

LIFE SCIENCES



Life Sciences—Definition

The Life Sciences cluster focuses on industries involved in the enhancement of quality of life through psychosocial, biological, medical research and engineering. It is also comprised of chemical and medical device manufacturing.

Missouri's Strengths

Industries within the Life Sciences cluster are enhanced by Missouri's quality universities and hospitals, highly skilled researchers, cutting edge technology, and strong agricultural base.

Pharmaceutical / Chemical Manufacturing

Pharmaceutical Manufacturing is a large employing industry in this cluster and an international exporter. Companies such as Pfizer Incorporated, K-V Pharmaceutical, and Aventis are involved in this type of activity. Agricultural chemical product manufacturing is a key growth industry for this cluster represented by the Monsanto and Bayer Corporations. Along with organic chemical manufacturers, such as Sigma-Aldrich Corporation, biological product manufactures represent the fastest growing sectors in this area.

Biological Research and Medical Laboratories

Other large employers and exporters within the life sciences segment in Missouri involve biological and medical research, and medical laboratory services. Types of research include studies on cancer, bone marrow, cholesterol, medical devices, medications, plant genomes, and agricultural enhancements. Laboratory services have grown substantially in the last five years and include processing patient samples, and genetic testing. Saint Luke's Regional Labs, Stowers Institute, and LabCorp are examples from this industry group.

Medical Instrument and Laboratory Equipment Manufacturing

Both Laboratory Equipment and Medical Instrument Manufacturing are considered sizable employers in the state. Types of equipment include microbial detection, molecular diagnostics, immunoassay, clinical software, pathogen detection, refractive laser surgery devices, and weighing systems. Related companies include Bio Merieux Inc., Bausch & Lomb Surgical, and Cardinal Scale.

Key Locations

The largest Life Science employing areas are located mainly in the St. Louis and Kansas City metro areas, and Boone and Greene counties. The highest growth areas include the I-70 corridor, the Ozarks region, the southeast, the northeast, and the southwest. Areas with high cluster concentrations include Holt, Audrain, Pike, Marion, and Buchanan counties, and St. Louis.

Factoid:

- Missouri ranks 3rd in Percent of Patents in Biopharmaceuticals.
- University of Missouri-Columbia and Washington University account for 90% of all university life science research in the state.
- 49% of the corn grown in Missouri is genetically modified.
- George Washington Carver, a Missouri native and early Life Science researcher, created 325 products from the peanut.



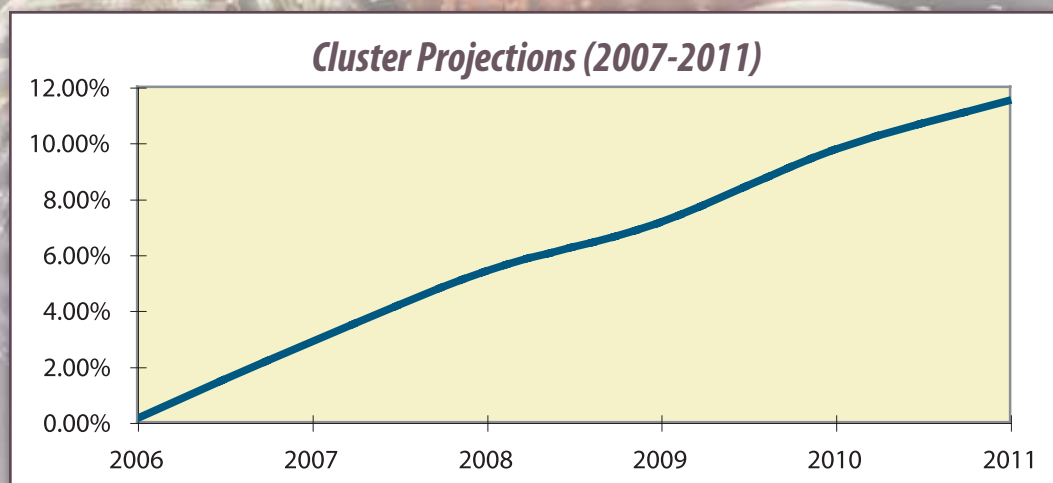
What's Next for Life Sciences?

Life science is an important and growing economic driver in Missouri. This diverse palette of research and manufacturing industries make up 1.2% of total jobs in the state, with 17% employment growth over the past five years. The University of Missouri-Columbia Life Science Center estimates their overall economic impact at \$440 million.

Life sciences are both sustained by and support the health care industry. The rapid expansion in health care is expected to continue with the demands presented by population growth, aging, outpatient services, and long term care. In turn, the life science industry supplies those demands with new products and techniques. Agriculture also benefits from life science products with advancements in plant science and genetic engineering.

