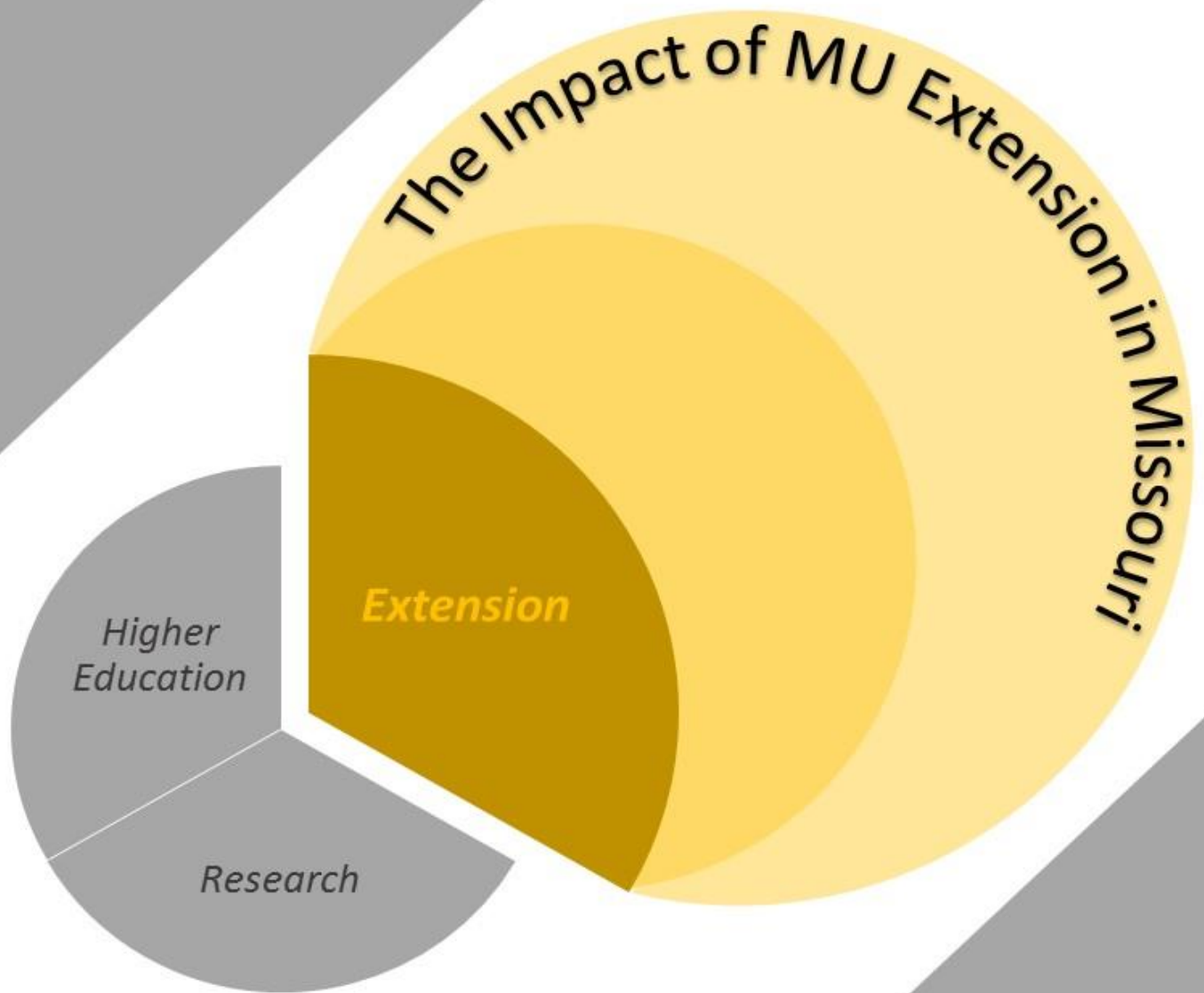


A Quantitative and Qualitative
Review of the Impacts of
University of Missouri Extension

June 2017





TEconomy Partners, LLC is a global leader in research, analysis, and strategy for innovation-based economic development. Today, we're helping nations, states, regions, universities, and industries blueprint their future and translate knowledge into prosperity.

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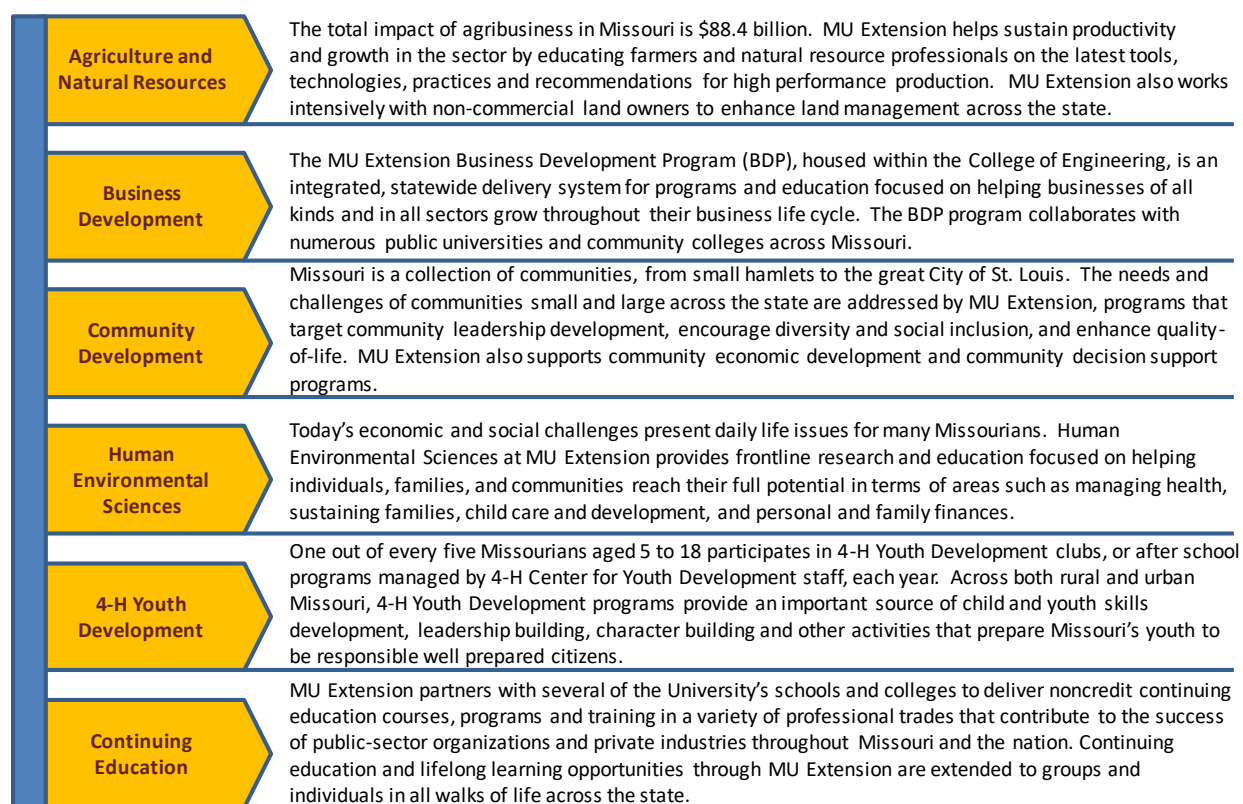
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Executive Summary

In addition to the missions of higher education and advanced research that all research universities share, America’s Land-grant universities, including the University of Missouri, have a third and critically important mission for the nation and its citizens—Extension. The University of Missouri Extension (MU Extension) is a practical system designed to bring the University’s knowledge, findings, innovations, technologies, and practice advancements to individuals and organizations across Missouri. Providing services in every county and community in Missouri, MU Extension provides a unique and highly practical system purpose-designed to meet the needs of individuals and organizations for reliable, actionable information and advice.

