



The Economic and Community Impact of the University of Missouri System, FY17

Conducted by: Tripp Umbach



Thank you for reviewing the UM System Community and Economic Impact Report



A note from University leaders regarding the economic impact of the UM System

The University of Missouri System—our four campuses, MU Extension and MU Health Care—is dedicated to the welfare and success of the citizens of Missouri. As the state's premier public higher education and research institution, we know the contributions we make each day play a vital role in the state's economic vitality.

To measure and quantify our impact, we conducted a comprehensive analysis with Tripp Umbach, a nationally recognized firm that performs impact studies for top academic institutions. As part of the study, they evaluated the economic, employment, government revenue and community benefit derived from the University. We are pleased to share that their findings show the UM System has a \$5.4 billion annual impact on the state of Missouri. In addition, more than 61,000 people have jobs, either directly or indirectly, and more than \$244 million in tax revenues are collected because of the University. Given that our annual appropriations are approximately \$400 million per year, our annual return on investment stands at an impressive ratio of 13 to 1. Our contributions through research, teaching and service are unmatched in the state.

We invite you to read the details of this report. You will find that the depth and breadth of our work and our economic and societal contributions are making a lasting impact on Missourians. We also encourage you to share the findings with your colleagues so that each Missourian recognizes that the University is committed to growing our economic impact.



UM System President
Mun Y. Choi



UM System VP for Research
and Economic Development
Mark McIntosh



MU Vice Chancellor for
Extension and Engagement
Marshall Stewart

This impact report outlines information provided to the UM System by Tripp Umbach in April 2018. For questions or clarification, please reach out to:

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Background

In November 2017, the University of Missouri System (UM System) retained Tripp Umbach to provide comprehensive analysis on the economic, employment and government revenues that arise from UM System operations and expenditures. The impact analysis measured effects throughout the state of Missouri and each of its four campuses, in Columbia, Kansas City, Rolla and St. Louis, as well as MU Extension and MU Health Care.

The influence the UM System and the aforementioned entities have on the vitality of the economy within each region and across the state includes business volume impacts (capital expenditures, operational expenditures, salary data and state and regional business volumes); direct and indirect/induced employment; government revenue at the local and state levels; employee and student spending in the local economy on goods and services; and visitor spending on the economy (wage premiums, job creation, etc.). This report outlines the overall impact of the UM System on the state of Missouri, as well as the impact of the system's four distinct campuses, extension organization and academic medical center.

Methodology Employed in the Economic Impact Study

Tripp Umbach's economic impact analysis measures the direct, indirect and induced business volume and government revenue impacts of MU's operations throughout the state of Missouri for fiscal year 2017. UM System provided Tripp Umbach with the following primary data used to conduct the analysis: capital expenditures, operational expenditures, number of employees and students, conferences, payroll and benefits and taxes paid to local and state governments. Tripp Umbach utilized IMPLAN to complete the economic impact analysis. For more information on the methodology, or for definition of terms, technical information and FAQs, see pages 17-20.

About Tripp Umbach



Tripp Umbach is a national leader in conducting economic impact studies, consultation and communication services for a wide variety of academic clients including Boston University, Indiana University, Michigan State University, The Pennsylvania State University, The Ohio State University, University of Arizona, University of Michigan, University of Minnesota, the University of Pittsburgh and the University of Virginia. Tripp Umbach has provided consultation and economic impact analysis services to more than 300 clients in all regions of the United States since 1990.

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UM SYSTEM'S IMPACT ON THE STATE OF MISSOURI IN FY17



\$5.4 BILLION

in economic impact to the state of Missouri



61,105 JOBS

supported throughout the state of Missouri



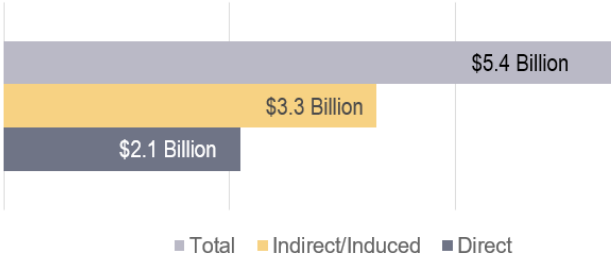
\$244.4 MILLION

generated in state and local tax revenue



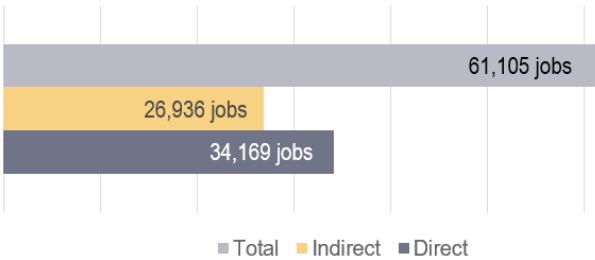
Economic

The UM System provides important economic activity throughout Missouri. Direct spending to vendors and employees helps generate additional spending throughout the state. In FY17, the University generated:



Employment

The workforce the UM System directly supports makes a contribution to the overall vitality of the state economy. Spending on capital projects, development, planning and suppliers indirectly support additional jobs in Missouri. In FY17, the UM System supported:



State and Local Government Revenue

The UM System contributes significantly to state and local tax bases through spending with state and local organizations, jobs for the University workforce and visitor spending. In FY17, UM System generated \$244.4 million in direct and indirect/induced tax payments in Missouri for state and local governments.

