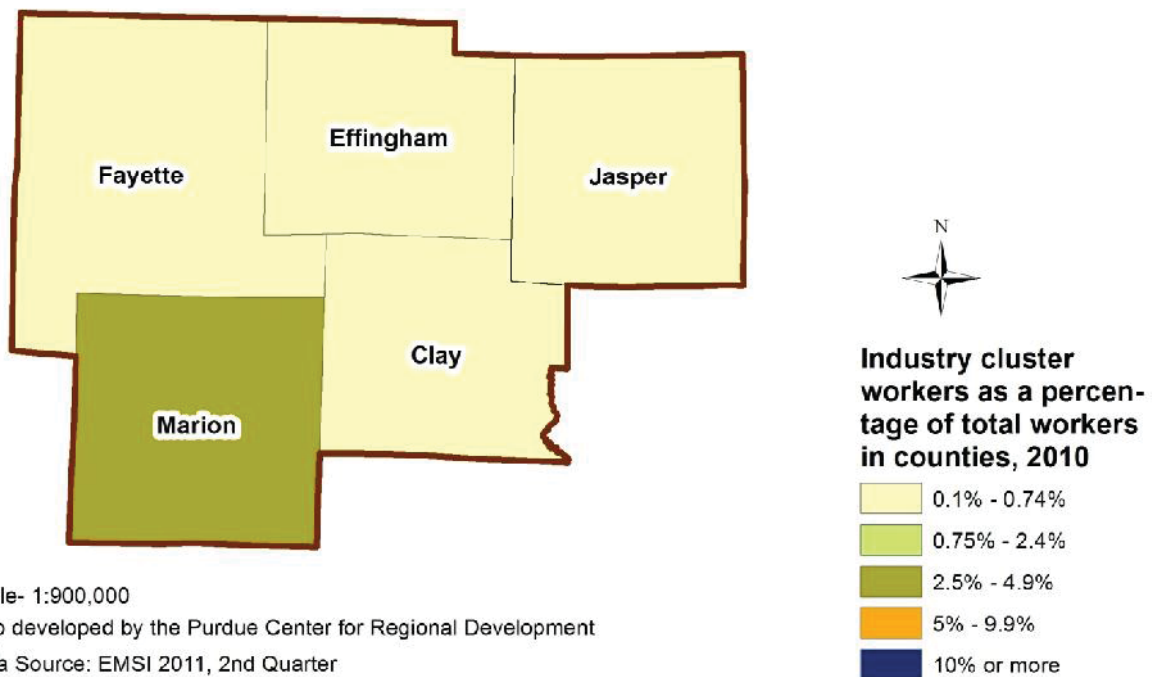
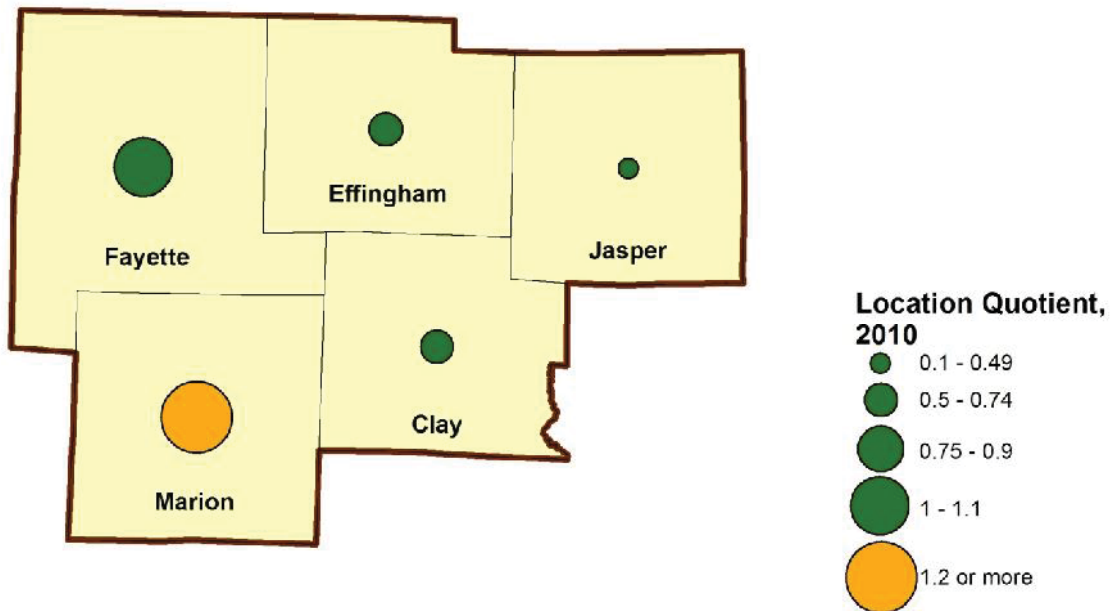
Data Source: EMSI 2011, 2nd Quarter

South Central Illinois Regional Planning and Development Commission, Industry Clusters, 2010 Information Technology and Telecommunications