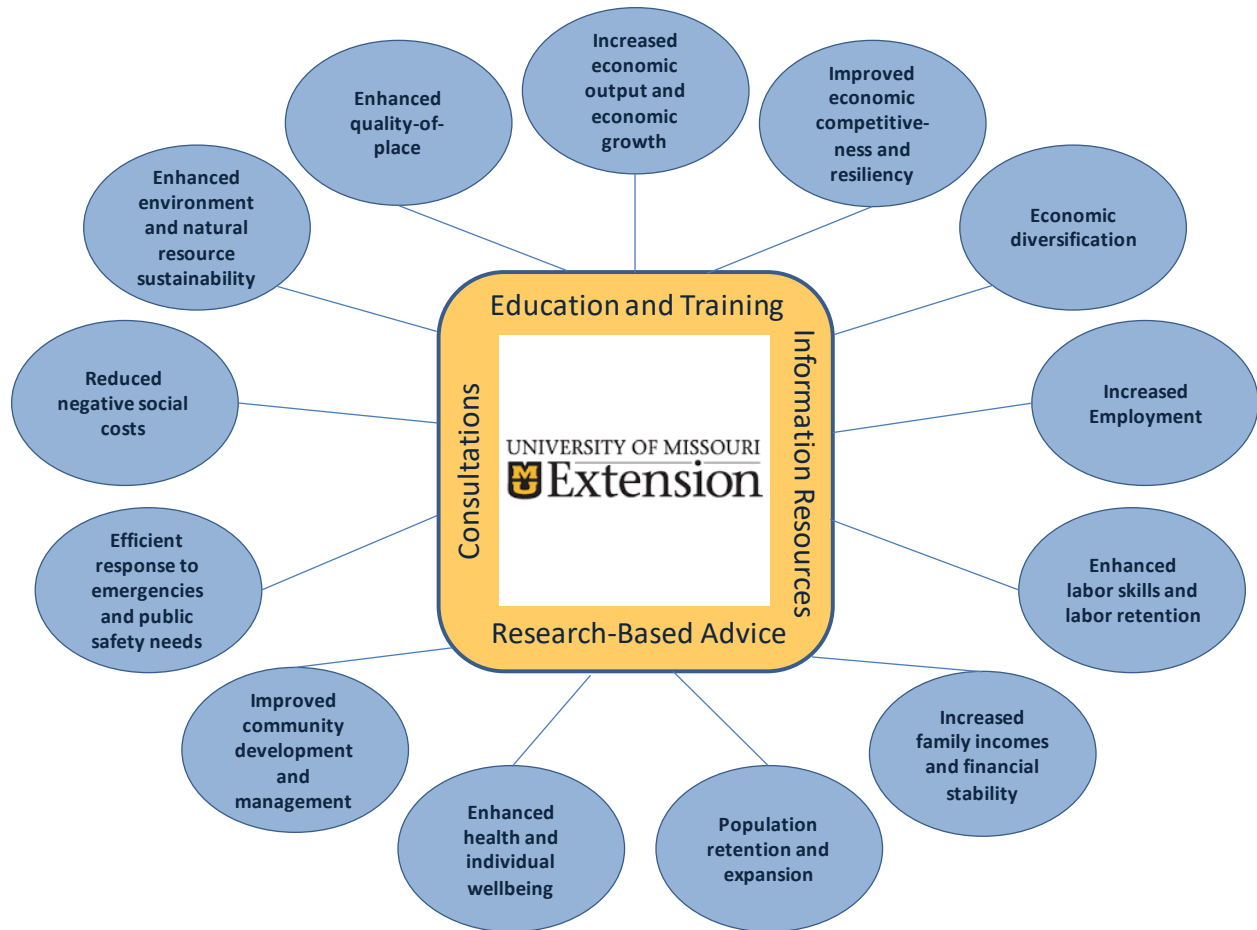
The scope of work undertaken by MU Extension is both broad and deep. At any given time, hundreds of initiatives, programs, educational events, and workshops are being run by MU Extension professionals across the state. It is not easy to summarize all the diverse activities undertaken under MU Extension’s mission, but at its heart, a series of six core program areas characterize a large majority of its activities (Figure ES-1).

Figure ES-1: Core Program Clusters within MU Extension



Taken as a system overall, MU Extension is responsible for generating substantial and wide-ranging impacts for the economy, for society, for communities, for families, and for individual Missourians. Figure ES-2 summarizes many of these key impact benefits. Within this report, TEconomy Partners, LLC (TEconomy) provides an independent evaluation and reporting of the many and varied ways in which the programs and operations of MU Extension create functional impacts across the state.

Figure ES-2: Core Program Clusters within MU Extension



MU Extension provides these services and impact benefits at a considerable scale, as these statistics from Extension show:

- MU Extension’s website is a critically important and efficient gateway to Extension. Website resources were accessed 6.9 million times in 2015, by 2.8 million unique visitors. The website recorded 14.5 million downloads of Extension publications.
- More than 1.3 million Missourians, distributed across every county and the City of St. Louis, directly participated in MU Extension programs during the year.
- Over 230,000 children and youth across Missouri participated in 4-H Youth Development clubs and afterschool programs managed by 4-H Center for Youth Development staff. 4-H Youth Development clubs reported more than 95,000 hours of volunteer service time, valued at \$39 million.
- Over 200,000 Family Nutrition Program-eligible Missourians are provided with direct SNAP-Ed education annually through MU Extension, and an additional 400,000 are served by MU Extension indirect educational program activities.

Individual programs operated by MU Extension also generate large-scale economic impacts for Missouri. While it is not possible to quantify each and every impact of the very large number of programs operated annually by MU Extension, several case studies reported herein serve to highlight the substantial benefits being generated (Table ES-1).

Table ES-1: Examples of Programmatic Economic Impacts at MU Extension

Example Program	Focus	Quantified Financial Impact
Show-Me-Select Replacement Heifer Program	Focuses on practices and strategies (both short- and long-term) to improve cattle reproductive efficiency.	Over 800 farms have participated in the program. \$34 million in gross sales benefit has been generated through increased livestock value. The total economic impact over 17 years of the program is estimated at >\$75 million.
Business Development Programs (Aggregated)	Helping business start-up, grow, and thrive in Missouri through management and entrepreneurial education and support services.	In the past three years, it is estimated that businesses engaged in the programs have increased sales by \$900 million, made \$436 million in new Missouri investments, procured \$1.1 billion in government contracts, and generated or retained almost 24,000 jobs.
Winter Feeding Systems for Cattle	Focuses on practices and strategies for on-farm production of forage for winter feed.	Cattle producers save approximately \$62 per cow annually when they use stockpiled tall fescue in their winter feeding system. As a result of this program, the number of Missouri cattle producers using stockpiled tall fescue increased 31 percentage points between 1998 and 2013. At the adoption rate of 57 percent statewide when last measured, the winter feeding system saves the state's cattle producers approximately \$38 million annually.
Regional Grazing Schools	Provides forage and grazing workshops to promote best practices for livestock production.	Over 600 schools held with over 15,000 Missouri producers participating. Impact has been estimated at \$83.6 million per year for the Missouri economy.
Pasture-Based Dairy Program	Focuses on practices and strategies for pasture-based dairy production, rather than confined animal feeding.	Reversed decline in dairy operations in the state, and has led to an additional 40 million gallons in annual milk production in the state (worth over \$50 million annually at farm-gate prices). An estimated 1,110 jobs have been generated in Missouri through expansion of pasture-based dairies.
Missouri Taxpayer Education Initiative	Provides Missouri individuals and families with tax preparation counseling and preparation assistance.	Over 10 years of the program, the completion of 43,824 federal returns have been supported with Missourians participating and federal tax refunds totaling \$39 million.

Many of the functional benefits provided by Extension programs are not specifically focused on generating economic impacts, but rather are focused on helping Missourians make better-informed life choices regarding their health, personal fitness, diet, family dynamics, child-rearing, home management, education, and other key quality-of-life impacting areas. Several examples show the large numbers of Missourians served by, and benefitting from, MU Extension programming (Table ES-2).