University Research

Research and innovation emanating from the University of Missouri System's research, graduate studies and economic development activities are continually advanced by faculty, staff and student innovation and scholarship. As a result of research activity and spending by the UM System across all campuses, significant economic, employment and government revenue is generated throughout the state. In FY17, UM System research totaled a \$391 million impact on the economy. In addition, these research activities supported more than 6,500 jobs and generated \$327,000 in state and local government revenue.

Stakeholder Interviews

Tripp Umbach interviewed internal and external stakeholders to better understand the perceptions and opinions regarding the UM System. Three key themes arose.

The UM System is Vital to The Missouri Economy

All stakeholders were aware and adamant regarding the important role the UM System plays in local and regional economies. Many stakeholders were quick to acknowledge the number of jobs held by staff, faculty, vendors and other businesses directly related to University operations.

Further, interviewees noted that the UM System is an indispensable pipeline for talent into the workforce. Without the UM System, respondents noted, there would be a noticeable void of readied talent, especially in the fields of agriculture and health care. Many business owners who spoke with Tripp Umbach were thankful and appreciative of the quality of students who graduate from the University.

The Perception of the UM System Is Improving

Another recurring sentiment throughout the interviews was the belief that the best days are ahead for the UM System. Specifically, respondents felt new leadership was "righting the ship" and helping mend strained relationships. Individuals felt that the universities were becoming "good neighbors" again in their communities, and that the UM System leadership was doing a good job of treating all campuses equally. Overall, there was a sense of optimism about the future of the UM System.

The UM System Needs to Be More Comfortable in Sharing Successes

A repeated theme was the call for the UM System to become more comfortable in sharing successes. Respondents felt the UM System holds a sense of "Midwestern humbleness," and the University would be wise to share more of its accomplishments.

BEYOND THE NUMBERS

While strong job creation, income generation and workforce development are undoubtedly key contributors to financial and economic growth, we must also recognize the myriad attendant benefits in the many communities of Missouri.

As a land-grant institution, we're committed to our obligation to extend the benefits of our university research and teaching beyond the boundaries of our campuses. With an AAU research university, two comprehensive urban research universities, a top science and technological university, a partnership with extension and an academic health center, the University of Missouri System serves all 114 Missouri counties each and every day. Our students, staff, and faculty are constantly making essential contributions to improve lives in Missouri communities.

The stories you will read in this report represent just a glimpse of our work. We're pleased to be able to serve you!

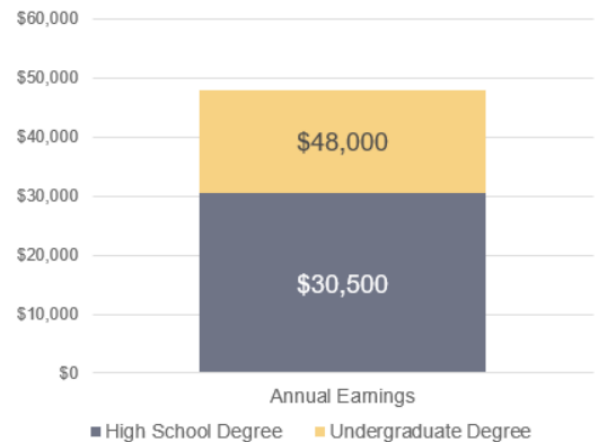
UM SYSTEM ALUMNI PLAY A VITAL ROLE IN THE MISSOURI ECONOMY

The Workforce of Missouri

The University of Missouri System educates and trains the future workforce of Missouri and beyond. Nearly 17,000 students graduate every year from a UM System campus, and each graduating class provides essential contributions to the state's human capital and workforce needs. More than 268,000 alumni live within the state of Missouri, comprising about half of all University of Missouri System alumni around the world.

Alumni Earnings

The typical bachelor's degree recipient can expect to earn about 66% more during a 40-year working life than the typical high school graduate earns over the same period¹. Further, Georgetown University estimates that, on average, college graduates earn \$1 million more in earnings over their lifetime. Another study by the Pew Research Center found that the median yearly income gap between high school and college graduates is around \$17,500. By forgoing college, an individual will forfeit about \$17,500 per year and \$1 million over a lifetime².



