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

WEST CENTRAL REGION

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 economy:

- **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 crafting 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 an industry 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 West Central Region has a population of 165,325, which accounts for 2.8 percent of Missouri’s total population. Sedalia is the largest employing city, where nearly 16 percent of area residents work. Other economic centers include Warrensburg (8.8%), Marshall (8.4%), and Clinton (6.9%). Just over 9 percent of region residents work in Jackson County.* The average wage in 2008 was $28,589.

In 2008 non-farm employment for the area was 56,407, which includes public and private sectors. Manufacturing was the largest employer at 17.3 percent, followed closely by health care. The two combined sectors employ 1 out of every 3 workers. Whiteman Air Force Base is located here and is home to over 3,000 military personnel. Farming is also important as over 7,400 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 is significant to the region.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>NAICS</td>
<td>Industry</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Agriculture, Forestry, Fishing, and Hunting</td>
<td>404</td>
<td>0.7%</td>
</tr>
<tr>
<td>21</td>
<td>Mining</td>
<td>79</td>
<td>0.1%</td>
</tr>
<tr>
<td>22</td>
<td>Utilities</td>
<td>523</td>
<td>0.9%</td>
</tr>
<tr>
<td>23</td>
<td>Construction</td>
<td>2,558</td>
<td>4.5%</td>
</tr>
<tr>
<td>31-33</td>
<td>Manufacturing</td>
<td>9,751</td>
<td>17.3%</td>
</tr>
<tr>
<td>42</td>
<td>Wholesale Trade</td>
<td>1,702</td>
<td>3.0%</td>
</tr>
<tr>
<td>44-45</td>
<td>Retail Trade</td>
<td>7,068</td>
<td>12.5%</td>
</tr>
<tr>
<td>48-49</td>
<td>Transportation and Warehousing</td>
<td>1,459</td>
<td>2.6%</td>
</tr>
<tr>
<td>51</td>
<td>Information</td>
<td>1,077</td>
<td>1.9%</td>
</tr>
<tr>
<td>52</td>
<td>Finance and Insurance</td>
<td>1,508</td>
<td>2.7%</td>
</tr>
<tr>
<td>53</td>
<td>Real Estate and Rental and Leasing</td>
<td>508</td>
<td>0.9%</td>
</tr>
<tr>
<td>54</td>
<td>Professional, Scientific, and Technical Services</td>
<td>1,067</td>
<td>1.9%</td>
</tr>
<tr>
<td>55</td>
<td>Management of Companies and Enterprises</td>
<td>310</td>
<td>0.5%</td>
</tr>
<tr>
<td>56</td>
<td>Administrative and Support Services</td>
<td>1,837</td>
<td>3.3%</td>
</tr>
<tr>
<td>61</td>
<td>Educational Services</td>
<td>6,996</td>
<td>12.4%</td>
</tr>
<tr>
<td>62</td>
<td>Health Care and Social Assistance</td>
<td>9,224</td>
<td>16.4%</td>
</tr>
<tr>
<td>71</td>
<td>Arts, Entertainment, and Recreation</td>
<td>713</td>
<td>1.3%</td>
</tr>
<tr>
<td>72</td>
<td>Accommodation and Food Services</td>
<td>4,921</td>
<td>8.7%</td>
</tr>
<tr>
<td>81</td>
<td>Other Services</td>
<td>1,636</td>
<td>2.9%</td>
</tr>
<tr>
<td>92</td>
<td>Public Administration</td>
<td>3,069</td>
<td>5.4%</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td><strong>56,407</strong></td>
<td></td>
</tr>
</tbody>
</table>

**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

West Central Missouri industry analysis revealed a number of core clusters and spot strengths that can be described in three overall patterns. Agribusiness, Metal/Machinery Manufacturing, and Electrical Equipment Manufacturing represent strong industry concentrations in the region and encompass firms in a variety of industry subsectors.

These core cluster and spot industries account for 18 percent of all private employment in the region.* Patterns demonstrate the heavy importance of agribusiness and manufacturing sectors, a common characteristic of many rural Midwestern regions. The specialized products developed by area firms closely link with other regions and industry strengths in Missouri.