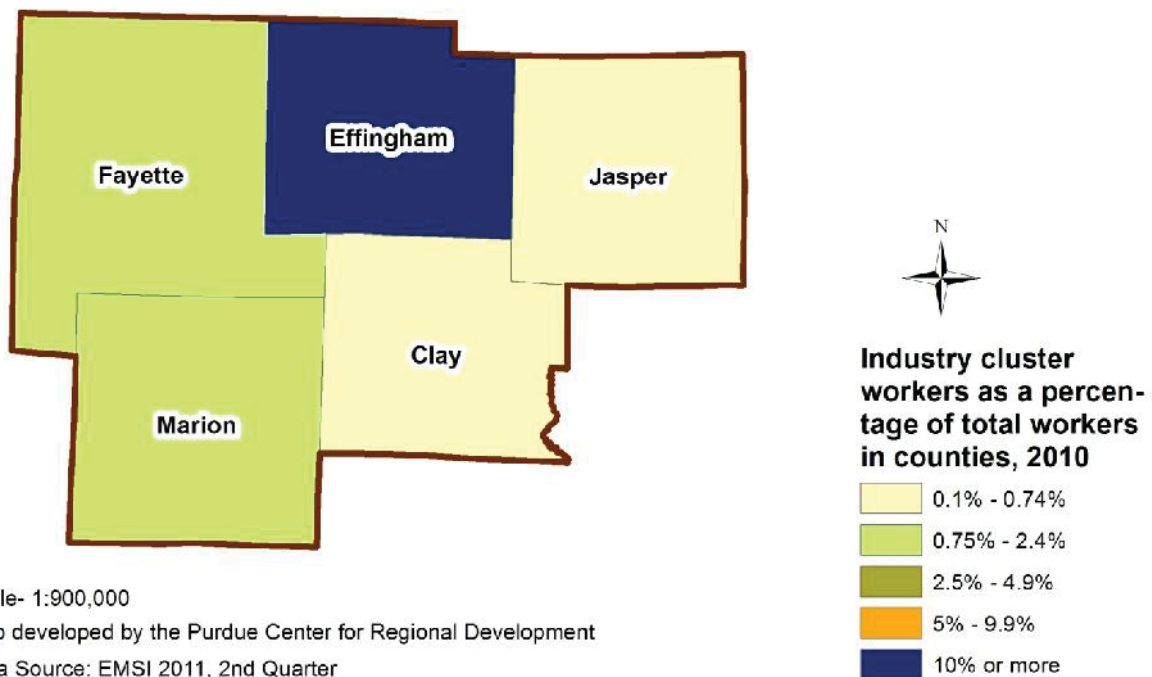
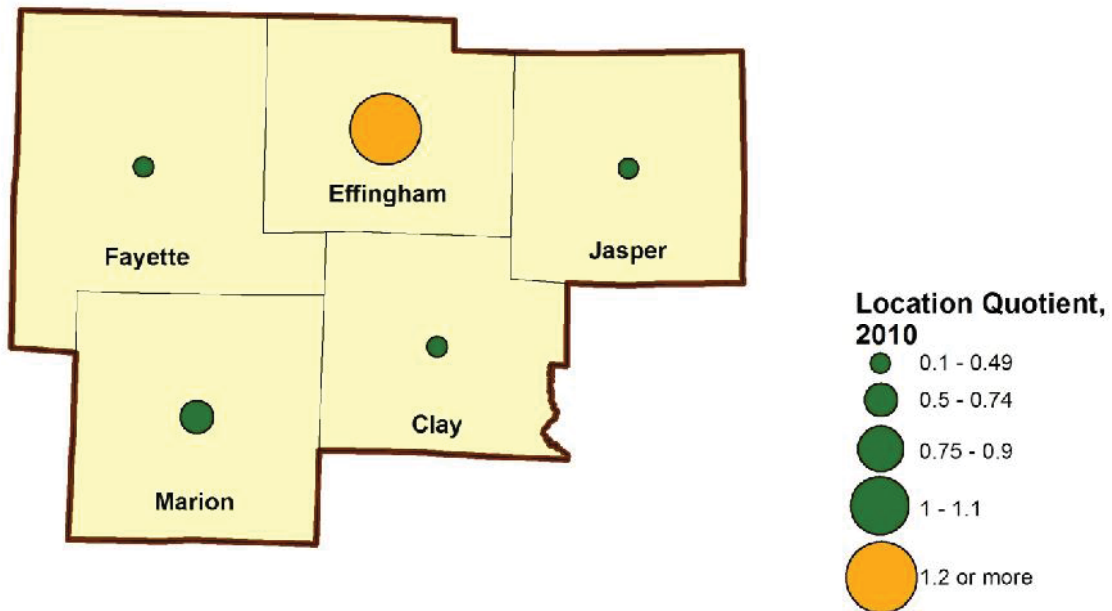
South Central Illinois Regional Planning and Development Commission, Industry Clusters, 2010

Mining



South Central Illinois Regional Planning and Development Commission, Industry Clusters, 2010