Table ES-2: Examples of Programmatic Participation at MU Extension

Example Program	Focus	Quantified Participation
Health Insurance Education Initiative	Designed to help Missourians navigate health insurance options, in particular those under the Affordable Care Act.	330 educational workshops conducted with 3,750 workshop direct participants. An additional 780,000 Missourians accessed information resources regarding health insurance and the ACA via Extension.
Stay Strong, Stay Healthy	Provides strength training classes for middle-aged adults and senior citizens across Missouri.	Has served over 8,000 individual participants, with over three-quarters of participants showing postprogram health improvement on quantitative evaluations.
Building Strong Families	Programming, education, and strategies to help build resilient families across Missouri.	Participation by over 27,000 adults and 7,000 youth.

The faculty and specialist staff in MU Extension serve hundreds of thousands of Missourians in any given year, and the MU Extension website serves millions. The programs in agriculture, human environmental sciences, business development, community development, the 4-H Center for Youth Development, and continuing education have “direct contacts” with persons individually or as participants in formal workshops, plus have “indirect contacts” through reaching people at public events, providing educational materials (printed and online), and via other pathways. MU Extension has reporting systems in place to capture data on these contacts as Table ES-3 illustrates.

Table ES-3: MU Extension Direct and Indirect Contact Data for Five Program Areas

(Continuing Education is reported separately on Table ES-4)

Program Area	Direct Contact Total	Indirect Contact Total	Total Contacts
Human Environmental Sciences	955,301	565,152	1,520,453
4-H Youth Development	98,439	190,993	289,432 ¹
Agriculture and Natural Resources	64,734	129,473	194,157
Community Development	25,179	75,007	100,186
Continuing Education	64,165	N/A	64,165
Business Development	19,449	3,650	23,099
TOTAL	1,163,102	964,225	2,127,327

The MU Extension website provides an efficient and highly used portal for accessing informational resources developed and curated by MU Extension. In the most recently completed year, the website recorded over 14.5 million downloads of publications (equivalent to 2.4 publications downloaded for every person in Missouri’s 6 million population).

As noted in Table ES-3, MU Extension is a large-scale provider of continuing education services for professionals in public safety and health professions. 2016 statistics reported by the University show a large body of both professionals and Missouri citizens served across the state (Table ES-4).

¹ Includes Family Nutrition Education Program participants.

Table ES-4: Participation in MU Extension Continuing Education and Lifelong Learning Programs

Continuing Education Unit	Focus	Number of Activities	Attendance Total
Continuing Medical Education	Continuing education for practicing physicians in Missouri.	1,879	31,779
Fire and Rescue Training Institute	Professional training for firefighters, plus rescue training for first responders and other special projects.	637	13,237
Missouri Training Institute	Training and job skills development for management, supervisors, and other personnel in business, nonprofit, and government organizations.	421	11,997
Osher Lifelong Learning Institute	Providing educational courses and programs designed to complement the interests, concerns, and lifestyles of over-50 adults.	127	2,324
MU Nursing Outreach	Statewide continuing education for nurses through a seven-month program combining face-to-face instruction, online classes, and mentoring by nursing faculty.	67	2,094
Law Enforcement Training Institute	Operation of police academy, continuing education for law enforcement officers, and special services in training School Protection Officers and Animal Cruelty Investigators.	67	1,369
Labor Education	Providing educational services for organized labor leaders and members in the state.	39	1,007
Veterinary Medicine	Providing continuing education for practicing veterinarians and the general public.	7	358

MU Extension exists to provide the functional impacts shown above and, as demonstrated, is reaching on an annual basis over 2 million persons across the state with varied programming and education resources, plus meeting demand for more than 14 million downloads via online traffic. These programmatic and resource access activities are generating a broad range of economic and functional impacts that benefit the economy, society, communities, families, and individual Missourians.

Quantifying the dollar value of functional impacts is highly challenging—not only because of the large volume and diverse range of programs provided through MU Extension, but also because education, information, and training are designed to influence human behavior, performance, and associated outcomes (each of which are difficult to evaluate). To provide a useful overview of the scale of impacts likely being generated by the functional work of MU Extension, TEconomy took an approach of choosing several functional impact areas and modeling (using input/output analysis) the impact of a positive change in a key measure pertaining to that impact. The areas modeled included the following:

- A 1 percent improvement in Missouri agricultural productivity:
 - Overall
 - In crop production
 - In cattle production
 - In dairy production.
- The impact a 1 percent improvement in the productivity of the Missouri healthcare workforce (e.g., via continuing education programs improving worker effectiveness).
- A 1 percent improvement in Missourians health and fitness as a result of MU Extension diet and exercise programs.

- A 3 percent reduction in substance abuse as a result of engagement of youth in 4-H Youth Development programs and a lifelong positive impact on behavior.
- A 1 percent savings in local government expenditures, hypothesized as occurring through the training and planning assistance provided by MU Extension.
- The impact of a 1 percent increase in funding for MU Extension’s Business Development Programs.

Using only the conservative impact effect for each of these variables results in substantial total impact effects in Missouri. Table ES-5 provides a brief synopsis of these findings.

Table ES-5: Synopsis of Measuring the Effect of Positive Swings in Key Missouri Variables as a Result of Selected MU Extension Programs (Total = Direct + Indirect + Induced Impacts Calculated Via IMPLAN I/O Models)

Functional Impact Variable	Total Economic Impact (\$ Output)	Total Employment Effect (# of Jobs)
Overall Agricultural Output (effect of a 1% increase in ag output via MU Extension functional impacts)	\$192.8 million	1,690
Crop Impact Only	\$85.2 million	712
Cattle Impact Only	\$38.8 million	454
Dairy Impact Only	\$6.3 million	31
Healthcare Cost Savings (effect of a 1% increase in healthcare workforce productivity via MU Extension Continuing Education resulting in effective savings to the healthcare system in MO).	\$352.8 million	–
Hospitalization Cost Savings (effect of a 1% reduction in hospitalizations occurring via improved diet and exercise impacts on associated diseases).	\$17.4 million	–
Reduction in Substance Abuse in Missouri (effect of a 3% reduction in substance abuse as a result of 4-H Youth Development programming). ²	\$24 million	–
Local Government Cost Savings (1% decrease in economic output (\$) for local government sectors due to lowered spending from increased operational efficiency as a result of leadership training and other community development programs). ³	\$12.1 million	–
Increase in the number of companies that receive business development assistance as the result of a 1% increase in operational funding.	\$70.5 million	242

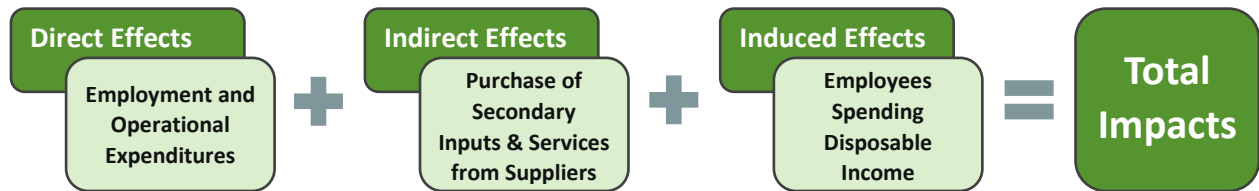
TEconomy considers these models to be highly conservative. Given the large numbers of individuals served in Missouri annually (across such major sectors as agriculture, healthcare, local government, etc.), the actual impacts likely exceed these estimates. It is important to consider the “return on investment” that the funders of MU Extension receive in Missouri in relation to the total operational funding that MU Extension receives. In fiscal year (FY) 2016 MU Extension had \$86.2 million in total operating funds. A 1 percent increase in Missouri agricultural output alone (not counting the many other functional impact areas modeled) surpasses the total cost of operating Extension by \$106.6 million.

² RAND estimates that school-based drug prevention programs can reduce lifetime use of drugs by as much as 3 percent (https://www.rand.org/content/dam/rand/pubs/testimonies/2005/RAND_CT237.pdf).

³ Key assumption is that money is reallocated to tax cuts for households, public infrastructure construction projects, and education support in equal proportions. Also, assumption that tax cut is spread equally across household income brackets.

