PATTERN ANALYSIS
HIGHLIGHTING INDUSTRY PATTERNS THAT DRIVE NEW WEALTH IN A REGIONAL ECONOMY

NORTH CENTRAL REGION

MORE WITH MERIC
TIMELY TARGETED INTELLIGENT

MISSOURI Department of Economic Development
AN INTRODUCTION TO INDUSTRY PATTERN ANALYSIS

Discovering patterns of connected industries can be difficult given the number of companies in an economy and the data available for analysis. Yet understanding the business patterns that drive wealth in a region is critical to designing effective development initiatives.

This report uses industry trend, concentration, and individual firm data to summarize two important patterns in a region’s economic core:

- **Spot Strengths** of large sector employment, typically in one or two firms, and

- **Core Clusters** of employment across a mix of similar or linked industries.

Recognizing spot strengths and core cluster patterns is important as these collectively large employers attract new income to a region. Knowing these industries, and the shared supply-chain and labor issues these companies have, can aid economic and workforce developers in the crafting of policies for the broadest impact.

Pattern analysis highlights the strengths and linkages of area industries and can serve as a starting point for understanding a regional economy. People familiar with company operations know that no two firms have the same business model. Pattern information should ultimately be enhanced by individuals with local business knowledge.

See the **NOTES** section for more details on industry pattern analysis and the methods used in this report.
What comes after “Pattern Recognition?”

Economic and workforce developers have been speaking the “cluster” language for a long time. However, just knowing that a spot strength or core cluster pattern exists is only one step in the process. Here are some additional things to consider:

Group Think
While large, individual businesses will always be important and drive some policy actions, decision-makers can use pattern knowledge to focus efforts on the common problems that related businesses have. This approach makes the best use of limited resources by providing the biggest impact to the most companies.

Customize Help
One size does not fit all when it comes to supporting an industry pattern. Assisting a business cluster may involve specific projects like expanding utilities or broader actions such as helping attract additional knowledge workers. Whatever the needs, the pattern approach can help prioritize actions.

Work on Workforce
Many business location or expansion decisions revolve around issues of available labor. Workforce training geared toward supporting clusters can be very valuable as many of the firms hire workers with similar skill sets. Likewise, talented workers want to locate where clusters of similar businesses offer better odds at finding employment.

Career centers, community colleges, and universities can customize training programs to meet the need of cluster industries for specialized workers.

Spread the Word
Economic and workforce developers can tell the story of how a region’s industries and institutions create clusters of opportunity for existing companies, workers, and new investment. Examples such as the Animal Health Corridor (Missouri-Kansas) and the Plant and Medical Sciences Cluster (St. Louis) are excellent branding campaigns that highlight the combined strengths of businesses, universities, incubators, and workforce to form clusters of growth.

Plan for the Future
The current recession reminds everyone that major structural changes in the economy will occur from time to time. Missouri’s automotive industry is undergoing that change right now. Developers that understand a region’s pattern of industries will be better positioned to promote new opportunities of growth that fit well with an economy’s existing and transforming strengths.
INDUSTRY OVERVIEW

The North Central region has a population of 115,651, which accounts for 1.9 percent of Missouri’s total population. Economic centers include Kirksville, where roughly 18 percent of area residents work, to Chillicothe (9.5%), Trenton (5.9%) and Macon (5.8%).* The average wage in 2008 was $27,623, considerably lower than the state average of $40,710.

In 2008 non-farm employment for the area was 39,808, which includes public and private sectors. Healthcare and manufacturing were the primary employing industries in the region, accounting for 3 out of every 10 jobs. Although most employment in the primary farming sector is not captured by this measure, over 11,400 people were estimated to be either a farm owner or worker in 2007.** Many of these farmers may also have other jobs, but clearly agriculture in a significant part of this region’s economy.

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<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>11</td>
<td>Agriculture, Forestry, Fishing, and Hunting</td>
<td>1,464</td>
<td>3.7%</td>
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<tr>
<td>21</td>
<td>Mining</td>
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<td>22</td>
<td>Utilities</td>
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<td>23</td>
<td>Construction</td>
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<td>31-33</td>
<td>Manufacturing</td>
<td>5,598</td>
<td>14.1%</td>
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<td>42</td>
<td>Wholesale Trade</td>
<td>1,409</td>
<td>3.5%</td>
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<td>44-45</td>
<td>Retail Trade</td>
<td>5,155</td>
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<td>48-49</td>
<td>Transportation and Warehousing</td>
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<td>Information</td>
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<td>52</td>
<td>Finance and Insurance</td>
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<td>Real Estate and Rental and Leasing</td>
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<tr>
<td>54</td>
<td>Professional, Scientific, and Technical Services</td>
<td>985</td>
<td>2.5%</td>
<td>$23,599</td>
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<tr>
<td>55</td>
<td>Management of Companies and Enterprises</td>
<td>296</td>
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<tr>
<td>56</td>
<td>Administrative and Support Services</td>
<td>523</td>
<td>1.3%</td>
<td>$25,163</td>
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<td>61</td>
<td>Educational Services</td>
<td>4,867</td>
<td>12.2%</td>
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<tr>
<td>62</td>
<td>Health Care and Social Assistance</td>
<td>6,296</td>
<td>15.8%</td>
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<tr>
<td>71</td>
<td>Arts, Entertainment, and Recreation</td>
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<td>1.0%</td>
<td>$13,361</td>
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<tr>
<td>72</td>
<td>Accommodation and Food Services</td>
<td>2,925</td>
<td>7.3%</td>
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<tr>
<td>81</td>
<td>Other Services</td>
<td>1,382</td>
<td>3.5%</td>
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<tr>
<td>92</td>
<td>Public Administration</td>
<td>2,538</td>
<td>6.4%</td>
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</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td>39,808</td>
<td></td>
<td>$27,623</td>
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**The most accurate and timely industry employment numbers come from the Bureau of Labor Statistics, Quarterly Census of Employment and Wages program (QCEW). However, reporting requirements for this program excludes most farmers so the USDA 2007 Census of Agriculture is used as an alternative, non-comparative measure.
INDUSTRY PATTERNS