Printing and Publishing



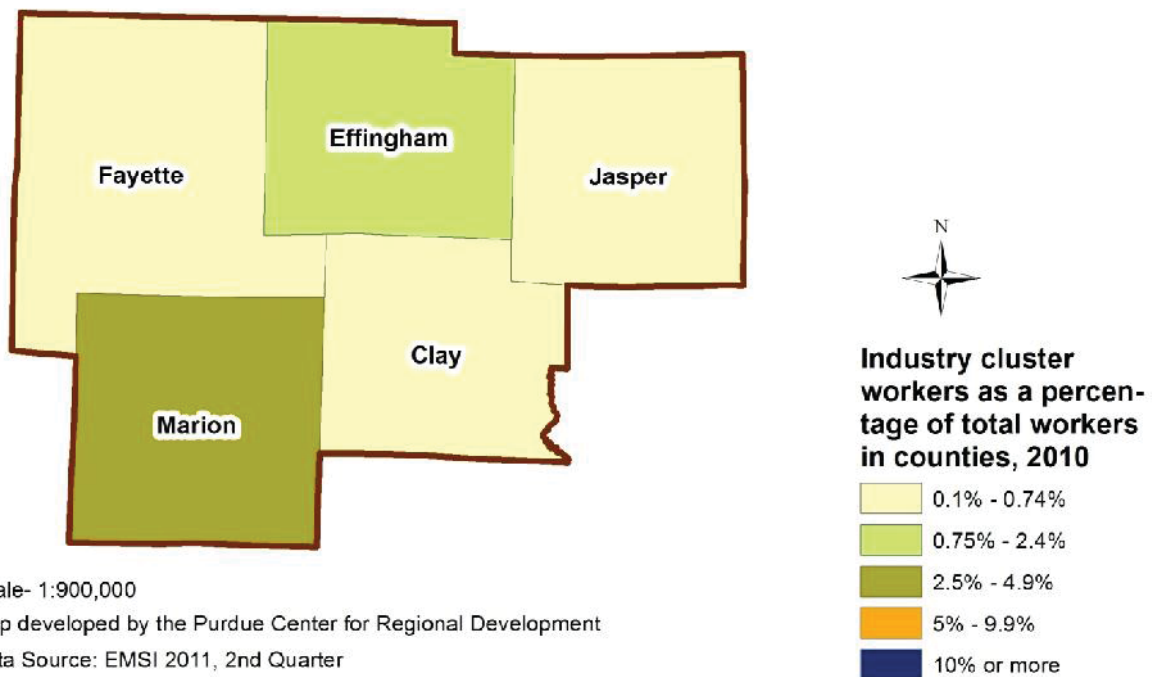
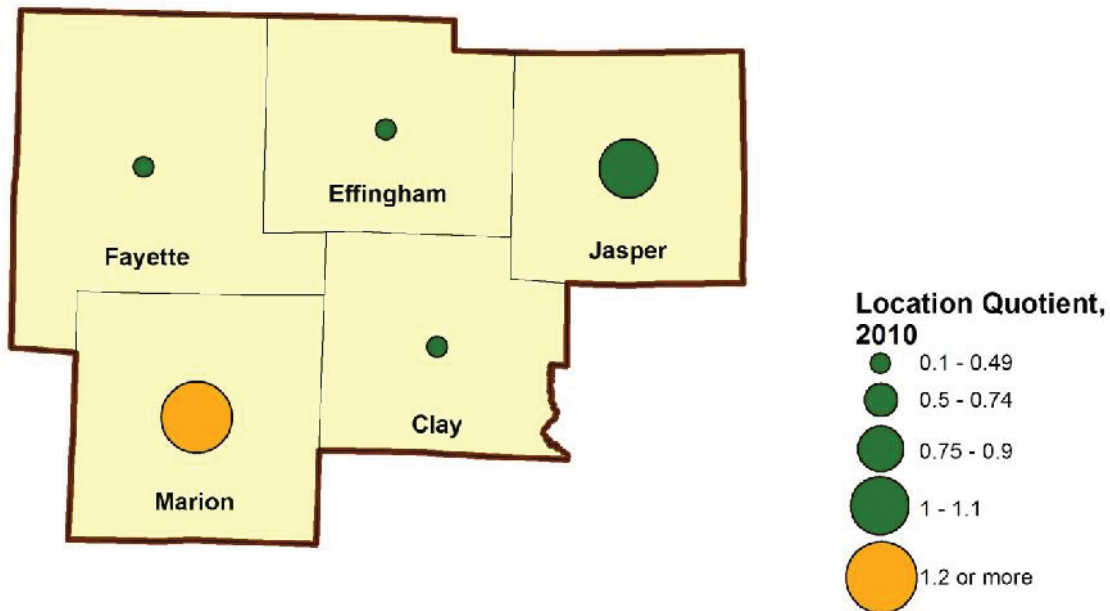
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Map developed by the Purdue Center for Regional Development

Data Source: EMSI 2011, 2nd Quarter

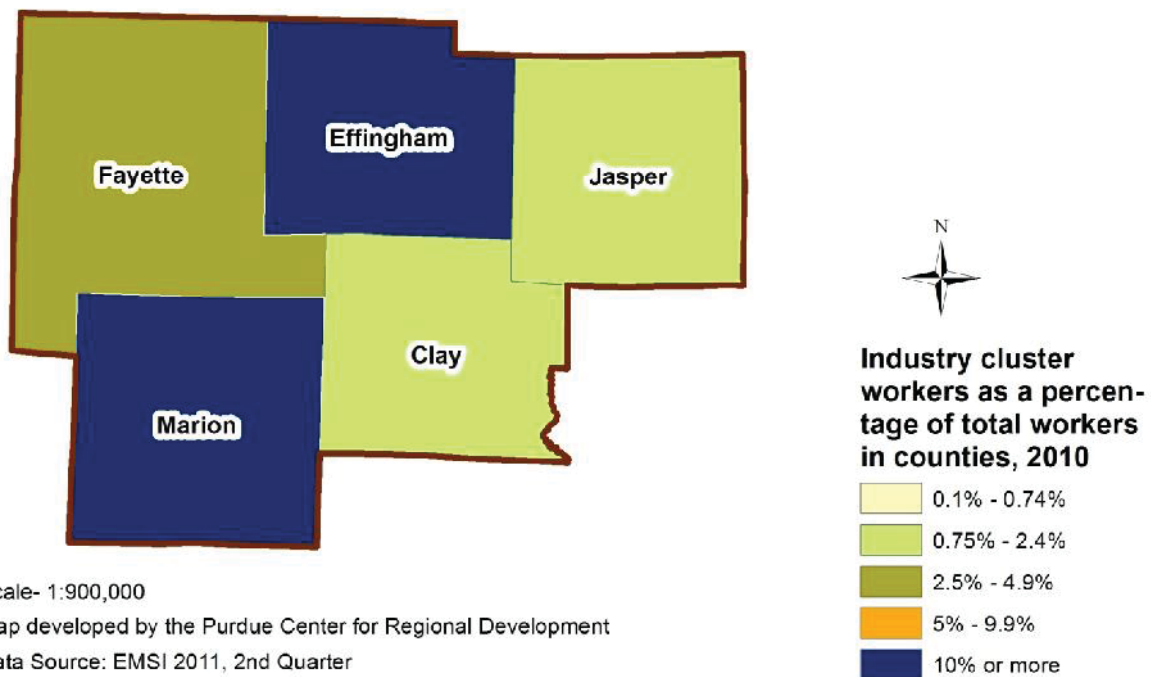
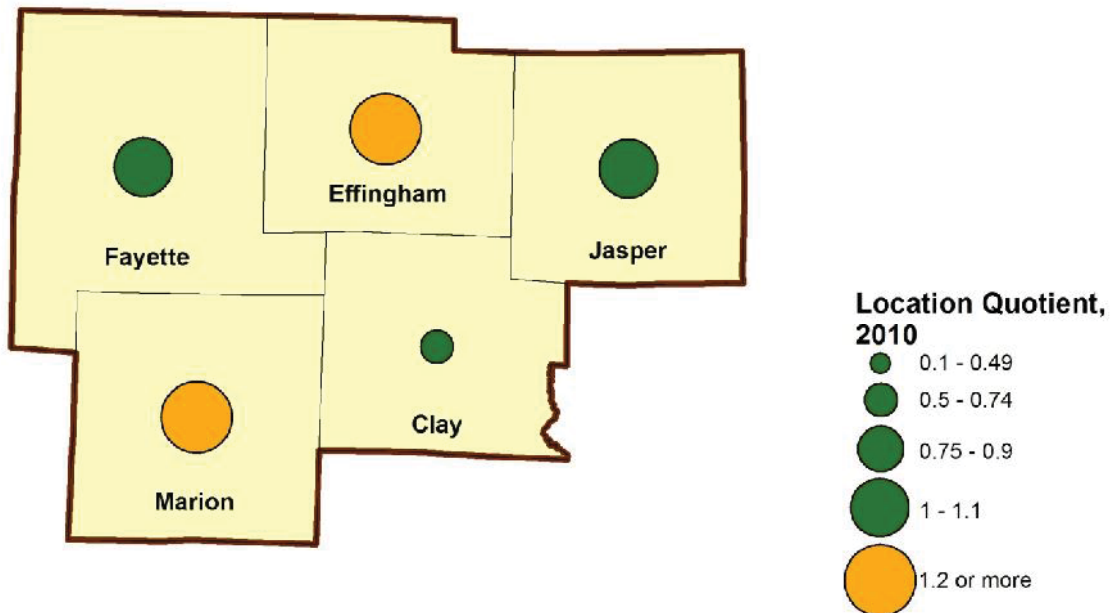
South Central Illinois Regional Planning and Development Commission, Industry Clusters, 2010