<table>
<thead>
<tr>
<th>TYPE</th>
<th>NAICS</th>
<th>INDUSTRY</th>
<th>LQ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cluster</td>
<td>112</td>
<td>Animal Production</td>
<td>2.5</td>
</tr>
<tr>
<td>Spot</td>
<td>311</td>
<td>Food Manufacturing</td>
<td>6.0</td>
</tr>
<tr>
<td>Spot</td>
<td>331</td>
<td>Primary Metal Manufacturing</td>
<td>5.2</td>
</tr>
<tr>
<td>Cluster</td>
<td>332</td>
<td>Fabricated Metal Product Manufacturing</td>
<td>2.3</td>
</tr>
<tr>
<td>Cluster</td>
<td>333</td>
<td>Machinery Manufacturing</td>
<td>3.4</td>
</tr>
<tr>
<td>Spot</td>
<td>335</td>
<td>Electrical Equipment and Appliance Mfg.</td>
<td>4.3</td>
</tr>
</tbody>
</table>

* Spot industry employment by detailed sector is not reportable due to BLS confidentiality restrictions.
Agribusiness Cluster

Animal Production (NAICS 112)
Food Manufacturing (NAICS 311) - Spot Strength

The Agribusiness cluster, comprised primarily of food manufacturing along with farm producers, represents a significant industry for the West Central Region.* Farmers and food manufacturers both benefit from the close proximity which reduces transportation costs. Likewise, many local firms in other sectors exist to serve these producers.

Food manufacturers are six times more concentrated in this region than the national average. Although employment declined over the 2003-2007 primary study period, job numbers did increase slightly through the recession. Manufacturers in this area specialize in meat and dairy products.

Missouri is located in the largest corn and soybean producing region of the world, so it is no surprise that food manufacturing is a specialty of the state (LQ 1.4). A positive trend of emerging world economies demanding more value-added food products has boosted exports for the U.S. in recent years. As foreign countries emerge from the global recession, Missouri and other Midwestern states will benefit as demand picks up.

Metal and Machinery Manufacturing Cluster

Primary Metal Manufacturing (NAICS 331) - Spot Strength
Fabricated Metal Product Manufacturing (NAICS 332)
Machinery Manufacturing (NAICS 333)

Metal and Machinery Manufacturing includes firms in primary and fabricated metal production along with machinery manufacturers that are likely connected in this region. Cluster employment in 2007 was over 3,700 with fabricated metal and machinery manufacturing growing at an annual rate of over 5.6 percent from 2003 to 2007.

Fabricated metal producers shape basic metal forms provided by primary metal manufacturers. Machinery makers use primary and fabricated metal products as key inputs in the production process. Companies in this cluster also hire similarly skilled workers, such as welders, machinists, and multiple machine tool operators, and pay industry wages about 30 percent higher than the regional average.

* 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 7,477 farm owners and hired labor worked in the West 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.
The recession diminished the number of jobs in the Metal and Machinery Mfg. Cluster but employment and location quotients were still significant in 2009. Companies in this regional cluster specialize in aluminum casting, metal wire and ropes, ammunition, agribusiness machinery, and HVAC machinery.

Electrical Equipment Manufacturing Spot Strength
Electrical Equipment and Appliance Manufacturing (NAICS 335)

Electrical equipment manufacturing is the smallest pattern industry in the area and represents a spot strength with a few firms dominating employment. The industry did show impressive annual growth of over 5.5 percent from 2003 to 2007. U.S. growth averaged 1.5 percent over the same time period.

Firms in the region specialize in small electric motors and electric utility components. These market niches are shared with other regions of the state which together form larger multi-regional clusters in electrical equipment and energy products. Recently a large energy consulting firm located in the area sending a good signal that Missouri’s strength in this larger goods-producing cluster is paying off with the attraction of related professional services.
INDUSTRY CONTRIBUTION IMPACT: FABRICATED METAL PRODUCT MANUFACTURING

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

Fabricated metal manufacturing uses basic inputs from iron ore, steel mills, ferroalloy manufacturing, metal cutting, and machine tool manufacturing. The industry makes fabricated structural products that are typically inputs to other final products sold in export markets, thereby bringing additional money into the regional economy.

Fabricated metal product manufacturing workers are among the highest paid in the region at $34,476. An addition of 100 employees in primary metal manufacturing creates an estimated total of 175 jobs paying $6.3 million in salaries and contributing over $10 million to the gross state product. The value-added per worker in fabricated metal product manufacturing and supporting industries is $57,143.

<table>
<thead>
<tr>
<th>Fabricated Metal Manufacturing Impact: Addition of 100 employees</th>
<th>Direct Impact</th>
<th>Indirect Impact</th>
<th>Total Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employment</td>
<td>100</td>
<td>75</td>
<td>175</td>
</tr>
<tr>
<td>Labor Income*</td>
<td>$4.0M</td>
<td>$2.3M</td>
<td>$6.3M</td>
</tr>
<tr>
<td>Gross Domestic Product</td>
<td>$6.3M</td>
<td>$3.7M</td>
<td>$10.0M</td>
</tr>
</tbody>
</table>

*Labor income includes employee benefits and proprietors income.
INDUSTRY INTERLINKAGES: FABRICATED METAL PRODUCT MANUFACTURING

Fabricated metal product manufacturing in the West Central Region employs a large number of local 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 fabricated metal product 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/accommodations/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, third 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.

Winter 2010

Primary Research: Alan Spell
Graphic Design: Maggie Lear

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