1. CollegeBoard
2. CornerStone University





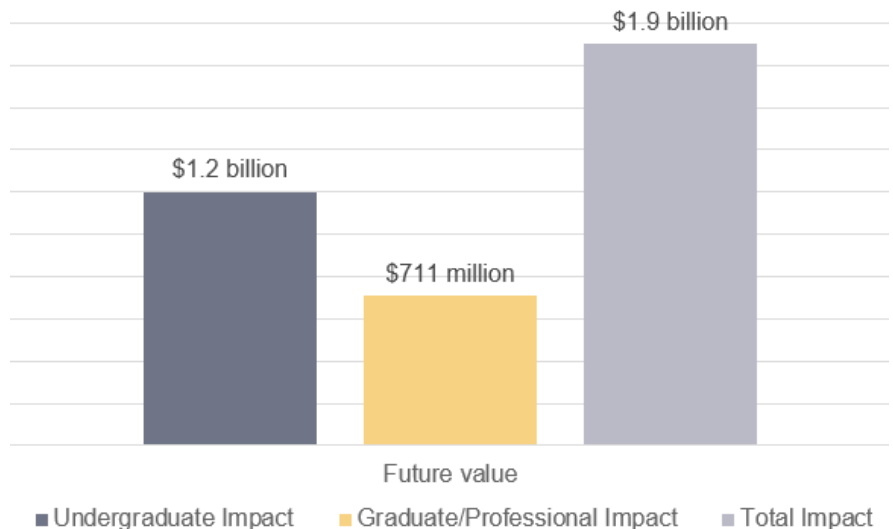
The nearly **11,000 baccalaureate degrees** and **5,800 advanced degrees** awarded by the UM System campuses in 2016-2017 equate to the creation of **\$1.9 billion** in future value over the next 40 years.

Future Value

The nearly 11,000 baccalaureate degrees the UM System awarded in 2016-2017 equates to the creation of \$1.2 billion in future value over 40 years (only counting graduates from a single year). Similarly, the 5,800 advanced degrees (i.e., masters, doctoral, professional) for 2016-2017 indicates another \$711 million of value created. In total, the UM System is creating over \$1.9 billion of incremental lifetime earnings for members of each graduating class.

Based on an average of \$6,218¹ in additional salary per graduate of the University of Missouri System, it is estimated that UM System working graduates since 1990 support \$46 billion in additional income in the state's economy annually (assuming that 70 percent are in the workforce).

Future Value Created by of a UM System Graduating Class



1. This number is the average amount of additional income that a graduate of a school with a similar profile to the University of Missouri System earns over the average college graduate. It is based upon an average of the studies that Tripp Umbach has completed for peer universities and university systems in which primary survey analysis was conducted.

Top 10 Industries Supported by the UM System in Terms of Economic Output

Industry	Total Output
Colleges and Universities	\$1,859,902,875
Real Estate	\$457,755,548
Hospitals	\$298,177,437
Owner-occupied dwellings	\$137,663,392
Agriculture	\$87,201,499
Restaurants	\$84,696,322
Wholesale	\$67,387,791
Hotels and motels	\$58,915,829
Wired telecommunications carriers	\$43,361,273
Insurance carriers	\$42,635,495





Top 10 Industries Supported by the UM System in Terms of Total Employment Output

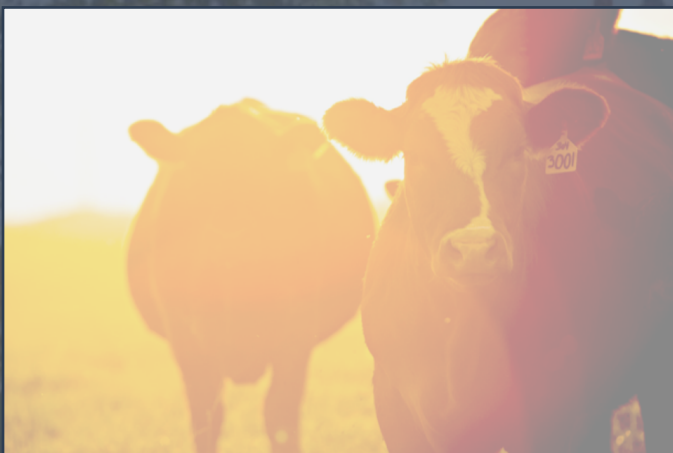
Industry	Total Employment
Colleges and Universities	21,692
Hospitals	9,731
Restaurants	3,481
Real Estate	2,285
Personal Care Services	1,477
Agriculture	1,136
Employment Services	813
Automotive Repair and Maintenance	762
Retail	519
Wholesale trade	508

PRODUCING BETTER BEEF

Show-Me-Select Program celebrates 20 years

Now celebrating its 20th anniversary as a nationally-recognized model in the land-grant system for translational research, the Show-Me-Select Replacement Heifer Program gives Missouri beef producers the tools to increase their herds' production and profitability, generating an economic impact of more than \$150 million.

Missouri ranks third in the country for total number of beef cows and beef production — an industry that contributes \$2 billion annually to the state's economy. In conjunction with University of Missouri Extension and the College of Agriculture, Food and Natural Resources, the Show-Me-Select Program studies the genetic potential and breeding performance of heifers. This knowledge enables Missouri farmers to make more informed decisions when it comes to production practices. With 857 farms from nearly every county in the state enrolling over the past decade, the program's research and the \$50 million in actual beef sales it creates are felt in virtually every household of Missouri.