Apparel and Textiles



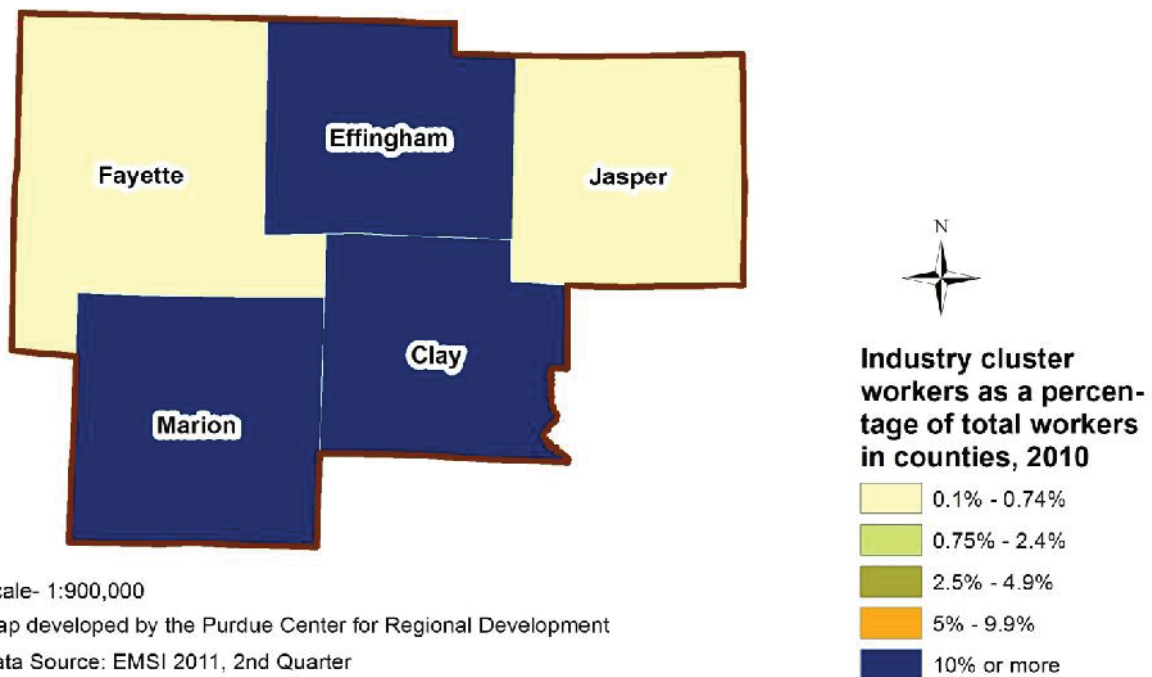
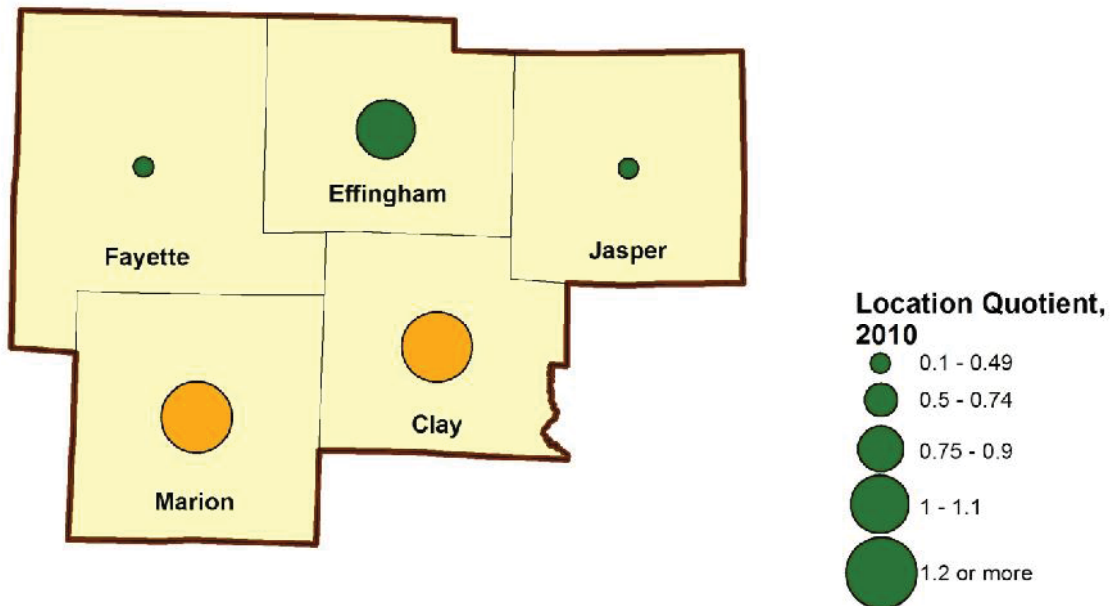
South Central Illinois Regional Planning and Development Commission, Industry Clusters, 2010