The challenge for the industry is in transitioning the research into marketable products; sometimes under considerable financial risk and speculation. Industry concerns for the future involve public opinion, legislation, and consequently market trends related to genetically modified foods, stem cell research, the label "organic," and pesticide use. Other concerns involve the expiration of patents, particularly in pharmaceutical industries where the loss in revenue to generic drugs may limit companies' ability to fund future research and development.

Missouri is positioning itself to be a leader in this industry by establishing and promoting a life sciences corridor built on the strengths of universities and companies based in St. Louis, Columbia, Kansas City, and Rolla. UM-Columbia recently opened the Life Sciences Center and is developing a technology incubator. Plans have also been announced for a 1,450 acre agricultural experiment station and research park in Columbia. UM-Kansas City is building a Health Sciences Building and collaborates with the Stowers Institute. UM-St. Louis collaborates with the Donald Danforth Plant Science Center, Washington University, the Missouri Botanical Garden, and incubators including the Center of Emerging Technologies, and the Center of Research Technology and Entrepreneurial Enterprise (CORTEX).



Cluster Statistics

- Number of Businesses (2006) 1,034
- Number of Jobs (2006) 31,295
- Percent of Total Missouri Jobs (2006) 1.36%
- Average Annual Wages (2005) \$66,505
- Location Quotient (2006) 0.91
- Percent Change from 2001 Location Quotient 11.95%
- Net Percent Change in Jobs (2001-2006) 17.4%

- Total Change in Jobs (2001-2006) 4,629
Employment Change from 2001 attributed to:
 - National Factors 685
 - Industry Factors 932
 - Missouri's Competitiveness 3,013

Top Five Industries

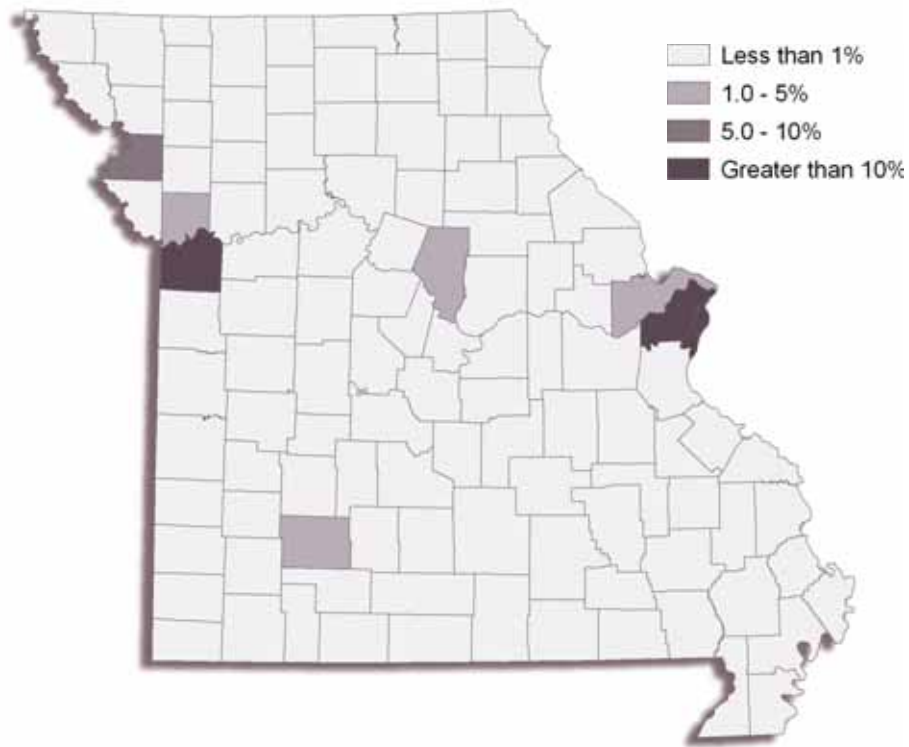
- Physical, engineering and biological research
- Pharmaceutical preparation manufacturing
- Pesticide and other ag. chemical mfg.
- Medical laboratories
- Surgical and medical instrument manufacturing