MU's Show-Me-Select Replacement Heifer Program brings big dollars and big improvements to Missouri's beef industry





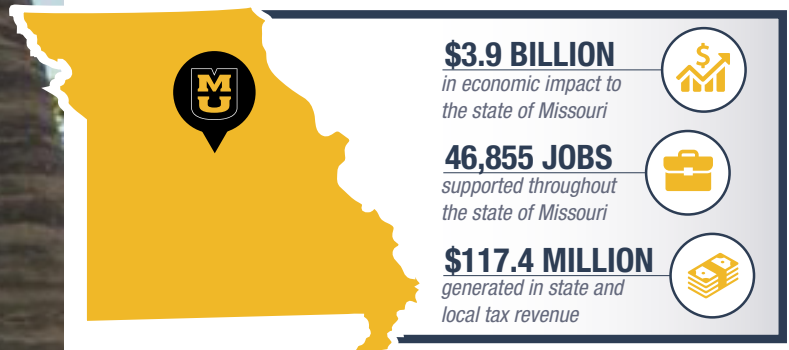
ABOUT THE UNIVERSITY OF MISSOURI-COLUMBIA

University of Missouri-Columbia (MU) students represent every Missouri county, all 50 states and 120 countries. As the state's largest university, it is one of only six public universities nationwide with schools of law, journalism, medicine, veterinary medicine, business, engineering and a nuclear research reactor all on one campus. Publications, web-based services and extension offices and faculty members in every county provide the benefits of MU research to all Missouri's citizens.



MU Chancellor
Alexander Cartwright

MU's Impact on Missouri in FY17



MU generated more than \$3.9 billion in economic impact for the state, which represents direct spending in Missouri (\$1.6B) and indirect spending that occurred as a result of the presence of MU (\$2.3B).

MU supported 28,687 full-time and part-time jobs throughout the state in FY17, and campus spending supported additional indirect jobs. In total, the presence of MU supported 46,855 jobs in Missouri.

MU's \$117.4 million total for in-state and local tax revenue reflects direct and indirect/induced tax payments in the state.



ABOUT UNIVERSITY OF MISSOURI EXTENSION

University of Missouri Extension (MU Extension) works with citizens across the state to help them gain practical knowledge, understand and adapt to change, solve problems and make informed decisions. Using University research-based knowledge, MU Extension addresses a wide range of needs that fall into three grand challenges for the state of Missouri:

- Economic opportunity
- Educational excellence
- Healthy futures

Every year, more than one million Missourians turn to MU Extension for education and support specifically designed to respond to current needs. MU Extension offers programs to address needs related to agriculture and the environment; business and community development; family and youth development; and health and safety.

MU Extension's Impact on Missouri in FY17

MU Extension has a significant economic impact on employment and revenue generated throughout the state. In FY17, the economic impact of MU Extension operations within the UM System totaled \$106 million. A report, conducted by TEconomy Partners using FY16 data, estimated that for every dollar invested in MU Extension, \$11 of public value is returned. The total returned public value for MU Extension was estimated at \$945 million. MU Extension operations support faculty serving in all 114 counties of the state and the City of St. Louis.

Similarly, for every \$1 invested in MU Extension's Business Development Program in the past three years, the program returned \$120 in economic impact for its clients in the form of increasing sales by more than \$1.19 billion. The program has helped create or retain more than 29,021 jobs while attracting nearly \$347 million in capital investments and \$1.17 billion in government contracts for a total impact of \$2.7 billion.

Spotlight: AllThingsMissouri.Org

MU Extension's Center for Applied Research and Engagement Systems has developed a new online tool — AllThingsMissouri.org. An interactive online resource focused on all things Missouri, the tool uses location-specific state and national data to provide interactive mapping, reports and insights about issues facing Missourians. Community, business and government leaders will find AllThingsMissouri.org helps them make informed decisions.

For every \$1 invested in the **Business Development Program** in the past three years, *the program returned \$120 in economic impact* for its clients in the form of increasing sales by more than \$1.19 billion.





MU School of Medicine's more than 680 faculty physicians and scientists educate more than 1,000 medical students, residents, fellows and others seeking advanced degrees, as well as more than 1,000 undergraduate students *each semester*.



ABOUT UNIVERSITY OF MISSOURI HEALTH

University of Missouri Health (MU Health) encompasses MU Health Care, the MU School of Medicine, the MU School of Health Professions and the MU Sinclair School of Nursing. As an academic health center, MU Health is home to groundbreaking research that has made it an international health care destination. MU Health Care physicians help patients across Missouri and around the world receive leading-edge care. University researchers, scientists and physicians work together to provide bench-to-bedside treatments that give patients access to truly personalized medicine based on factors as specific as the DNA of cancer tumors. Through access to the University of Missouri Research Reactor, researchers are able to pursue and provide innovative, customized treatments to the people of Missouri and beyond.

MU School of Medicine graduates treat patients from every county in the state, and more Missouri physicians have earned their medical degree from MU than any other university. The School of Medicine's more than 680 faculty physicians and scientists educate more than 1,000 medical students, residents, fellows and others seeking advanced degrees, as well as more than 1,000 undergraduate students each semester.

