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

NORTHEAST 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 Northeast region has a population of 90,231, which accounts for 1.5 percent of Missouri’s total population. Economic centers include Hannibal, where roughly 25 percent of area residents work, to Quincy, IL (5.4%) and Louisiana, MO (4.2%).* The average wage in 2008 was $28,266, considerably lower than the state average of $40,710.

In 2008 non-farm employment for the area was 30,882, which includes public and private sectors. Healthcare, manufacturing, and retail were the primary employing industries in the region, accounting for 45 percent of all jobs. Although most employment in the primary farming sector is not captured by this measure, over 6,600 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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</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>Agriculture, Forestry, Fishing, and Hunting</td>
<td>594</td>
<td>1.9%</td>
<td>$22,507</td>
</tr>
<tr>
<td>21</td>
<td>Mining</td>
<td>147</td>
<td>0.5%</td>
<td>$36,465</td>
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<tr>
<td>22</td>
<td>Utilities</td>
<td>321</td>
<td>1.0%</td>
<td>$53,812</td>
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<tr>
<td>23</td>
<td>Construction</td>
<td>1,498</td>
<td>4.8%</td>
<td>$38,981</td>
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<tr>
<td>31-33</td>
<td>Manufacturing</td>
<td>4,345</td>
<td>14.1%</td>
<td>$40,576</td>
</tr>
<tr>
<td>42</td>
<td>Wholesale Trade</td>
<td>1,215</td>
<td>3.9%</td>
<td>$34,538</td>
</tr>
<tr>
<td>44-45</td>
<td>Retail Trade</td>
<td>4,325</td>
<td>14.0%</td>
<td>$18,988</td>
</tr>
<tr>
<td>48-49</td>
<td>Transportation and Warehousing</td>
<td>1,213</td>
<td>3.9%</td>
<td>$33,517</td>
</tr>
<tr>
<td>51</td>
<td>Information</td>
<td>391</td>
<td>1.3%</td>
<td>$28,507</td>
</tr>
<tr>
<td>52</td>
<td>Finance and Insurance</td>
<td>986</td>
<td>3.2%</td>
<td>$33,082</td>
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<tr>
<td>53</td>
<td>Real Estate and Rental and Leasing</td>
<td>128</td>
<td>0.4%</td>
<td>$15,394</td>
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<tr>
<td>54</td>
<td>Professional, Scientific, and Technical Services</td>
<td>624</td>
<td>2.0%</td>
<td>$32,047</td>
</tr>
<tr>
<td>55</td>
<td>Management of Companies and Enterprises</td>
<td>202</td>
<td>0.7%</td>
<td>$45,501</td>
</tr>
<tr>
<td>56</td>
<td>Administrative and Support Services</td>
<td>578</td>
<td>1.9%</td>
<td>$24,365</td>
</tr>
<tr>
<td>61</td>
<td>Educational Services</td>
<td>2,864</td>
<td>9.3%</td>
<td>$28,151</td>
</tr>
<tr>
<td>62</td>
<td>Health Care and Social Assistance</td>
<td>5,274</td>
<td>17.1%</td>
<td>$28,692</td>
</tr>
<tr>
<td>71</td>
<td>Arts, Entertainment, and Recreation</td>
<td>656</td>
<td>2.1%</td>
<td>$14,963</td>
</tr>
<tr>
<td>72</td>
<td>Accommodation and Food Services</td>
<td>2,140</td>
<td>6.9%</td>
<td>$10,393</td>
</tr>
<tr>
<td>81</td>
<td>Other Services</td>
<td>1,108</td>
<td>3.6%</td>
<td>$19,241</td>
</tr>
<tr>
<td>92</td>
<td>Public Administration</td>
<td>2,276</td>
<td>7.4%</td>
<td>$27,776</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td>30,882</td>
<td></td>
<td>$28,266</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

Industry pattern analysis revealed some interesting core clusters and spot strengths in Northeast Missouri. Three diverse clusters of Agribusiness, Metal/Machinery Mfg., and Truck Transportation were identified along with additional manufacturing strengths and a concentration in Amusement services.

These core cluster and spot industries account for 18 percent of all private employment in the region.* Patterns demonstrate the heavy importance that agribusiness and manufacturing play in the region along with the linkages these industries have with Truck Transportation. Amusement activities highlight the role of tourism, especially in Hannibal and around Mark Twain Lake.