76.9% of
Cluster Jobs

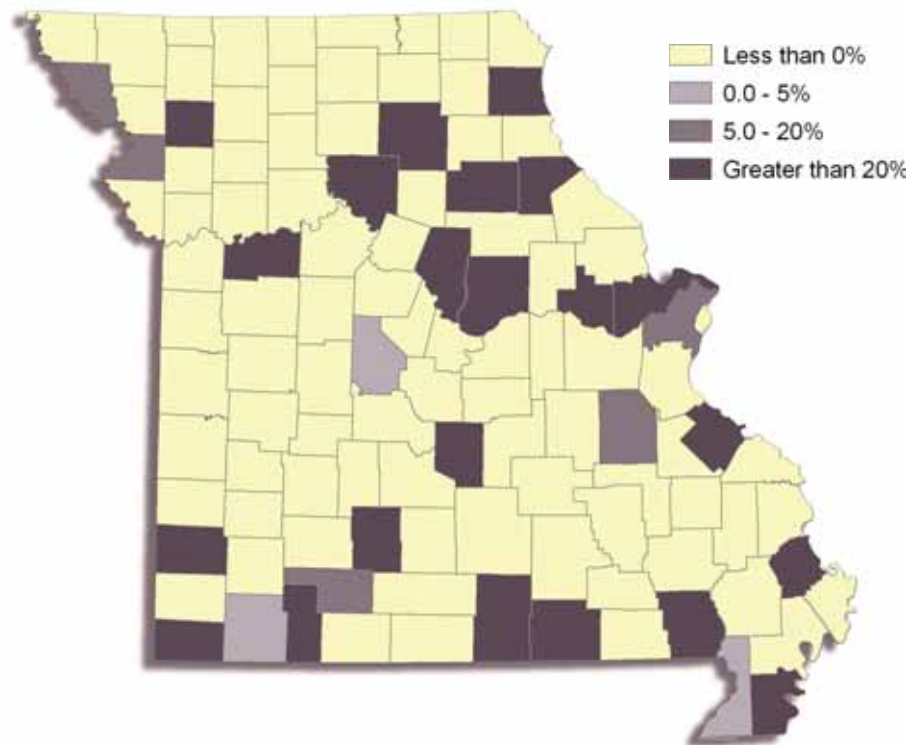
Targeted Occupations with Projected Growth and Current Wage

<i>15% of Cluster Occupations</i>	<i>Current Wage</i>	<i>Projected Growth 2004–2014</i>
Medical Scientists	\$59,910	30.00%
Medical and Clinical Laboratory Technicians	\$28,800	19.10%
First-Line Supervisors/Managers	\$47,950	4.30%
Team Assemblers	\$28,570	4.30%
Chemists	\$58,410	4.30%

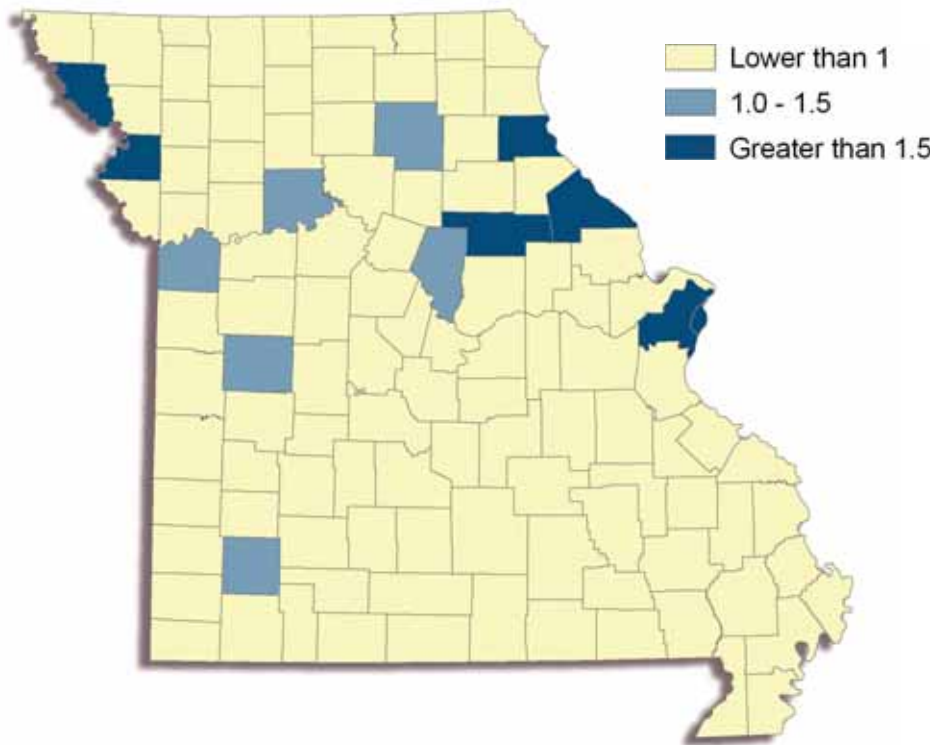
Employment Percentage by County (2006)