Transportation and Logistics



South Central Illinois Regional Planning and Development Commission, Industry Clusters, 2010

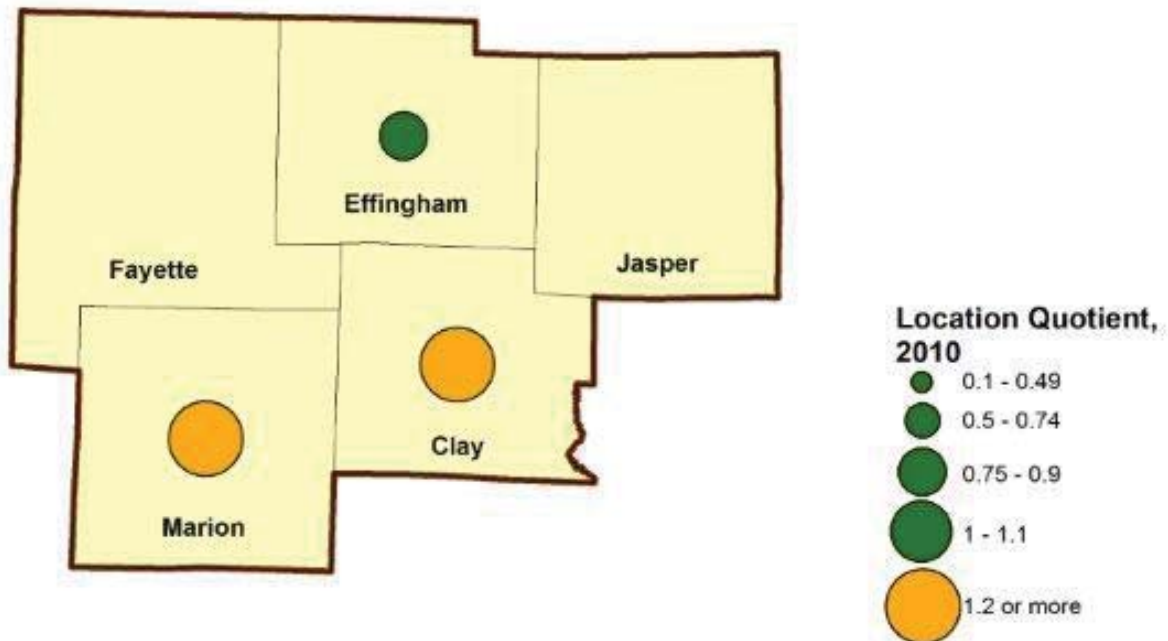
Manufacturing Supercluster



Manufacturing Subclusters

South Central Illinois Regional Planning and Development Commission, Industry Clusters, 2010