Cluster Summary

<table>
<thead>
<tr>
<th>Cluster</th>
<th>Agribusiness</th>
<th>Metal/Machinery Mfg.</th>
<th>Truck Transp.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location Quotient</td>
<td>2.39</td>
<td>5.86</td>
<td>1.84</td>
</tr>
<tr>
<td>Employment</td>
<td>268</td>
<td>272</td>
<td>566</td>
</tr>
<tr>
<td>Avg. Wage</td>
<td>$21,429</td>
<td>$22,080</td>
<td>$45,987</td>
</tr>
<tr>
<td>Description</td>
<td>Engaged in growing crops mainly for food and fiber, and includes farms, orchards, groves, etc.</td>
<td>Involved in the raising of fattening animals for the sale of animals or animal products.</td>
<td>Transformation of livestock or agricultural goods into products for intermediate or final consumption.</td>
</tr>
</tbody>
</table>

* Spot industry employment by detailed sector is not reportable due to BLS confidentiality restrictions.
The agribusiness cluster, comprised of animal and crop producers as well as food manufacturers, represents a significant and diversified industry for the Northeast 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 trucking, rail, and port service represent a key linkage for this cluster as it sells products to export markets. Specialized farm retailers and wholesalers also provide important inputs to this business cluster.

Crop producers, mainly focused on soybean and corn acreage, have benefited from increases in commodity prices spurred by foreign demand and biofuel mandates. The recession has

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* 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 6,624 farm owners and hired labor worked in the Northeast 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.
recently weakened prices but demand will hopefully rebound with the global economy. The northern Missouri energy producers of ethanol and biodiesel are strongly linked to this cluster and may see growth pick back up with a rise in oil prices and new federal initiatives. Animal producers are 5 times more concentrated in the Northeast than the rest of the nation and represent the highest location quotient (LQ) of all agribusiness industries.

As the Cluster Chart illustrates, the agribusiness industry did not see employment growth from 2003 to 2007. Part of reason may be the on-going decline in farm employment based on productivity gains. Agribusiness, like manufacturing, is becoming more high-tech and therefore continually needs fewer and fewer workers to produce the same output. It is noteworthy that from 2007 to 2008 this cluster grew 2.9 percent in employment while the region as a whole increased by only 0.5 percent.

**Metal and Machinery Manufacturing Cluster**

*Primary Metal Manufacturing (NAICS 331)*
*Machinery Manufacturing (NAICS 333)*

The Primary Metal and Machinery Manufacturing Cluster is highly specialized in the Northeast region with LQs of 5.49 and 3.45 respectively. Machinery manufacturing employment, in particular, grew over 14 percent a year from 2003 to 2007 while U.S. annual growth was only 1.5 percent.

This manufacturing cluster is primarily engaged in the export of value-added industrial inputs, serving intermediate demands in national and foreign markets. The sector declined in employment during 2008 which is not surprising given the overall global reduction in manufacturing output. Most firms do not appear to be linked to the automotive sector which is seeing more drastic, long-term changes. This fact may help this sector rebound more quickly once the economy turns around.

**Truck Transportation Cluster**

*Truck Transportation (NAICS 484)*

Truck transportation activities can serve regional markets with short-haul services (typically less than 100 miles) and national markets with longer hauls. Trucking services provide a key logistics input for many commodity-based and manufacturing industries. In the Northeast region, the majority of small-to-mid sized firms specialize in long-haul activities, thereby generating income from companies outside the region.

The Truck Transportation Cluster exceeded the U.S. growth rate from 2003 to 2007 with annual employment increases over 3 percent, a rate almost matched in 2008 despite the recession.
INDUSTRY CONTRIBUTION IMPACT: PRIMARY METAL MANUFACTURING

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

Primary metal manufacturing consists of ferrous (containing iron) and non-ferrous metal production and processing, foundries, steel product manufacturing and iron, steel mills and ferroalloy manufacturing. The industry makes basic metal parts that are typically inputs to other final products sold in export markets, thereby bringing additional money into the regional economy.

Primary metal manufacturing workers are among the highest paid in the region at $39,953. An addition of 100 employees in primary metal manufacturing creates an estimated total of 354 jobs paying $13.6 million in salaries and contributing over $23.6 million to the gross state product. The value-added per worker in primary metal manufacturing and supporting industries is $66,742.

<table>
<thead>
<tr>
<th>Primary Metal Manufacturing Impact: Addition of 100 employees</th>
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<tbody>
<tr>
<td></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: PRIMARY METAL MANUFACTURING

Primary metal manufacturing in the Northeast region employs 522 workers and directly creates $7 million in Gross Domestic Product. 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 primary metal 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.*

### Location Quotient

<table>
<thead>
<tr>
<th>Regional Employment</th>
<th>U.S. Employment</th>
</tr>
</thead>
<tbody>
<tr>
<td>INDUSTRY TOTAL</td>
<td>INDUSTRY TOTAL</td>
</tr>
</tbody>
</table>
Northeast Region

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.

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