Analysis of the North Central region revealed two industry concentration patterns. The Agribusiness and Print industries are highly specialized in this area and represent nearly 16 percent of all private employment.*

Both of these industry patterns are spot strengths in the region as a small number of firms account for the majority of business activity. Agribusiness at the farm level, however, is naturally more diversified as is the large number of supporting industries that rely heavily on the success of agriculture. Most of these pattern industries shrank in employment during the last business growth cycle.

* Spot industry employment by detailed sector is not reportable due to BLS confidentiality restrictions.
Agribusiness
Crop Production (NAICS 111)
Animal Production (NAICS 112)
Food Manufacturing (NAICS 311)

The agribusiness pattern, comprised of animal and crop producers as well as food manufacturers, represents a significant industry for the North Central region.* Farmers and food manufacturers both benefit from the close proximity which reduces transportation costs. Likewise, many crop farmers produce feedstock which nearby animal producers can benefit from. Firms specializing in transportation services represent a key linkage for this cluster as it sells products to export markets. Specialized farm retailers, wholesalers, and bankers also provide important inputs to this business pattern.

Animal production is highly concentrated in North Central Missouri and is a primary input to food manufacturers. This specialization combined with crop production does offer opportunities for increased wealth generation, especially in foreign markets, once global economies rebound from the Great Recession.

The increasing appetite for Missouri agricultural products by foreign countries was particularly strong toward the end of the last business cycle and even into the first year of the recession. From 2006 to 2008 Missouri exports in combined crop, animal, and food production increased by over 70 percent, while total exports climbed by 0.4 percent. Although commodity prices clearly played a strong role in this increase, the growth is reflective of the higher global demand for these products.

Print Industry
Print Manufacturing (NAICS 323)
Publishing (NAICS 511)

The Print industry in North Central Missouri includes the manufacturing and publishing of books, magazines, and commercial screen printing. Some companies in this region specialize in educational institution and student products. All firms in the print and publishing industry rely on a variety of paper, ink, logistics, and machinery inputs to develop competitive products. Some of the top occupations include print machine operators, prepress technicians, graphic designers, editors, and sales representatives.

* Crop and animal production employment used in the summary and location quotient are from the Quarterly Census of Employment and Wages (QCEW) and does not capture most farm production employment. The U.S. 2007 Census of Agriculture indicated that a combined total of 11,428 farm owners and hired labor worked in the North Central Region but due to different collection methodologies cannot be directly added to the QCEW. However, the Agriculture Census employment numbers do highlight the greater significance of farm production to the region’s economy.
Although it is a regional spot pattern, the state has a slight print industry cluster LQ of 1.1 with most other firms located in the Central and Kansas City regions. Declining employment in this industry may be due to a variety of factors, one being the on-going process of most manufacturers to increase technology usage which, in turn, requires fewer operators.

**RURAL REGION CHALLENGES**

The small number of pattern industries and slow employment growth demonstrated in North Central Missouri is very common in rural regions across the U.S. These areas face challenges such as population out-migration and business consolidation that make economic diversification difficult. A 2009 Kansas City Federal Reserve report points out these challenges and highlights a couple of rural trends worth consideration:

- **Net migration trends show that middle-aged populations (ages 30-44) are making up an increasingly larger share of rural communities.**

  Although rural communities continue to lose younger adults, middle-agers are bucking the trend. These experienced workers, some moving back to hometowns for family reasons or for a smaller-town lifestyle, may be the next entrepreneurs in a local community. A recent Kauffman Foundation survey found that entrepreneurs in high-growth industries tended to be well-educated, experienced, have a family, and be on average 40 years old.

- **Older adults are continuing to relocate to communities with high quality of life factors that include healthcare, education, personal services, and recreation.**

  While Florida and the Southwest have long been a destination for retirees, lesser-known communities offering great amenities at a lower cost are gaining ground. Places that offer jobs and continuing education opportunities are also able to attract older adults who are looking to slow down but not completely give up work. These adults can be key sources of business leadership and experience.