MU Health Care's Impact on Missouri in FY17

In FY17, the economic impact of MU Health Care totaled \$899 million. The employment impacts of these activities supported over 8,900 jobs throughout the state. Nearly \$645,000 of in-state and local government revenue generated in FY17 can be attributed to the activities of MU Health Care.

Spotlight: Show-Me ECHO

Show-Me ECHO, a telehealth training initiative from the MU School of Medicine, empowers primary care providers in rural parts of the state to identify and treat increasingly common conditions. With ECHO and access to specialist teams, clinicians throughout Missouri are equipped to address conditions such as asthma, autism, child psychiatry, chronic pain, dermatology, hepatitis C and opioid use disorder.

More than 800 individuals took part in Show-Me ECHO in 2017, including more than 650 Missourians from 62 counties and the City of St. Louis. Not only does the program save money and increase access to care, but it also impacts policy. Asthma ECHO helped save MO Health Net, the state's Medicaid program, an estimated \$8.3 million over two years.



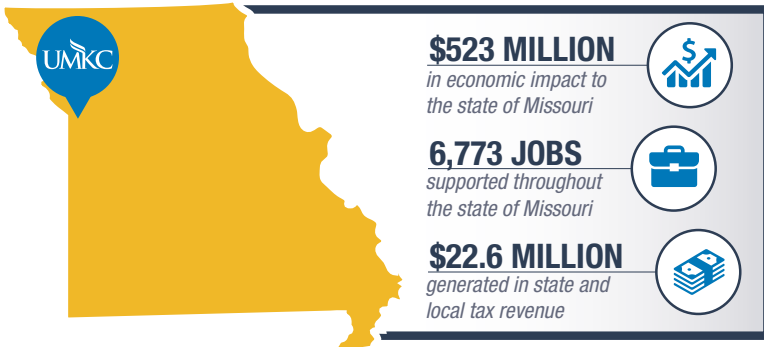
ABOUT THE UNIVERSITY OF MISSOURI-KANSAS CITY

The University of Missouri-Kansas City (UMKC), originally chartered in 1929 as a private institution, is now the largest comprehensive, fully accredited university in the Kansas City area. With a 14:1 student-to-faculty ratio and students from all 50 states and more than 85 countries, UMKC has earned national and international attention for the quality of its faculty, students, research and community leadership.



UMKC Interim Chancellor
Barbara Bichelmeyer

UMKC's Impact on Missouri in FY17



UMKC generated more than \$523 million in economic impact for the state, which represents direct spending in Missouri (\$200 million) and indirect spending that occurred as a result of the presence of UMKC (\$323 million).

UMKC directly supported 3,841 full-time and part-time jobs throughout the state in FY17, and campus spending supported additional indirect jobs. In total, the presence of UMKC supported 6,773 jobs in Missouri.

UMKC's total of \$22.6 million in-state and local tax revenue reflects direct and indirect/induced tax payments throughout Missouri.



ADDRESSING AN EPIDEMIC

UMKC receives \$8 million grant to help address national public-health emergency

144 people in the U.S. die from opioid-related causes each day. In February, the University of Missouri-Kansas City was awarded an \$8 million grant to help address what has been declared by the Department of Health and Human Services a national public-health emergency.

One reason our country has not been able to address the epidemic is because we don't have the workforce capacity to do so, says Laurie Krom, an investigator on the grant at the Collaborative to Advance Health Studies at the UMKC School of Nursing and Health Studies. Grant money will go to building the capacity of physicians and counselors necessary to provide treatment. The Collaborative is home to several national-based centers that implement evidence-based clinical practices into substance-use and mental-health treatment.

In 2016, more than 900 people in Missouri died from opioid overdoses. According to state data, one in every six deaths was opioid-related. Krom says 419,000 people in Missouri have diagnosed substance-abuse disorders, and 17,000 of those people are children between 12 and 17 years old.



A student at the UMKC School of Nursing and Health Sciences receives hands-on training in a clinic setting

THE MIRRAGEN MIRACLE

Mirragen: An innovative medical treatment from Missouri S&T labs

What began as a graduate student's research into the effects of borate-based glass on soft tissues is today a medical product that is poised to revolutionize the way physicians treat hard-to-heal open sores and wounds.

The Mirragen Advanced Wound Matrix is a wound dressing composed solely of microscopic glass fibers and particles that are absorbed by the body. Both flexible and moldable, the cotton-candy-like dressing can be easily customized, while its fiber structure allows Mirragen to absorb fluid from the wound site and facilitate healing.

Mirragen is one of several bioactive glass products manufactured by MO-SCI, a Rolla-based business co-founded by longtime Missouri S&T Professor Delbert E. Day.



Steve Jung, Missouri S&T alumnus, at MO-SCI with samples of Mirragen.





ABOUT MISSOURI UNIVERSITY OF SCIENCE AND TECHNOLOGY

Missouri University of Science and Technology (Missouri S&T) puts a strong focus on innovation and research. With 6,900 undergraduate and 1,900 graduate students from all 50 states and 60 countries, the campus offers 98 degree programs in 39 areas of study such as computer science, business, engineering, humanities and liberal arts.



