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

NORTHWEST 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 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 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 Northwest Region has a population of 176,575, or 3 percent of Missouri’s total population. The economic center is St. Joseph, where 47 percent of area residents work. Nearly 8 percent are employed in Maryville, the home of Northwest Missouri State University, while 5.8 percent commute to Kansas City.* The average wage in 2008 was $31,103.

In 2008 non-farm employment was 73,475, which includes public and private sectors. Manufacturing employed 18 percent of area workers, a higher percentage than the state (11%) and all but two of Missouri’s 12 economic regions. Manufacturing, combined with healthcare and retail sectors, employed 45 percent of all workers. Although most employment in the primary farming sector is not captured by this measure, over 10,000 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>516</td>
<td>0.7%</td>
<td>$22,155</td>
</tr>
<tr>
<td>21</td>
<td>Mining</td>
<td>72</td>
<td>0.1%</td>
<td>$34,212</td>
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<td>22</td>
<td>Utilities</td>
<td>537</td>
<td>0.7%</td>
<td>$49,899</td>
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<td>23</td>
<td>Construction</td>
<td>3,479</td>
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<td>31-33</td>
<td>Manufacturing</td>
<td>13,201</td>
<td>18.0%</td>
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<td>42</td>
<td>Wholesale Trade</td>
<td>3,125</td>
<td>4.3%</td>
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<td>44-45</td>
<td>Retail Trade</td>
<td>9,351</td>
<td>12.7%</td>
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<tr>
<td>48-49</td>
<td>Transportation and Warehousing</td>
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<td>51</td>
<td>Information</td>
<td>1,136</td>
<td>1.5%</td>
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<td>52</td>
<td>Finance and Insurance</td>
<td>2,835</td>
<td>3.9%</td>
<td>$38,677</td>
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<tr>
<td>53</td>
<td>Real Estate and Rental and Leasing</td>
<td>609</td>
<td>0.8%</td>
<td>$21,891</td>
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<tr>
<td>54</td>
<td>Professional, Scientific, and Technical Services</td>
<td>1,552</td>
<td>2.1%</td>
<td>$45,776</td>
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<tr>
<td>55</td>
<td>Management of Companies and Enterprises</td>
<td>470</td>
<td>0.6%</td>
<td>$49,596</td>
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<tr>
<td>56</td>
<td>Administrative and Support Services</td>
<td>3,258</td>
<td>4.4%</td>
<td>$21,041</td>
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<tr>
<td>61</td>
<td>Educational Services</td>
<td>6,438</td>
<td>8.8%</td>
<td>$31,861</td>
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<tr>
<td>62</td>
<td>Health Care and Social Assistance</td>
<td>10,523</td>
<td>14.3%</td>
<td>$36,250</td>
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<tr>
<td>71</td>
<td>Arts, Entertainment, and Recreation</td>
<td>1,033</td>
<td>1.4%</td>
<td>$16,140</td>
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<tr>
<td>72</td>
<td>Accommodation and Food Services</td>
<td>5,953</td>
<td>8.1%</td>
<td>$11,147</td>
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<tr>
<td>81</td>
<td>Other Services</td>
<td>2,486</td>
<td>3.4%</td>
<td>$20,797</td>
</tr>
<tr>
<td>92</td>
<td>Public Administration</td>
<td>4,761</td>
<td>6.5%</td>
<td>$32,572</td>
</tr>
<tr>
<td></td>
<td>TOTAL</td>
<td>73,475</td>
<td>$31,103</td>
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</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

Northwest Missouri industry analysis revealed a number of core clusters and spot strengths that can be described in three broad patterns. Agribusiness, Energy, and Metal 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 over 9,000 area jobs, or 16 percent of all private employment.* Over half of the employment in these industries is located in sectors with average wages above $45,000 a year.