In addition to the functional economic impacts identified above, there is also economic impact generated in the state through the operational expenditures of MU Extension. While MU Extension obviously does not exist simply to create economic stimulus through expenditures (but rather is focused on the wide-ranging and high-impact functional work as outlined above), the additional expenditure impact is not an insignificant impact for Missouri—primarily because a notable proportion of the funding for MU Extension comes from external (federal) funding sources that are then spent in operations across the state. The expenditure impacts associated with MU Extension are detailed below and comprise the elements shown on Figure ES-3.

Figure ES-3: Components of Total Impacts



In measuring expenditure impacts, TEconomy performed the analysis on a statewide basis (Table ES-6). The full-time equivalent (FTE) employment data used within the impact model consists of 883 FTE extension staff, administrative workers, and mission-specific contractors in FY 2016. The operational expenditures data used within the impact model reached more than \$86 million in FY 2016. The University of Missouri (including funding from the State of Missouri) provided \$49 million or 57 percent of the funds used to support extension activities across the state. As part of the national Land-grant based Cooperative Extension program, MU Extension also receives approximately \$23 million in annual funding (27 percent) from the U.S. Department of Agriculture’s (USDA’s) National Institute of Food and Agriculture (NIFA) via the Smith-Lever Act Capacity Grant. County-based resources used for locally based extension workers’ compensation and operating costs reach nearly \$14 million and account for 16 percent of the total operational resources.

Table ES-6: Total Economic Impact of MU Extension, FY 2016

Impacts	Impact Metric					
	Employment (FTEs)	Labor Income (\$ in Millions)	Value Added (\$ in Millions)	Output (\$ in Millions)	State/Local Tax Revenue (\$ in Millions)	Federal Tax Revenue (\$ in Millions)
Direct Effects	883	\$58.0	\$61.6	\$86.2	\$1.6	\$11.0
Total Impacts	1,522	\$85.9	\$112.2	\$175.9	\$5.6	\$17.9

Source: TEconomy’s calculations and analysis using IMPLAN I/O model of the State of Missouri.

As Table ES-6 illustrates, the impact of MU Extension’s expenditures on the State of Missouri resulted in the following:

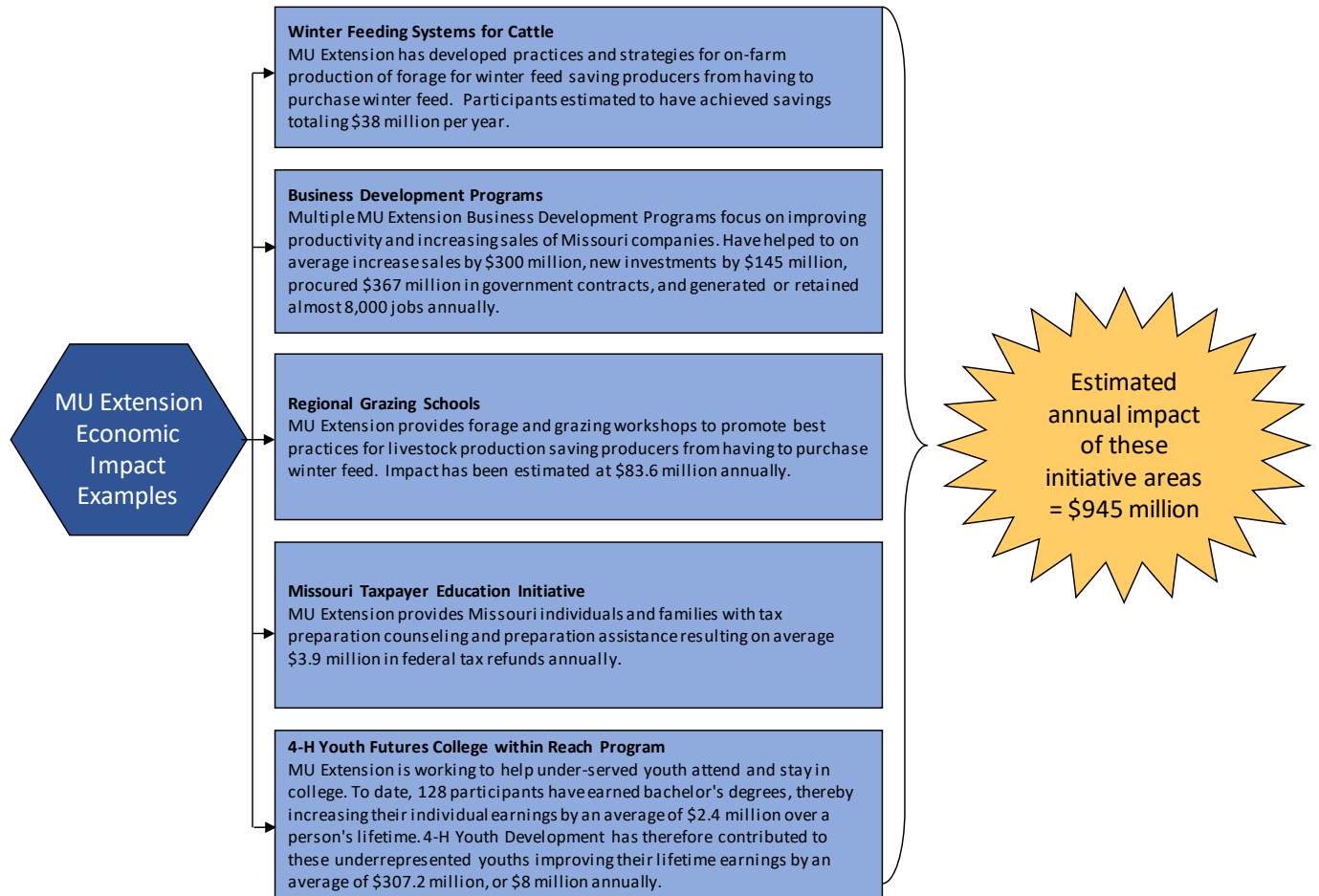
- More than 1,520 workers. For every one MU Extension job, Extension expenditures generate an additional 0.72 job in the Missouri economy.
- \$176 million in total economic impact of expenditures.
- More than \$23 million in total public revenues annually.

In conclusion, TEconomy finds MU Extension to be a significant economic catalyst for the State of Missouri. Simply in terms of expenditure impacts, MU Extension generates \$176 million in Missouri economic output and more than 1,550 jobs for Missourians. These expenditure impacts are, however, far eclipsed in their importance by the benefits accruing to the state through the wide array of services provided through MU Extension’s network of programs and initiatives (the functional impacts of Extension).

MU Extension is first and foremost a training- and information-provision organization with a uniquely practical mission—strengthening the economic conditions of Missouri’s agricultural and livestock producers, industries, communities, and individual citizens through research-based educational programming. MU Extension’s purpose is to produce positive economic and social impacts for the State of Missouri. These impacts are categorized by economists as “forward-linkage impacts,” which, rather than being related to institutional spending, are related to institutional mission and function. These are the impacts that Congress envisioned as benefits to be provided through the formation of the state extension programs. It is these impacts that are making a difference every day in the lives of Missourians in every county of the state.

Case studies used to assess the impact of just a few of these initiatives find positive benefits for the Missouri economy that total nearly a billion dollars on an annual basis (Figure ES-4).

Figure ES-4: Examples of MU Extension’s Impact



Overall, the investment in MU Extension clearly provides a very strong return on investment for the state. For an annual total investment of \$86.2 million (2016), MU Extension initiatives are generating dividends in just the five programs highlighted in Figure ES-4 with economic impacts alone totaling nearly \$950 million in an average year, more than a ten-fold return.

Section I: Introduction

In the knowledge-driven economy of the United States, there is no doubt that America’s world-leading universities play two critically important and vital roles in advancing national progress—research and education. **Academic research** is a key driver of discovery and innovation across the American economic, social, and cultural landscape and provides fact-based solutions to challenges and questions facing the nation, individual states, and communities. **Higher education** imparts the knowledge, problem-solving skills, and specific subject matter expertise required to realize the potential of individuals to participate in, and successfully contribute to, the complex social and economic fabric of the United States and the increasingly connected global community. The universe of U.S. university-based research and higher education spans a highly diverse range of disciplines in physical sciences, life sciences, social sciences, arts, humanities, and professional disciplines, working to assure our nation understands and addresses the full spectrum of needs and opportunities in social, political, cultural, technological, and economic aspects of life.