S&T Interim Chancellor Christopher Maples

Missouri S&T's Impact on Missouri in FY17



Missouri S&T generated more than \$404 million in economic impact for the state, which represents direct spending in Missouri (\$162 million) and indirect spending that occurred as a result of the presence of Missouri S&T (\$242 million).

Missouri S&T directly supported 3,419 full-time and part-time jobs throughout the state in FY17, and campus spending supported additional indirect jobs. In total, the presence of Missouri S&T supported 5,549 jobs in Missouri.

Missouri S&T's total of \$16.6 million in-state and local tax revenue reflects direct and indirect/induced tax payments throughout Missouri.



UMSL

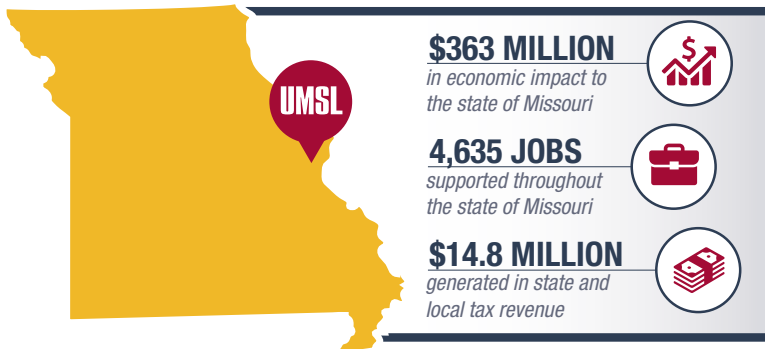
ABOUT THE UNIVERSITY OF MISSOURI-ST. LOUIS

The University of Missouri-St. Louis (UMSL) is the largest public research university in eastern Missouri, with nearly 17,000 students. It provides excellent learning experiences and leadership opportunities to a diverse student body whose influence on the region upon graduation is immense. While UMSL graduates can be found in all 50 states and 63 countries, their greatest impact is felt in the St. Louis area, where more than 70,000 UMSL alumni call the region home.



UMSL Chancellor
Thomas George

UMSL's Impact on Missouri in FY17



UMSL generated more than \$363 million in economic impact for the state, which represents direct spending in Missouri (\$155 million) and indirect spending that occurred as a result of the presence of UMSL (\$208 million).

UMSL directly supported 2,872 full-time and part-time jobs throughout the state in FY17, and campus spending supported additional indirect jobs. In total, the presence of UMSL supported 4,635 jobs in Missouri.

UMSL's total of \$14.8 million in-state and local tax revenue reflects direct and indirect/induced tax payments throughout Missouri.



ENERGY INNOVATION

UMSL teams with Ameren to develop game-changing, energy-related technologies

Creating successful startups and developing game-changing, energy-related technologies is the ultimate goal of the second installment of Ameren Accelerator – an innovative public-private partnership involving Ameren Corporation, University of Missouri–St. Louis, University of Missouri System and Capital Innovators. Through the program, select entrepreneurs receive \$100,000 in seed capital, intensive mentoring, technical assistance, facilities and networking connections.

“Through the Ameren Accelerator, we’ve been able to identify and support startups and innovations that have the potential to make a lasting, positive impact for our customers and our industry, while bringing new jobs to our region,” Ameren Chairman, President and CEO Warner Baxter said.

For the inaugural cohort, the Ameren Accelerator attracted more than 200 applications from startups representing 23 states and 31 countries. Seven companies were selected. Up to 10 UMSL students will again have an opportunity to work directly with the startups during the 2018 program.



Ameren Chairman, President and CEO Warner Baxter speaks to UMSL Accelerate students at the Cortex Innovation Center

Appendix A: Methodology

The economic impact analysis measures the effect of direct, indirect and induced economic, employment and government revenue impacts for the University of Missouri System and its four campuses, MU Extension and MU Health Care throughout the state of Missouri. Tripp Umbach utilized IMPLAN to complete the economic impact analysis.¹

The UM System and its entities affect business volume in Missouri in three ways:

- **Direct expenditures** for goods and services by the UM System, its faculty, staff, students and visitors. This spending supports local businesses, which in turn employ local individuals to sell goods and provide services UM System constituencies need.
- **Indirect spending** within the state of Missouri. Businesses that receive direct payments spend this money within the state, creating the demand for even more jobs.
- **Induced spending** by households, either directly employed by the UM System or its suppliers.

The UM System provided Tripp Umbach with the following primary data used to conduct the analysis:

- capital expenditures
- operational expenditures
- number of employees
- payroll and benefits
- taxes paid to local and state governments

The UM System's total economic impact includes the University's spending on goods and services with a variety of vendors; the spending of the University's faculty, staff, students and visitors; and the business volume generated by organizations within the regions and the state². Not all dollars spent by an institution remain in the institution's home state. Dollars that go out of the state in the form of spending with out-of-state organizations or people are not included in the University's economic impact. The economic impact values presented in this report are generated by direct, indirect and induced operational spending, capital spending, payroll, visitor spending and student spending within the state of Missouri.