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INDUSTRY CONTRIBUTION IMPACT: FOOD MANUFACTURING

Pattern recognition is important since changes to business production can have broad regional impacts across a range of linked industries and institutions. Food manufacturing is analyzed in this example of how those connections positively influence the area’s economy.

Food manufacturing includes the primary inputs of crop farming, and animal slaughter/processing among other things. The industry produces grain, oil, and meat products that can be a final good or an input to other food products sold in export markets, thereby bringing additional money into the regional economy.

Food manufacturing workers are among the highest paid in the region. An addition of 100 employees in food manufacturing creates an estimated total of 255 jobs paying $7.1 million in salaries and contributing over $10.9 million to the gross state product. The value-added per worker in food manufacturing and supporting industries is $42,745.

<table>
<thead>
<tr>
<th>Food Manufacturing Impact: Addition of 100 employees</th>
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<tbody>
<tr>
<td><strong>Direct Impact</strong></td>
</tr>
<tr>
<td>Employment</td>
</tr>
<tr>
<td>Labor Income*</td>
</tr>
<tr>
<td>Gross Domestic Product</td>
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</tbody>
</table>

*Labor income includes employee benefits and proprietors income.
INDUSTRY INTERLINKAGES: FOOD MANUFACTURING

Food manufacturers in the North Central region employ a large number of workers. Backward-linked (supply goods and raw materials to the industry) and forward-linked (produce value-added goods for consumers) activities display the interrelationship between various industries that add value to food manufacturing. While the backward linkages are between the suppliers of raw materials to the industry, forward linkages are between the industry and the consumers.
NOTES

Industry Analysis of a Region’s Economic Core

While a business is classified by the primary service or product it creates, another distinction is the market it serves. Companies that target customers outside a region are considered export-based, or core, whereas other businesses mainly serve local customers. Grocery stores, retailers, and doctor’s offices are typical examples of local market firms. The distinction between export and local market businesses is important when considering long range economic viability and development.

Export-market industries, by serving customers outside a region, bring new dollars into an economy and form the economic core of the community. Think of manufacturers and large-scale farming. Both industries serve national and global markets and therefore attract new income into the region that is paid out in wages, interests, rents, and profits. By contrast, a local market industry largely churns existing dollars within a region. While local services are absolutely important to a thriving community, seldom can an area’s population maintain a robust economy by only selling things to each other; it has to export goods and services to bring in new wealth.

Defining Export-Market Industries

Although some businesses are commonly thought of as exporters, location quotient (LQ) analysis provides a more comprehensive approach. This quotient indicates how concentrated an industry’s employment is in a certain area as compared to the U.S. average. If an industry has an LQ of 2.0 then it is twice as concentrated in employment as the U.S. average.

Location quotients can help identify regional industries that may be exporting a substantial amount of goods and services to outside markets. If an industry is much more concentrated than the national average, firms are likely creating more products than the local economy can consume. Industries typically considered as primary exporters include:

**Large Agriculture and Forestry Operations**
**Mining**
**Manufacturing**
**Management Headquarters**
**Tourism***

*High retail/restaurant LQ associated with destination spots.*
The list of primary exporters should be supplemented with LQ analysis to determine other industries that may be generating a large amount of income from outside a region. Services such as information technology, design and engineering, and research are often examples in metropolitan areas.

Identifying Industry Patterns

The industries with the highest LQ and combined employment were analyzed in the context of the region’s economy and knowledge of individual firms to determine if an industry pattern existed. Employment from 2003-2007 was analyzed to coincide with Missouri’s growth period during the last business cycle and to control for more recent recessionary effects. However, first quarter 2009 employment and business closures were reviewed to see if a pattern had greatly diminished due to major structural changes after the period of primary analysis.

Spot Strengths were identified as high LQ and employment sectors where 3 or fewer companies employed over 80 percent of the industry’s workforce. Spot firm employment or wage information cannot be disclosed due to confidentiality restrictions in the QCEW program. However, this report does try to identify those firm’s connections to larger clusters where applicable.

Spot firms employ a large percentage of workers and attract supply chain industries. These businesses are so prominent in a local economy, think of “factory towns,” that the firms can overshadow other regional industries. If a Spot business moves out of an area then the industry concentration (LQ) leaves with it, thereby introducing a vulnerability to the region’s economy.

Core Cluster patterns takes into account the number of businesses and employment within the region that make up an industry concentration. Cluster businesses are more diversified in firm count. Three or less firms do not account for over 80 percent of industry employment.

Core clusters benefit from the transfer of knowledge and a shared, skilled workforce that close proximity brings. Supply chains develop to serve these companies and competition keeps prices down. Experienced industry entrepreneurs periodically dream up better products, spin-off new local firms, and grow the economic core of a community.

While all companies are influenced by larger economic trends, having a number of similar businesses in an area helps diversify the risk and rewards as each company focuses on specialized products. These core cluster businesses collectively benefit from supporting services and workforce training that is tailored to common industry needs.
SOURCES

4. IMPLAN Economic Impact Model, 2007, MIG Inc.

Fall 2009

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Editing: Sreedhar Upendram and Alan Spell

Missouri Economic Research and Information Center
Department of Economic Development, Division of Business and Community Services