While all universities in the United States engage in the two core missions of higher education and research, there exists a special subset of universities that advance an important third mission. These are America’s **Land-grant universities** that carry forward the additional mission of **Extension**. In addition to sharing the research and higher education missions of all universities, Land-grant universities (as shown in Figure 1) are deliberately structured to contain an inbuilt system for disseminating, or “extending,” their knowledge, findings, innovations, and technological and practice advancements for use by key audiences outside of the university environment. Extension provides a unique and highly pragmatic system purpose-designed to assure science-based knowledge is not only contained within the academy, but is also deliberately and professionally transmitted to individuals and organizations across the economy and society—individuals and organizations who need advanced information to understand change, solve problems, make informed decisions, and carry innovations forward into practice.

Figure 1: Land-grant Universities and the Additional Mission of Extension



A. The Mission of Extension

While often recognized for advancing American progress in agriculture, Extension actually has a much wider range of focus and influence.

Extension has evolved to embrace an expansive mission, seeking to advance not only improvements in specific sectors of the economy but also provide knowledge to empower societal, family, and individual capacity to thrive in the economy and socio-cultural fabric of the United States. This holistic approach to extending the university to benefit society and individuals is particularly embraced within the **University of Missouri Extension (MU Extension)**, which operates as an extension service available to the full university, and beyond, rather than focused solely within a college of agriculture.

As noted by the University, MU Extension “is a partnership of the University of Missouri campuses, Lincoln University, the people of Missouri through county extension councils, and the National Institute for Food and Agriculture of the U.S. Department of Agriculture.”⁴ The University notes that “using science-based knowledge, University of Missouri Extension engages people to understand change, solve problems and make informed decisions.”⁵

The diversity of the MU Extension mission is highlighted in the statement that “MU Extension makes university education and information accessible for:

- Economic viability
- Empowered individuals
- Strong families and communities
- Healthy environments.”⁶

⁴ “About MU Extension” Accessed online at <http://extension.missouri.edu/about/home.aspx>.

⁵ Ibid.

⁶ Ibid.

A HISTORIC AND VISIONARY SYSTEM FOR AMERICAN PROGRESS

Land-grant universities have their historic roots in the Morrill Land-Grant Act of 1862, which provided grants of land to the states that could then be sold to finance and support institutions to teach agriculture, mechanics and military tactics, without forgoing classical studies.

These institutions particularly focused on providing a practical education suited to the demands of the expanding American economy. The original Morrill Act gave rise to, and supported, a series of colleges and universities that have grown to become many of this nation’s most prestigious and research-intensive institutions. The subsequent Hatch Act of 1887 further built upon the Morrill Act’s foundation by authorizing federal grant funds to each state for the establishment of an agricultural experiment station connected to each state’s land-grant institution. These experiment stations were then funded by ongoing federal funds leveraged with state matching dollars.

The Smith-Lever Act of 1914 created a Cooperative Extension Service associated with each land-grant institution. The “Cooperative” part of the Extension Service name references the unique partnership between the federal (USDA), state (land-grant colleges), and local (county) entities that enables the pragmatic and crucially important work of translating and disseminating the latest know-how, information, and innovations that result from the research of the land-grant colleges and their experiment stations.

It is a testament to Representative Justin Smith Morrill of Vermont (for whom the Morrill Act is named), and each successive administration and congress, that this integrated system of land-grant universities, Experiment Station Systems, and Cooperative Extension Services, providing R&D-based solutions and pragmatic knowledge transfer, has grown and thrived for more than 150 years.

Simon Tripp, et al., 2017. “National Evaluation of Capacity Programs.” TEconomy Partners LLC for the National Institute of Food and Agriculture.

Extension means “reaching out,” and the University of Missouri, alongside teaching and research, provides focused programs through MU Extension that “extend” its resources—working to meet public needs with university-developed information and university-based intellectual capital through a broad range of activities. These activities and programs, developed at the University, are delivered through a distributed system of county, City of St. Louis, regional, and University-based operations and personnel. MU Extension offices throughout Missouri house extension faculty and staff who respond to public inquiries; conduct workshops and other educational events; and provide answers to commonly encountered problems through educational materials, web-based information, the telephone, and individual consultations.

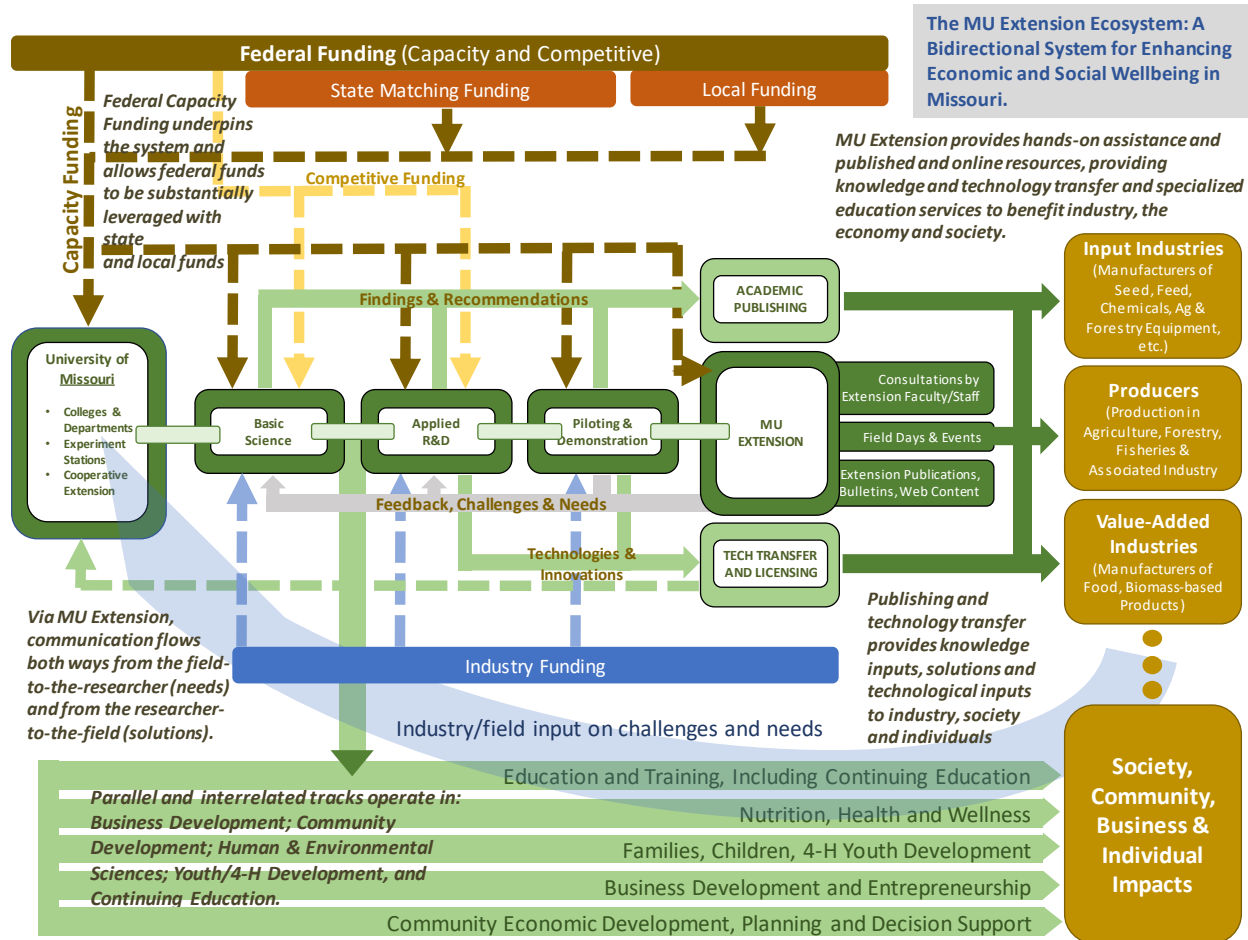
MU Extension helps assure that important research discoveries, innovations, and technologies are brought to the attention of those needing to implement them whether they be in production sectors or among government, communities, families, or individuals.