Employment Change by County (2001-2006)



Location Quotient by County (2006)

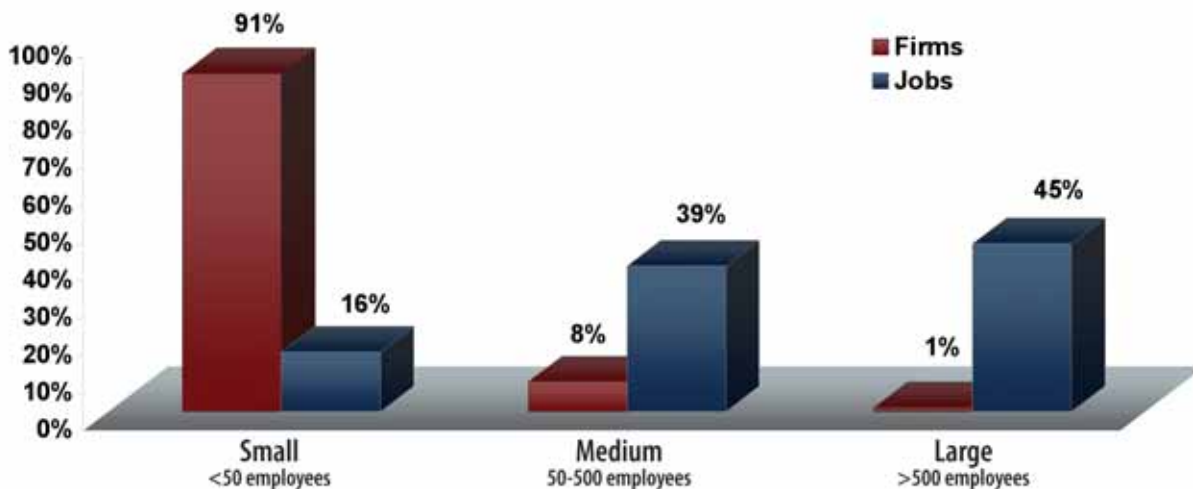


Top Industries by 2006 Location Quotient (LQ) with Change from 2001 LQ

NAICS	Industry	2006 LQ	Percent Change
325320	Pesticide and other ag. chemical mfg.	10.50	1.85%
325314	Fertilizer, mixing only, manufacturing	3.65	12.93%
311222	Soybean processing	3.08	-19.96%
325411	Medicinal and botanical manufacturing	2.71	-21.54%
325199	All other basic organic chemical mfg.	2.20	30.32%
311221	Wet corn milling	1.18	n/a*
339116	Dental laboratories	1.17	3.14%
325414	Other biological product manufacturing	1.15	18.60%
325193	Ethyl alcohol manufacturing	1.14	19.53%
339112	Surgical and medical instrument manufacturing	1.04	3.15%
621511	Medical laboratories	1.02	10.39%
339111	Laboratory apparatus and furniture mfg.	1.00	-3.80%

*Industry did not exist in Missouri in 2001

Distribution of Firms and Jobs by Firm Size (2006)



NAICS industries included in targeted cluster

311221	Wet Corn Milling
311222	Soybean Processing
311223	Other Oilseed processing
325193	Ethyl Alcohol Manufacturing
325199	All Other Basic Organic Chemical Manufacturing
325221	Cellosic organic fiber manufacturing
325311	Nitrogenous Fertilizer Manufacturing
325312	Phosphatic Fertilizer Manufacturing
325314	Fertilizer (Mixing Only) Manufacturing
325320	Pesticide and Other Agricultural Chemical Manufacturing
325411	Medicinal and Botanical Manufacturing
325412	Pharmaceutical Preparation Manufacturing
325413	In-Vitro Diagnostic Substance Manufacturing
325414	Biological Product (except Diagnostic) Manufacturing
334510	Electromedical and Electrotherapeutic Apparatus Manufacturing
334516	Analytical Laboratory Instrument Manufacturing
334517	Irradiation Apparatus Manufacturing
339111	Laboratory Apparatus and Furniture Manufacturing
339112	Surgical and Medical Instrument Manufacturing
339113	Surgical Appliance and Supplies Manufacturing
339114	Dental Equipment and Supplies Manufacturing
339115	Ophthalmic Goods Manufacturing
339116	Dental Laboratories
541380	Testing Laboratories
541710	Research & Development in the Physical, Engineering, & Life Sciences
621511	Medical Laboratories
621512	Diagnostic Imaging Centers



A Leader in Life Science: The University of Missouri-Columbia

The recent addition of the Life Science Center at the University of Missouri-Columbia has increased the overall research capacity at MU to more than six times that of any other public university in the state. University research and development spending of \$220 million annually generates nearly twice that amount in economic activity and employs more than 9,000 people.