1. Minnesota IMPLAN Group, Inc., (MIG) is the corporation that is responsible for the production of IMPLAN (IMPact analysis for PLANning) data and software. IMPLAN is a microcomputer-based, input-output modeling system. With IMPLAN, one can estimate Input-Output models of up to 528 sectors for any region consisting of one or more counties. IMPLAN includes procedures for generating multipliers and estimating impacts by applying final demand changes to the model.

2. To remain conservative while calculating visitor spending throughout the state, Tripp Umbach utilized federal per diem rates for Missouri: <https://www.gsa.gov/travel/plan-book/per-diem-rates>



Appendix B: Definition of Terms

Term	Definition
Study Year	Fiscal year, or FY17, is defined as July 1, 2016 - June 30, 2017
Total Industry Output	The total impact of an organization includes the spending of the organization, the labor income expenditures and the value added to the economy as a result of the organizational spending; this is described as the total industry output.
Total Economic Impact	The total impact of an organization is a compilation of the direct impact, the indirect impact and the induced impact generated in the economy as a result of the organization.
Direct Economic Impact	Direct impact includes all direct effects the organization has on the region due to the organization's operations. These include direct employees, organizational spending, employee spending and spending by students and visitors to the organization.
Indirect Economic Impact	The indirect impact includes the impact of local industries buying goods and services from other local industries. The cycle of spending works its way backward through the supply chain until all money is spent outside of the local economy, either through imports or by payments to value added.
Induced Economic Impact	The response by an economy to an initial change (direct effect) that occurs through re-spending of income received by a component of value added. IMPLAN's default multiplier recognizes that labor income (employee compensation and proprietor income components of value added) is not lost to the regional economy. This money is recirculated through household spending patterns causing additional local economic activity.
Multiplier Effect	The multiplier effect is the additional economic impact created as a result of the organization's direct economic impact. Local companies that provide goods and services to an organization increase their purchasing by creating a multiplier.
Government Revenue	Government revenue that is collected by governmental units in addition to those paid directly by an organization, including taxes paid directly by employees of the organization, visitors to the organization and vendors who sell products to the organization.

Appendix C: Technical Information

IMPLAN Methodology Definitions

The economic impact of the University of Missouri System was estimated using IMPLAN (Impact Analysis for PLANning), an econometric modeling system developed by applied economists at the University of Minnesota and the U.S. Forest Service. The IMPLAN modeling system has been in use since 1979 and is currently used by over 500 private consulting firms, university research centers and government agencies. The IMPLAN modeling system combines the U.S. Bureau of Economic Analysis' Input-Output Benchmarks with other data to construct quantitative models of trade flow relationships between businesses and between businesses and final consumers. From this data, one can examine the effects of a change in one or several economic activities to predict its effect on a specific state, regional or local economy (impact analysis). The IMPLAN input-output accounts capture all monetary market transactions for consumption in a given time period. The IMPLAN input-output accounts are based on industry survey data collected periodically by the U.S. BEA and follow a balanced account format recommended by the United Nations.

IMPLAN's Regional Economic Accounts and the Social Accounting Matrices were used to construct state- and regional-level multipliers, which describe the response of the economy to a change in demand or production as a result of the activities and expenditures of UM System. Each industry that produces goods or services generates demand for other goods and services, and this demand is multiplied through a particular economy until it dissipates through "leakage" to economies outside the specified area. IMPLAN models discern and calculate

leakage from local, regional and state economic areas based on workforce configuration, the inputs required by specific types of businesses and the availability of inputs in the economic area. Consequently, economic impacts that accrue to other regions or states as a consequence of a change in demand are not counted as impacts within the economic area.

The model accounts for substitution and displacement effects by deflating industry-specific multipliers to levels well below those recommended by the U.S. Bureau of Economic Analysis. In addition, multipliers are applied only to personal disposable income to obtain a more realistic estimate of the multiplier effects from increased demand. Importantly, IMPLAN's Regional Economic Accounts exclude imports to an economic area, so the calculation of economic impacts identifies only those impacts specific to the economic impact area. IMPLAN calculates this distinction by applying Regional Purchase Coefficients (RPC) to predict regional purchases based on an economic area's particular characteristics. The RPC represents the proportion of goods and services that will be purchased regionally under normal circumstances, based on the area's economic characteristics described in terms of actual trade flows within the area.

Employment Definitions

IMPLAN analysis is conducted to measure jobs/positions (part-time or full-time), not full-time equivalents (FTEs). Full-time and part-time employees generate impact in the economy and support additional indirect and induced employment throughout the state of Missouri. Employment data for the UM System was provided as an output of all individuals who receive a paycheck from the institution. This includes all full-time and part-time employed faculty, staff and students.

Government Revenue Impact Definition

Government revenue impacts generated in the current, FY17 study included all taxes paid by UM System to the state of Missouri (i.e., payroll, property, sales, unemployment, income and any other taxes paid to the state and local government). Any federal taxes paid by the University of Missouri System were not included in the government revenue impacts (i.e., FICA payments).