MU Extension is supported by federal, state, and local (primarily county-level) funding. The United States Department of Agriculture’s (USDA’s) National Institute of Food and Agriculture (NIFA) is the federal partner, providing annual Congressionally appropriated formula (capacity) funding that is further leveraged by state matching and county funding supports. Extension may also receive funds through contractual work and moderate fees charged for accessing programs and materials. It is important to note that University of Missouri tuition dollars are not available to provide support for MU Extension operations, and thus any expansions in University revenues from tuition increases cannot flow through to support Extension. The MU Extension system is very much dependent on federal capacity funding and matching funds leveraged from the State of Missouri and the counties and communities across the state.

B. The University of Missouri Extension Delivery System

The funding for MU Extension supports the operation of a sophisticated delivery system informed by a two-way flow of information and needs identification. In one direction, MU Extension works to disseminate innovations and knowledge produced through University-driven inquiries in scientific and other disciplines to those across Missouri who can benefit from the information. But, it is critically important to note that the system also works in the other direction, with county-level Extension personnel in the field and in communities learning about local challenges and needs and feeding them into the University research enterprise for study and the production of pragmatic solutions to identified needs. MU Extension thus operates as an “ecosystem” (Figure 2) dedicated to finding solutions to needs and transferring knowledge to key audiences who can improve the economy and society of Missouri and the well-being of Missourians and their families.

Figure 2: The MU Extension Ecosystem: A Bidirectional System for Enhancing Economic and Social Well-Being in Missouri



Adapted from original figure in Simon Tripp, et al., 2017. "National Evaluation of Capacity Programs." TEconomy Partners LLC for the National Institute of Food and Agriculture.

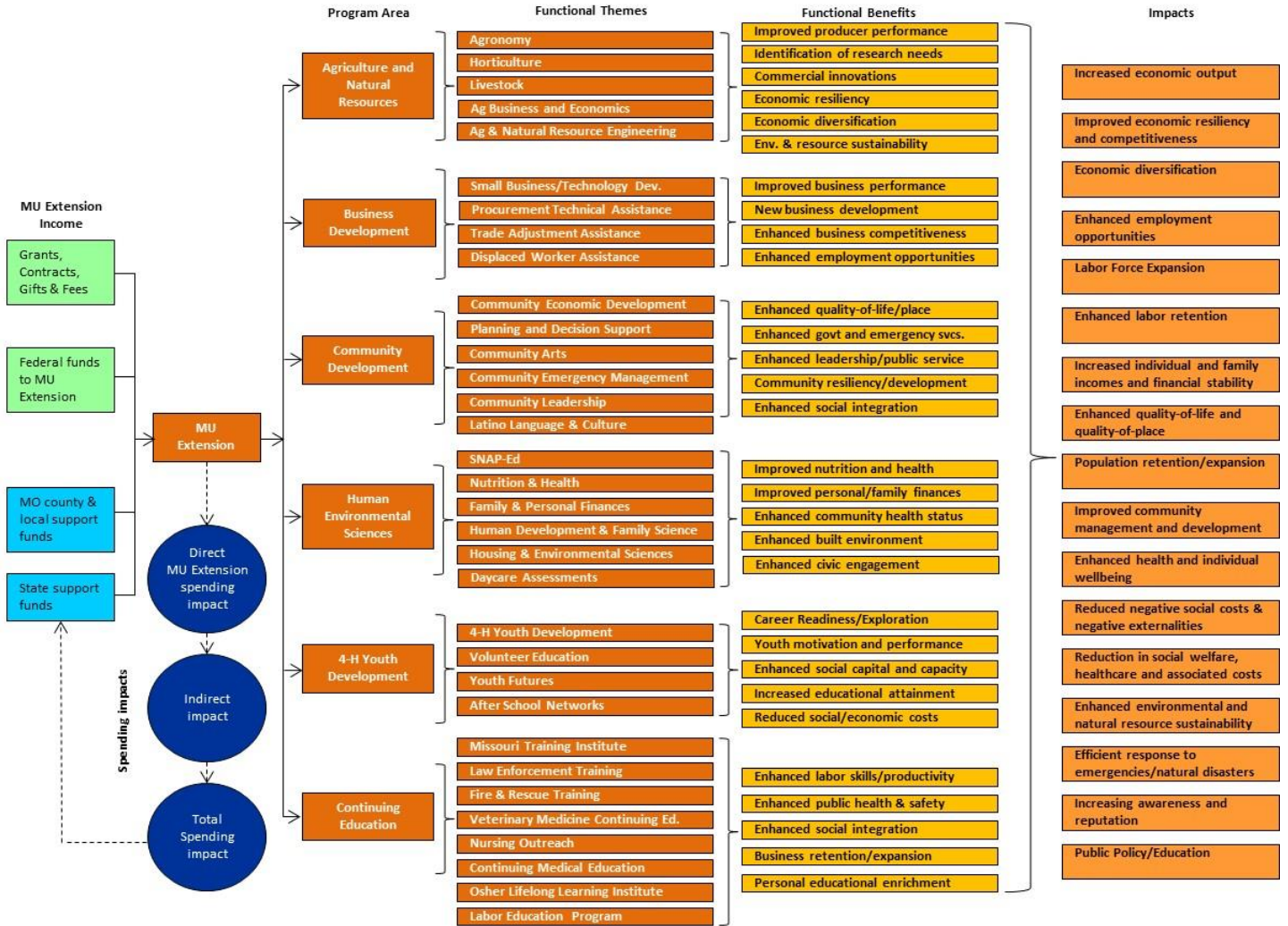
As shown in Figure 2, MU Extension operates a variety of programmatic themes directed toward educating a diverse range of business, government, community, and individual audiences. MU Extension specifically divides these programmatic themes into **six primary functional activity areas** (Figure 3), comprising the following:

- Agriculture and Natural Resources
- Business Development
- Community Development
- Human Environmental Sciences
- 4-H Youth Development
- Continuing Education.

C. Functional Impacts of MU Extension

Each of these functional activity areas generates functional benefits and positive economic and social impacts across Missouri. Classification and characterization of these impacts are shown in Figure 3 and Table 1.

Figure 3: Principal Impacts and Functional Impact Categories Generated by MU Extension Activities



As Figure 3 shows, the impacts of MU Extension can be viewed along two pathways. The primary, and most important pathway, comprises the **functional impacts** (the orange boxes on Figure 3). These functional impacts are the *raison d'etre* for MU Extension, comprising the core programmatic activities designed to bring benefits to Missouri’s economy, communities, and families. Economists typically term these functional impacts “forward-linkage impacts.” In addition, MU Extension also generates economic stimulus in the Missouri economy, and within the communities where it has a physical footprint, through its expenditures and the expenditures of its personnel (expenditure impact). The direct and indirect economic impacts on Missouri business volume (output), employment, and personal incomes generated by MU Extension expenditures are typically termed “backward-linkage impacts.” While MU Extension obviously does not exist simply to create economic stimulus through expenditures, this is not

an insignificant impact for Missouri—primarily because a large proportion of the funding for MU Extension comes from external (federal) funding sources that then are spent in operations across the state.

D. Evaluating the Economic and Functional Impacts of MU Extension

Recognizing a need to communicate the importance, modern relevance, and impact of MU Extension, the University of Missouri retained the services of impact analysis experts at TEconomy Partners LLC (TEconomy). TEconomy’s scope-of-work encompasses assessment of both the backward-linkage (expenditure) impacts and forward-linkage (functional) impacts depicted in Figure 3. Where data are available, TEconomy uses quantitative techniques (such as regional input/output analysis) to illustrate impacts. In other cases, the research uses case studies or narrative description to show the range of impacts generated and to provide examples. Throughout the report, reference is made to the broad classifications of impacts that MU Extension generates, with examples of programmatic activity used to illustrate these. These impact categorizations are listed in Table 1.