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* Spot industry employment by detailed sector is not reportable due to BLS confidentiality restrictions.
Agribusiness Core Cluster
Animal Production (NAICS 112)
Food Manufacturing (NAICS 311) - Spot Strength
Subset of Firms in Chemical Manufacturing (NAICS 325)

The Agribusiness cluster in northwest Missouri is comprised of more traditional agricultural enterprises, such as farming, granaries, and food manufacturers, along with advanced agri-science operations in the chemical manufacturing sector.*

Food manufacturing grew tremendously from 2003 to 2007, increasing over 300 percent during the 4 years. These firms, which produce food for human and animal consumption, are advantageously surrounded by four major feedstock states; Missouri, Kansas, Nebraska, and Iowa. This region also makes up the northern part of the Animal Health Corridor, which stretches from Columbia, MO through Kansas City to Manhattan, KS. This Corridor is home to a large number of companies and universities that lead the nation in animal nutrition and health science.

Many of the firms in chemical manufacturing are also directly tied to the Animal Health Corridor. Northwest manufacturers specialize in veterinary pharmaceuticals, animal food additives, and other agricultural chemical products. Chemical manufacturing employment grew substantially from 2003 to 2007 with an annual increase just over 9 percent.

Northwest agribusiness manufacturing showed positive employment growth well into 2009, even as the national economy was hitting a recessionary bottom. This continued employment strength and the diversity of agricultural products bode well for the future of this regional pattern industry.

Energy Spot Strength
Electrical Equipment and Appliance Manufacturing (NAICS 335)
Subset of Firms in Chemical Manufacturing (NAICS 325)

Rock Port, in northwest Missouri, was recognized in 2008 as the first 100 percent wind-powered city in America. It is fitting then that the Northwest Region also has a pattern of existing industries that are concentrated in new and traditional energy products.

* Crop and animal production employment from the Quarterly Census of Employment and Wages (QCEW) does not capture most farm production employment. The U.S. 2007 Census of Agriculture indicated that a combined total of 10,101 farm owners and hired labor worked in the Northwest 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.
From biofuels to batteries, many firms in this region are well-suited to play a role in the national effort to accelerate non-petroleum energy sources. First and second generation biofuel facilities operate in the area and benefit from a central feedstock location, just like firms in the agribusiness cluster. The electrical equipment manufacturing sector includes companies working in battery technology, a key concern for electric cars, and solar/wind power storage.

Energy pattern industries in the Northwest Region are currently concentrated in a small number of firms. Hopefully a continued national focus on alternative energy research will help local companies, university researchers, and entrepreneurs expand this pattern industry into a larger cluster over time.

**Metal Manufacturing Core Cluster**

*Primary Metal Manufacturing (NAICS 331) - Spot Strength*

*Fabricated Metal Manufacturing (NAICS 332)*

Metal manufacturing includes firms in the primary and fabricated metal industries that are likely connected in this region. Fabricated metal producers, by far the largest employing group in the cluster, shape basic metal forms provided by primary metal manufacturers. Producers of fabricated metal typically develop inputs that are used in other final goods and services.

A number of mid-sized firms in the region are classified as machine shops which typically produce customized metal products for a variety of manufacturing contracts. Other fabricated metal producers specialize in utility vehicle platforms, wire ropes, metal buildings, and metal containers.

Employment in primary metal manufacturing was flat from 2003 to 2007 while fabricated metal firms grew annually at 18.8 percent, a tremendous rate compared to the national average of 1.5 percent. The cluster did decline in employment through the recession but still had substantial employment and an LQ over 2.5 in 2009.
INDUSTRY CONTRIBUTION IMPACT: CHEMICAL MANUFACTURING

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

Chemical manufacturing includes the primary inputs of organic and inorganic chemicals, petroleum refining, paper and plastic containers, industrial machinery maintenance, and scientific research and development. The industry makes agribusiness chemicals, fertilizers, pesticides, and pharmaceutical products that are typically inputs to other final products sold in export markets, thereby bringing additional money into the regional economy.

Chemical manufacturing workers are among the highest paid in the region at over $58,000. An addition of 100 employees in chemical manufacturing creates an estimated total of 429 jobs paying $20.9 million in salaries and contributing over $56.1 million to the gross state product. The value-added per worker in chemical manufacturing and supporting industries is $130,738.

<table>
<thead>
<tr>
<th>Chemical 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>
</tr>
</tbody>
</table>

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

Chemical manufacturing in the Northwest Region employs over 1,300 workers in a diverse range of companies. 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 chemical manufacturing. While the backward linkages are between the suppliers of raw materials to the industry, forward linkages are between the industry and the consumers.
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/accommodation/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.