Transportation Equipment Mfg. Subcluster



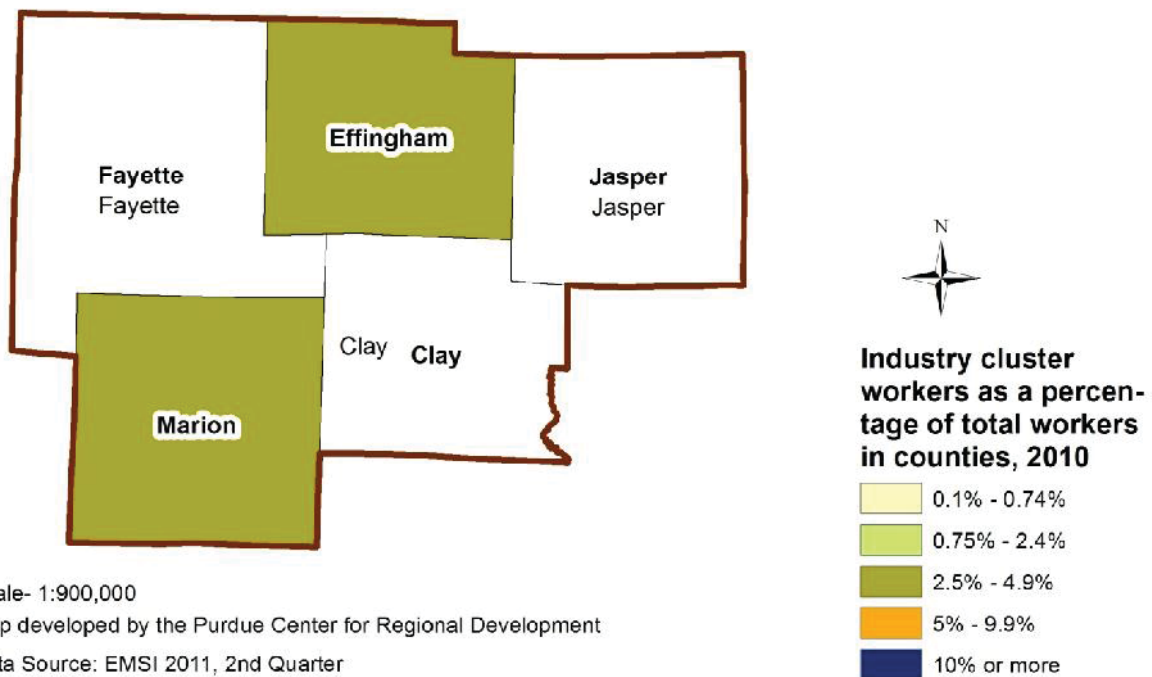
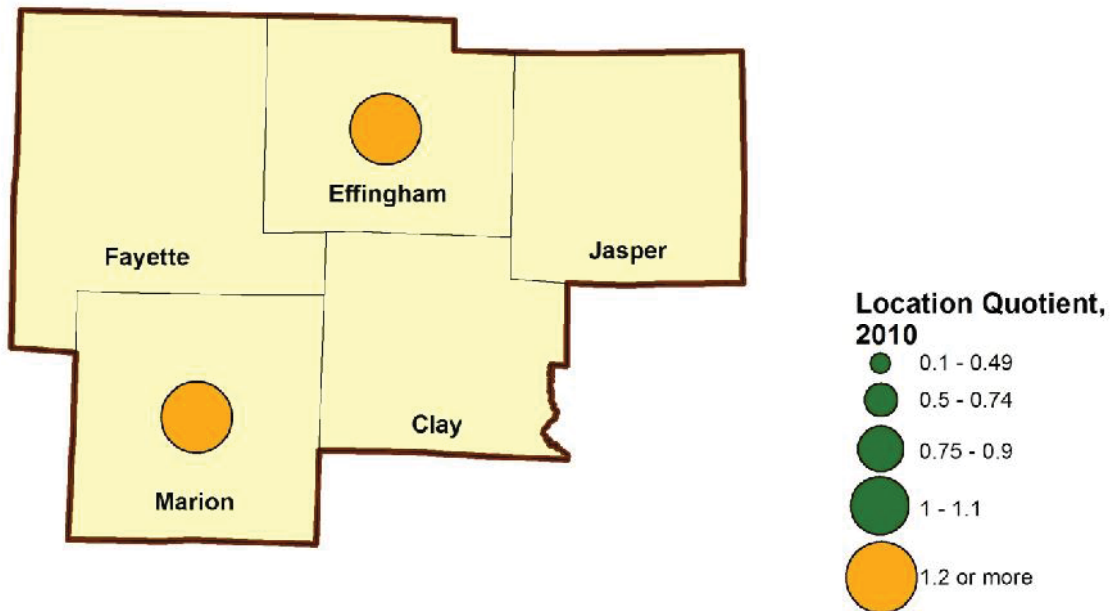
Scale- 1:900,000

Map developed by the Purdue Center for Regional Development

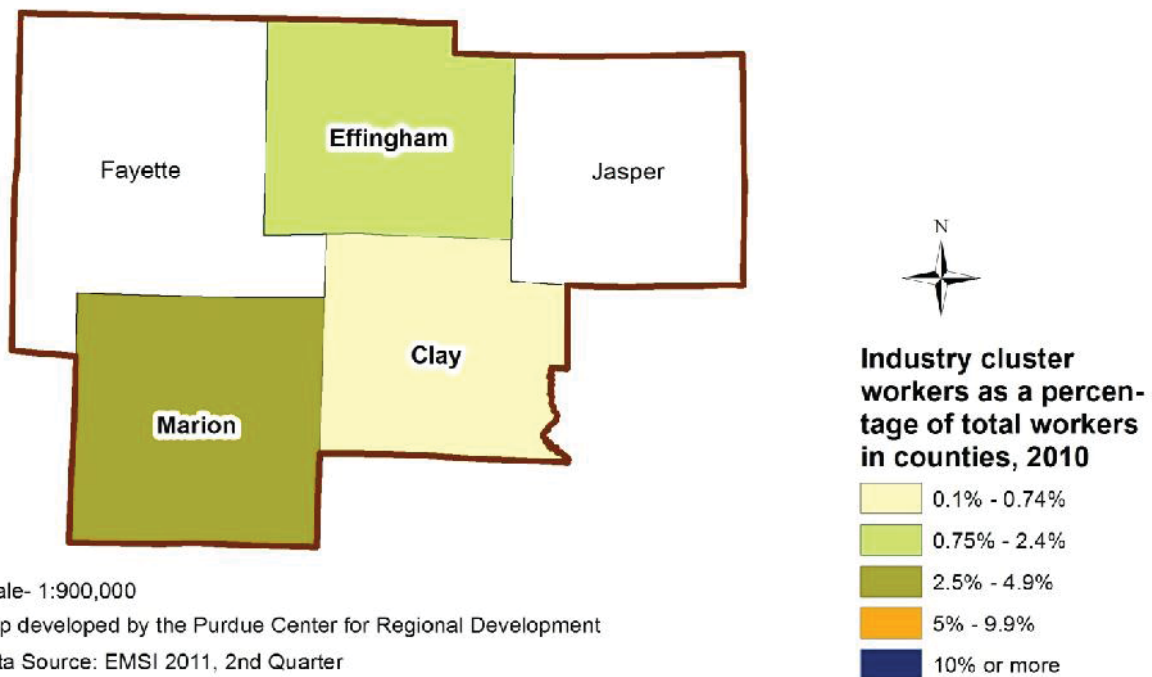
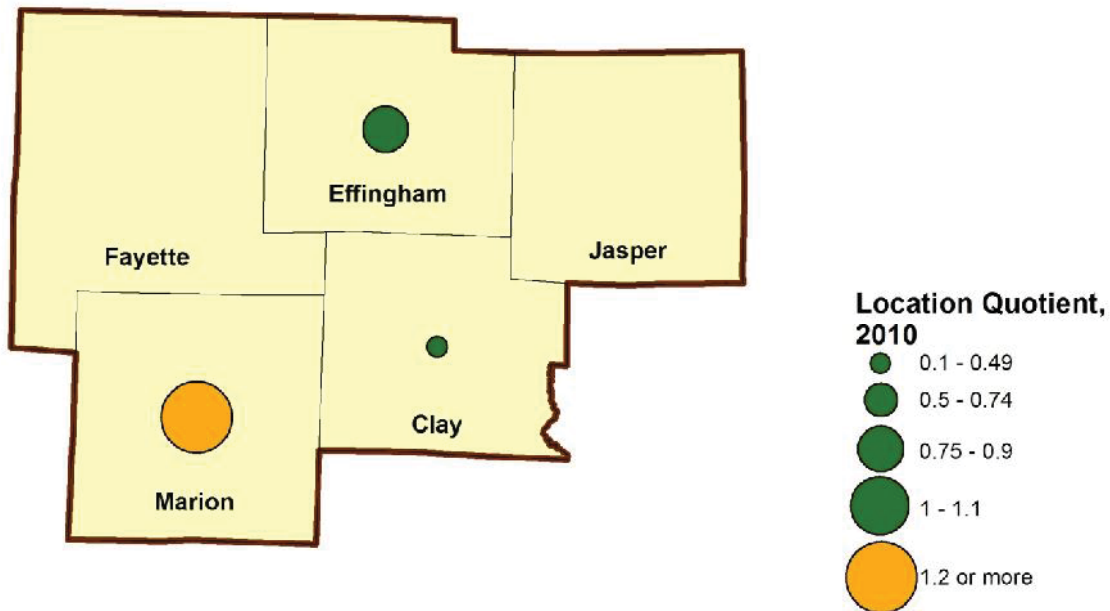
Data Source: EMSI 2011, 2nd Quarter