Table 1: Categorization of Impacts Generated by Extension Activities and Programming

Type of Impact	Description
Increased Economic Output	University research innovations may result in improved or new products or services being developed that increase economic output of industry sectors. In agriculture, for example, higher yielding crops or new value-added agricultural products development may increase revenues for Missouri producers and processors.
Improved Economic Competitiveness and Resiliency	University research in areas such as water use efficiency, energy use efficiency, the introduction of new higher-value crops, etc., may lead to innovations and practice recommendations for industry that enhance competitiveness and sustainability.
Economic Diversification	Economies that are over dependent on a few industry sectors are vulnerable to the fortunes of those industries. Research that brings new technologies, products, or services to market improve the economic diversity by helping new industry sectors to grow and thrive.
Increased Employment	Research based innovations resulting in new products or services for industry, new business start-ups, or the attraction of new enterprise to the state generate new job demand.
Labor Force Expansion	Employers often highlight difficulties in accessing work-ready employees. Extension 4-H Youth Development programs, skills training programs, displaced worker programs, and other Extension initiatives increase the work readiness and marketable job skills of participants, leading to an expanded labor base.
Enhanced Labor Retention	Continuing education programs help to upskill labor, increase job responsibilities and job satisfaction, and enhance retention.
Increased Individual and Family Incomes and/or Financial Stability	Extension activities helping people enter the workforce, helping them improve their skills, or helping family farms and small businesses become more profitable increase income potential for workers and proprietors. Family and personal finance programs help Missourians better manage their finances and secure their financial future.
Population Retention and Expansion	Extension’s diverse work in business development, community development, environmental sustainability, arts and culture, etc., enhance opportunities and secure a higher quality of life in Missouri, helping to retain current Missourians and attract new people to the state.

Improved Community Management and Development	The management of local government operations, the governance of municipal organizations, and the management of community development take professional skills—skills that can be harder to find in small towns, rural communities, and inner-city neighborhoods. Extension programming helps enhance the skills of those engaged in the management of communities.
Enhanced Health and Individual Well-Being	Extension programs in food preparation, nutrition, personal fitness, healthy living, child care, stress and budget management, etc., help Missourians live healthier lives. Extension programs in food safety, monitoring for zoonotic diseases, etc., help support enhanced public health. Extension training of healthcare and public safety professionals help assure high-quality service provision in support of health and well-being.
Reduced Negative Social Costs and Externalities	Social problems, criminal behavior, health problems, environmental damage, livestock disease outbreaks, etc., all carry negative costs to society, government, and the economy. Extension programs help to prevent or mitigate these negative impacts.
Enhanced Environmental and Natural Resource Sustainability	The key fixed asset of Missouri is its land and natural resources. Protecting and passing on these assets to the next generation of Missourians is a tangible public good. Extension works to help preserve natural resources, better manage water and soil resources, and provide solutions to pollution across the state.
Efficient Response to Emergencies and Natural Disasters	The public interest is served through having well-trained and efficient public safety professionals able to respond to emergencies, natural disasters, or other incidents. Extension contributes through continuing education programs for police, fire, and rescue workers and through community organization for coordinating local resources for preparedness and response.
Enhanced Quality-of-Place	Taken together, the activities and programs of MU Extension in improving and sustaining the economy, rural and urban communities, educational opportunities, and the environment combine to provide an enhanced quality-of-place and quality-of-life in Missouri. This helps create, attract, and retain talent and commercial enterprise for Missouri.

Through study of these and other impacts, the analysis reported herein seeks to provide the following:

- Measures of the quantitative impact of MU Extension operations and activities on key economic metrics such as Missouri business volume, personal incomes, and employment.
- An understanding of the broad range of functional social and community benefits afforded by MU Extension’s activities in the state.
- Specific illustrations of the range of positive functional impacts generated in the state because of MU Extension’s activities as they relate to: Agriculture and Natural Resources; Business Development; Community Development; Human Environmental Sciences; 4-H Youth Development; and Continuing Education.
- Consideration of future initiatives that could be undertaken to further enhance MU Extension’s functional impact on the state and relevant populations.

As noted above, TEconomy uses both quantitative and qualitative approaches in evaluating MU Extension’s broad range of impacts. On a quantitative basis, TEconomy reports the results of economic impact calculations using input/output analysis techniques. Qualitative research techniques are used to provide illustrative examples of the types of functional impacts generated by MU Extension. A series of detailed one-on-one interviews were conducted with MU Extension leadership, program area directors, and field extension personnel to gather insight regarding programs and impacts. In addition, reporting records for MU Extension impacts previously provided to NIFA were also accessed to understand impact scope.

It is clear that through a broad variety of functional activities, MU Extension has generated a substantial track record in contributing to Missouri's and Missourians' economic and social well-being. Equally clear is that, as knowledge and innovation continue to be the foremost drivers of modern economic progress, it is likely that MU Extension activities will be highly relevant for the foreseeable future. Strengthening the economy, communities, and families of Missouri through research-based educational programming (activities at the core of MU Extension's mission) is key to the long-term competitive sustainability of Missouri's generally robust standard of living. The degree to which MU Extension's work contributes to progress in Missouri, today and into the future, is the subject of this report.

Section II: The Impact of MU Extension Expenditures

A. Measuring Economic Impacts

The main impact of MU Extension is created and obtained through the activities that MU Extension faculty and staff are engaged in throughout the State of Missouri (functional impacts). These activities improve the character and quality of life of thousands of Missouri residents in both rural and urban settings and improve economic performance through the transfer of knowledge, technologies, and practices. From a traditional economic perspective, however, MU Extension also has an “economic impact” on the State of Missouri through its direct operational expenditures and, ultimately, the expenditures of its extension faculty, other staff, and service providers. In addition, many of these expenditures are then recirculated within the state economy as recipients of the first round of income spend a portion of this income with other businesses and individuals within the subject economy. This respending is termed the multiplier effect (incorporating both indirect and induced economic impacts).

The standard analytical technique for the quantification of expenditure impacts is input/output (I/O) analysis. I/O analysis, the technique deployed for impact measurement herein, uses a matrix representation of an economy that quantifies the impact of spending by one sector of the economy on all other sectors, consumers, and government. TEconomy uses software and data systems developed by IMPLAN for application of I/O analysis. The IMPLAN models are the most widely used models in the nation and are based on a number of federal datasets, including data from the U.S. Bureau of Economic Analysis (BEA) and the U.S. Bureau of Labor Statistics.⁷ The I/O methodology allows TEconomy to calculate the expenditure impacts of MU Extension across multiple measures, including the following:

- Economic Output, also known as business volume, is the total value of goods and services produced in an economy and represents the typical measure expressed as “economic impact” in a standard economic impact study.
- Employment includes both direct employment at MU Extension (including mission-specific contractors) and the jobs within the economy supported by MU Extension expenditures (indirect employment).
- Income is the total amount of income received by labor in the economy because of the presence and operations of MU Extension via MU Extension payrolls and contractor payments.

Methodology

Impact analysis makes use of an I/O model to represent the interrelationships among economic sectors. I/O data show the flow of commodities to industries from producers and institutional consumers for any given region. The data also show consumption activities by workers, owners of capital, and imports from outside the region. These trade flows built into the model permit estimating the impacts of one sector on other sectors. These impacts consist of three types: **direct effects** (the specific impact of the firm and/or sector(s) in question), **indirect effects** (the impact on suppliers to the focus industry or firm), and **induced effects** (the additional economic impact of the spending of these suppliers and employees in the overall economy). The summation of these three effects are considered the **total impacts**.

⁷ This analysis uses the 2015 State of Missouri model from IMPLAN as the 2015 models are the most currently available at the time of the study. Output, labor income, and tax revenue figures and impacts are adjusted and reported in 2016 current dollars.

The estimated impacts of MU Extension operations were calculated using an I/O model from IMPLAN of the State of Missouri. IMPLAN provides a software system for impact analysis and highly detailed data tables.