Great strides are being made at MU in pharmaceutical and health sciences. Cancer fighting radio-pharmaceutical drugs are produced using the university research reactor. Other types of drugs developed at MU treat acid reflux, ulcers, and liver and bone cancer.

The university's effective diagnostic methods and technologies enhance the early detection of breast cancer and HIV; and can reveal evidence of stroke and Alzheimer's disease through brain imaging. Researchers are also working on potential cures for muscular dystrophy, Type I diabetes, arthritis, heart disease, and joint degeneration.

Agricultural benefits are generated from plant science at MU. Researchers are improving crop yields by genetically engineering plants to withstand the effects from pests, disease, floods, and even droughts.

The technology incubator complements MU's research as a place to transition discoveries into marketable products. In the past year, 42 new inventions received a patent and more than 20 businesses were created with the help of university faculty. The University of Missouri-Columbia is not only a leader in research, but a major economic stimulus in the state.



Definition of Terms

Location Quotient

Location Quotient (LQ) measures the employment concentration of an industry within a specified area relative to the nation as a whole. It is calculated by dividing the region's industry employment share by the nation's industry employment share. A LQ of 1.00 or greater means that there is a higher concentration in the region for an industry than exists nationally. The Location Quotient is a quick guide to understanding key industries within an area, especially when coupled with employment growth trends that shift-share analysis can reveal.

What Does the Location Quotient (LQ) Mean?		
	Low Employment Growth	High Employment Growth
High LQ	Important industries that may require attention	Important growth industries
Low LQ	Industries with lower potential for local economy	Potential emerging industries

Statewide Location Quotients are provided by cluster in the summary section and in each cluster and sub-cluster section. Top industry and county Location Quotients are included in each cluster and sub-cluster section.

Shift Share Analysis

Shift Share analysis measures employment changes in an industry, cluster, or regional industry mix. It breaks out employment changes into three components: National Share (NS), Industry Mix (IM), and Regional Shift (RS).

National Share (NS)—is the share of regional employment changes attributed to factors in the national economy.

Industry Mix (IM)—identifies local industry employment changes attributed to national industry employment changes.

Regional Shift (RS)—identifies a region's lagging or leading industries. This is also considered a measure of a region's competitiveness.

The shift share analysis is provided in the summary section and in each cluster and sub-cluster section under the heading Cluster Statistics.

Summary of Clusters

	Agribusiness	Automotive	Defense Homeland Security	Energy	Finance	Information Technology	Life Sciences	Transportation Logistics	All Clusters
Employer Units (2006)	3,040	258	348	696	9,769	2,345	1,034	12,468	29,349
Employment (2006)	88,645	36,223	16,922	20,275	132,036	38,604	31,295	175,064	519,316
Average Employment per Establishment (2006)	29	140	49	29	14	16	30	14	18
Percent of Total Missouri Jobs (2006)	3.86%	1.58%	0.74%	0.88%	5.75%	1.68%	1.36%	7.62%	22.62%
Average Annual Wages (2005)	\$39,605	\$54,167	\$77,935	\$58,053	\$52,206	\$70,938	\$66,505	\$43,374	\$51,285
Location Quotient (2006)	1.19	1.65	0.78	1.29	1.04	0.79	0.91	1.05	1.06
Percent Change from 2001 Location Quotient	5.25%	3.91%	38.25%	-1.91%	-2.34%	8.69%	11.95%	0.11%	1.22%
Projected Employment Change (2011)	1.03%	-1.43%	4.61%	1.72%	0.12%	9.25%	11.41%	3.81%	2.88%
Percentage of Firms with less than 50 Employees	91%	66%	88%	93%	92%	93%	91%	94%	93%
Net Percentage Change in Jobs (2001-2006)	-8.9%	-12.2%	42.2%	-17.6%	1.4%	10.8%	17.4%	0.3%	-3.40%
Employment Change in Jobs (2001-2006) Total Change	-8,654	-5,051	5,024	-4,320	1,798	3,760	4,629	446	-18,482
Employment Change from 2001 attributed to National Factors	2,498	1,059	305	631	3,343	894	685	4,482	13,805
Employment Change from 2001 attributed to Industry Factors	-14,590	-7,066	180	-4,315	3,204	195	932	-2,178	-32,559
Employment Change from 2001 attributed to Missouri's Competitiveness	3,438	956	4,538	-637	-4,749	2,670	3,013	-1,858	272

Note: Some industries are in more than one cluster, so the sum of individual clusters will not equal the total for all clusters.