South Central Illinois Regional Planning and Development Commission, Industry Clusters, 2010

Machinery Mfg. Subcluster

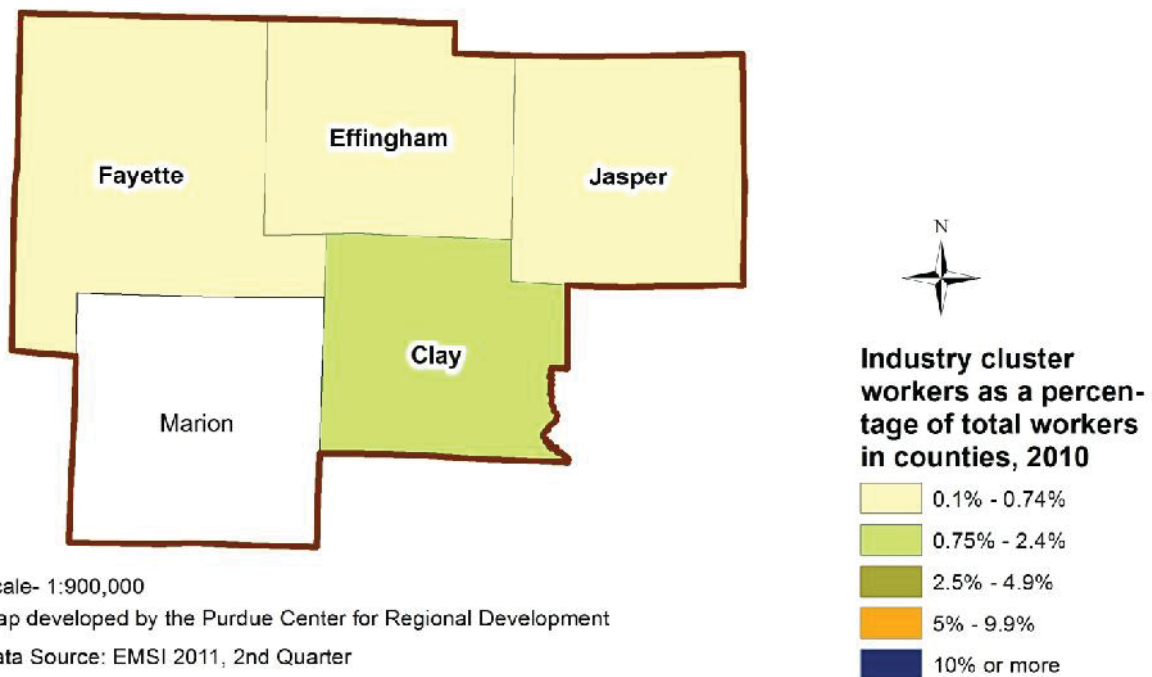
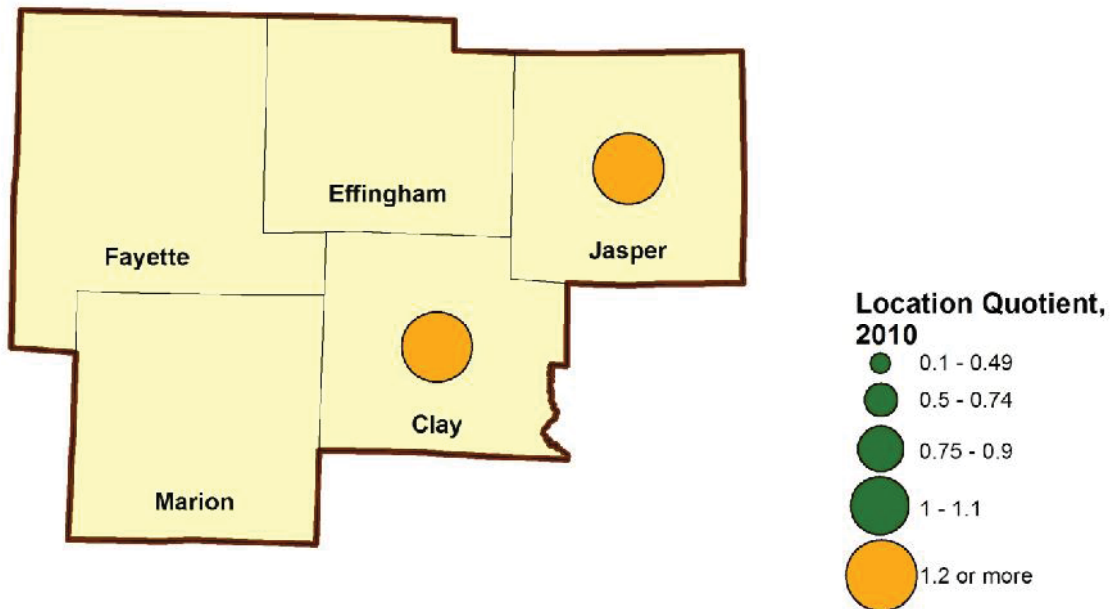