Visitor Definitions

Impact analysis looks to quantify the impact of the attraction of "fresh" dollars to a region. Therefore, when including visitor spending in the impact analysis of a university, the analysis will only include those visitors coming to a region from outside of said region. Visitors to events who also live in the region would have spent their dollar in that region otherwise; therefore, this dollar was not attracted to the region as a result of the organization being analyzed. For UM, the impact analysis looked at impacts to the state of Missouri. Visitors to the UM System were only counted if they were from outside of said region being analyzed.

Appendix D: FAQs

What is economic impact?

Economic impact begins when an organization spends money. Economic impact studies measure the direct economic impact of an organization's spending, plus additional indirect spending in the economy as a result of direct spending. Economic impact has nothing to do with dollars collected by institutions, their profitability or even their sustainability, since all operating organizations have a positive economic impact when they spend money and attract spending from outside sources.

Direct economic impact measures the dollars that are generated within a geographic region due to the presence of an institution. This includes not only spending on goods and services with a variety of vendors within the region, and the spending of its employees and visitors, but also the economic impact generated by businesses within the region that benefit from the spending of the institution. It is important to remember that not all dollars spent by an institution stay in geographic region of study. Dollars that "leak" out of the region in the form of purchases from out-of-area vendors are not included in the economic impact that an institution has on the region.

The total economic impact includes the "multiplier" of spending from companies that do business with an institution. Support businesses may include lodging establishments, restaurants, construction firms, vendors, temporary agencies and etc. Spending multipliers attempt to estimate the ripple effect in the economy where the spending occurs. For example: Spending by an institution with local vendors provides these vendors with additional dollars that they respense in the local economy, causing a "multiplier effect."

What is the multiplier effect?

Multipliers are a numeric way of describing the secondary impacts stemming from the operations of an organization. For example, an employment multiplier of 1.8 would suggest that for every 10 employees hired in the given industry, eight additional jobs would be created in other industries, such that 18 total jobs would be added to the given economic region. The multipliers used in this study range from 1.8 to 2.0.

The Multiplier Model is derived mathematically using the input-output model and Social Accounting formats. The Social Accounting System provides the framework for the predictive Multiplier Model used in economic impact studies. Purchases for final use drive the model. Industries that produce goods and services for consumer consumption must purchase products, raw materials and services from other companies to create their product. These vendors must also procure goods and services. This cycle continues until all the money is leaked from the region's economy. There are three types of effects measured with a multiplier: the direct, the indirect and the induced effects. The direct effect is the known or predicted change in the local economy that is to be studied. The indirect effect is the business-to-business transactions required to satisfy the direct effect. Finally, the induced effect is derived from local spending on goods and services by people working to satisfy the direct and indirect effects.

- Direct effects take place only in the industry immediately being studied.
- Indirect effects concern interindustry transactions: Because an institution is in business, it has a demand for locally produced materials needed to operate.
- Induced effects measure the effects of the changes in household income: Employees of an institution and suppliers purchase from local retailers and restaurants.
- Total economic impacts are the total changes to the original economy as the result of the operations of an institution, i.e., direct effects + indirect effects + induced effects = total economic impacts.

What methodology was used in this study?

IMPLAN (IMPact analysis for PLANning) data and software. Using classic input-output analysis in combination with regional specific Social Accounting Matrices and Multiplier Models, IMPLAN provides a highly accurate and adaptable model for its users. The IMPLAN database contains county, state, ZIP code and federal economic statistics that are specialized by region, not estimated from national averages, and can be used to measure the effect on a regional or local economy of a given change or event in the economy's activity.

What is employment impact?

Employment impact measures the direct employment (employees, staff, faculty and administration) plus additional employment created in the economy as a result of the operations of an institution.

Indirect and Induced employment impact refers to other employees throughout the region who exist because of an institution's economic impact. In other words, jobs related to the population — city services (police, fire, EMS and etc.), employees at local hotels and restaurants, clerks at local retail establishments and residents employed by vendors used by the institution.

What is the difference between direct and indirect taxes?

Direct tax dollars include sales taxes and net corporate income taxes paid directly by the institution to the state, while indirect taxes include taxes paid to the state by vendors that do business with an institution and individuals.

Is this a one-time impact, or does the impact repeat each year?

The results presented in this economic impact study are generated on an annual basis. The economic impact in future years can be either higher or lower based on number of employees, students, capital expansion, increases in external research and state appropriations.

What are Tripp Umbach's qualifications to perform economic impact analysis?

Tripp Umbach is the national leader in providing economic impact analysis to leading health care organizations, universities and academic medical centers. Since 1990, Tripp Umbach has completed more than 300 economic impact studies for such clients as: Boston University, Indiana University, Michigan State University, The Pennsylvania State University, The Ohio State University, UCONN, the University at Buffalo, University of Arizona, University of Michigan, University of Minnesota, the University of Pittsburgh, the University of Vermont, the University of Virginia, the University of Washington, and the University of Alabama at Birmingham.



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