South Central Illinois Regional Planning and Development Commission, Industry Clusters, 2010 **Fabricated Metal Product Mfg. Subcluster**

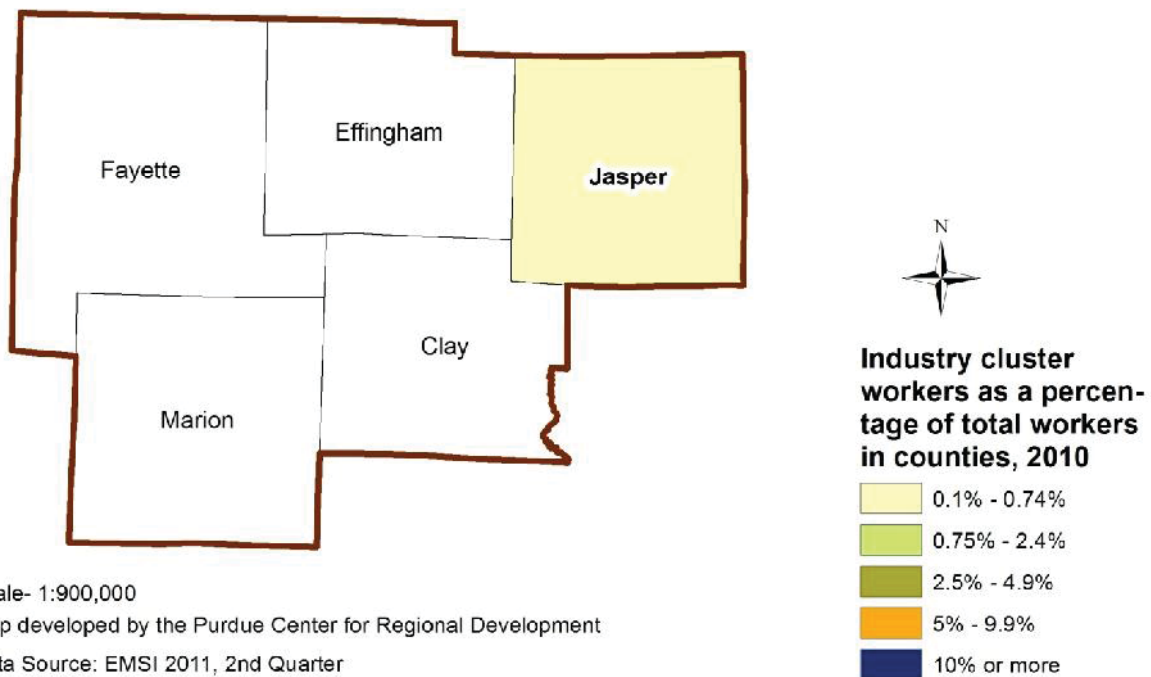
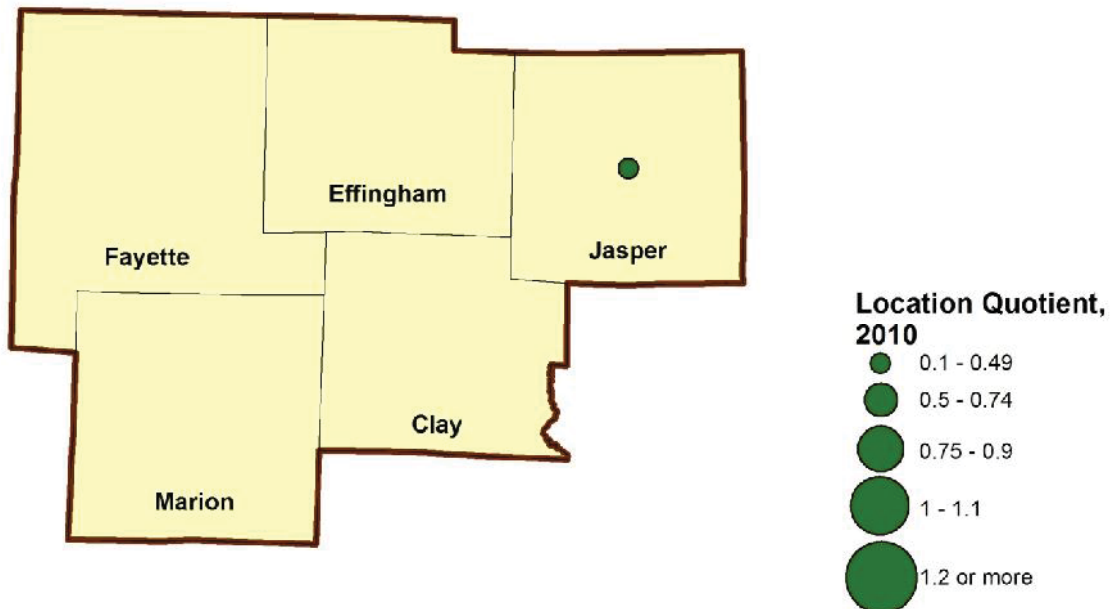


South Central Illinois Regional Planning and Development Commission, Industry Clusters, 2010

Primary Metal Mfg. Subcluster



South Central Illinois Regional Planning and Development Commission, Industry Clusters, 2010 **Electrical Equipment, Appliance & Component Mfg. Subcluster**



South Central Illinois Regional Planning and Development Commission, Industry Clusters, 2010

Computer & Electronic Product Mfg. Subcluster