Modeling Approach

Each IMPLAN model uses detailed region- and sector-specific information to estimate outcomes and gauge potential impacts. The model incorporates details of 536 individual industry and economic sectors that cover the entire state economy. With these sector possibilities, TEconomy can more precisely model the operations of MU Extension by aggregating the operational characteristics and production functions of the various aspects of MU Extension operations, encompassing agricultural extension; youth, community, and leadership development; business and workforce development; and consumer, health, and nutrition support.

This economic-impact assessment provides a results table that presents the **direct-effect** values driving the model (based upon the employment and operational data provided by MU Extension), additional estimated **indirect** and **induced effects** capturing the **ripple effect** of the impacts of MU Extension employment and expenditures on the state economy, and the **total impacts**. An impact **multiplier** is also provided for the four model components (**employment, labor income, value added, and output**)—for every one (job or dollar) of direct effect, the multiplier number will equal the total (*including the direct effect*) number of jobs or dollars created in the state economy. Thus, for example, an employment multiplier of 1.5 would indicate that, for every 1 direct job, an additional 0.5 indirect and induced job is created in the state’s economy. Finally, the IMPLAN model provides an estimate of state/local and federal tax revenues generated by the MU Extension operations, controlled for issues related to public and nonprofit status.

B. MU Extension’s Employment and Expenditures

Three data metrics are used to drive the economic interactions within the models: **employment** (more conservatively, but more precisely captured as full-time equivalent [FTE] employment, due to, for example, extension staff having part-time research or faculty appointments within other university departments); **labor income** (also called total compensation, including salaries, wages, and the full cost of benefits); and output, which is typically measured for public sector or nonprofit organizations such as MU Extension as **total expenditures** as they are a truer measure of total direct output than revenues.

Data were obtained from MU Extension regarding employment and FTE equivalents and detailed operational expenditures. Additionally, data were captured to reflect the county-level resources involved in operating the county field agent infrastructure (including both additional staffing and expenditures not captured by direct MU Extension financial reporting), and, finally, to represent and estimate the “in-kind” contribution the University of Missouri makes to MU Extension in the form of operating space.

The FTE employment data used within the impact model is provided in Table 2, which shows 883 FTE employees for the statewide MU Extension operations, with 87 percent of these extension workers employed directly by the University of Missouri. The remaining 13 percent of the extension workforce are county-based staff who provide administrative, logistical, and other services in support of county-based extension activities.

Table 2: MU Extension FTE Employment, Fiscal Year (FY) 2016

MU Extension	Total FTE Employment
University of Missouri Employees	764
Additional County-Based Staff	119
Total FTEs	883

Source: MU Extension FY 2016 data and additional County Budget Summary information.

The operational expenditures data (output) used within the impact model reaches more than \$84 million in FY 2016. The University of Missouri (including funding from the State of Missouri) provided \$28.6 million to support extension activities across the state (Table 3). As part of the national Land-grant based Cooperative Extension program, MU Extension also received approximately \$10.8 million in annual funding from the USDA's NIFA via the Smith-Lever Act Capacity Grant. County-based resources used for locally-based support and operating costs reached nearly \$14 million, including over \$5 million in county appropriated dollars. Appropriated dollars accounted for approximately half of the total expenditures with the other half supported by other self-generated sources. In addition to the required Smith Lever 1:1 match, the MU allocation provides match for grants and building faculty infrastructure on campus and throughout the state. MU Extension faculty, in turn, identify and secure additional resources to further education efforts and priority programming.

Table 3: MU Extension Operational Funding Sources, FY 2016 Annual Operations

Operational Funding Source	Funds
State of Missouri/University of Missouri	\$28,583,690
USDA NIFA Cooperative Extension	\$10,834,166
Additional County-Based Resources	\$13,999,560
Grants, Contracts, Fees and Other Self-Generated Resources	\$32,771,917
Total Operational Funds	\$86,189,333

Source: MU Extension FY 2016 data and additional County Budget Summary information. University of Missouri funds includes an estimate of \$2,095,278 for value of "in-kind" operational space.

C. Economic Impact of MU Extension

Impacts are estimated from the 2016 employment and operational expenditures of MU Extension's statewide operations (Table 4). The FTE employment of 883 within the MU Extension system supports an additional 638 jobs (including 192 indirect jobs with suppliers) in the Missouri economy, for a total employment impact of 1,522 jobs and an employment multiplier of 1.72. This multiplier indicates that every MU Extension job (including county-based workers) generates an additional 0.72 job in the Missouri economy.

Table 4: Economic Impact of MU Extension, 2016

Impact Type	Employment (FTE)	Labor Income	Value Added	Output	State/Local Tax Revenue	Federal Tax Revenue
Direct Effect	883	\$57,987,457	\$61,554,096	\$86,189,333	\$1,640,616	\$11,006,600
Indirect Effect	192	\$8,868,934	\$16,596,396	\$29,582,165	\$976,722	\$2,188,624
Induced Effect	446	\$19,090,654	\$34,089,657	\$60,115,993	\$3,024,797	\$4,693,556
Total Impacts	1,522	\$85,947,044	\$112,240,149	\$175,887,490	\$5,642,135	\$17,888,780
Multiplier	1.72	1.48	1.82	2.04		

Source: TEconomy's calculations and analysis using IMPLAN I/O model of the State of Missouri.

Note: Details may not add to totals due to rounding.

MU Extension jobs, those that are funded by the University as well as at the local level, average more than \$65,500 per year in total compensation (e.g., wages and benefits). In addition, jobs generated by suppliers as well as induced jobs average more than \$43,500 in total compensation per year.

The direct operational expenditures of \$86.2 million generate an additional \$29.6 million indirect economic activity (e.g., purchases from suppliers within the State), and an additional \$60.1 million in induced economic activity as both Extension workers and supplier workers spend their incomes throughout the State. These combined expenditures lead to an estimated total impact of \$175.9 million within the State of Missouri economy.⁸

As a program driven by the work of its extension faculty and supporting staff, the direct-effect value-added metric only slightly exceeds the value of the total labor income of these workers (labor income is a component of the value-added metric). However, as MU Extension purchases ripple through the Missouri economy, the increasing effects of suppliers (both to MU Extension activities but also to the connected workforce) cause the total value added estimated to reach more than \$112 million on an annual basis.

As a public-sector program, the potential to generate new additional tax revenue at the local, state, and federal level is limited. Personal income-based taxes generate \$1.6 million in state/local revenue and more than \$11.0 million in federal tax revenue. With additional tax revenue impacts (including property and corporate taxes) generated by suppliers and through induced spending, total state/local tax revenue exceeds \$5.6 million and federal tax revenue reaches nearly \$17.9 million.

⁸ The IMPLAN model, using industry-level employment and economic information, estimates economic leakages outside of Missouri that are not included in the total impacts value (e.g., out-of-state purchases, import purchases).

Section III: The Functional Impacts of MU Extension

A. Introduction

We live in “the information age” or “knowledge economy,” where success in daily life, commerce, and public service provision is dependent on a literate populace and decision makers having access to reliable and timely information. With smartphones and other computational and communications devices putting the power of the Internet and its information access in the hands of almost everyone, we have a golden age of information access. We are finding out, however, that not all information is reliable and that acting upon misinformation is worse than having no information at all. Unvetted, unmoderated information may not be synonymous with knowledge, but real actionable knowledge from reliable sources that empowers individuals and organizations to make rational decisions is a most valuable commodity. The unfortunate reality is that we currently have unprecedented access to information, but we also have a “cowboy” information age where “alternative facts,” deliberate misinformation, competing corporate interests and marketing messaging, and even political ideologies serve as a barrier between information resources and people having trusted, reliable knowledge upon which they can make properly informed decisions and execute rational actions.

For more than one hundred years, the United States, including the State of Missouri, has benefited from having a trusted, research-driven, reliable knowledge resource that is specifically dedicated to meeting the needs of agriculture and natural resource industry practitioners, rural and urban communities, families and individuals—Cooperative Extension. Via one-on-one interactions between Extension faculty and staff and key constituencies, via events and field-days, via publication of reliable research-based bulletins, advisories, and practice recommendations (on paper and on the Web), Extension has a well-established track record of service in providing best-practice, research-driven knowledge to those who need to put knowledge into action.

It is also the case that many in Missouri, and across the nation, face challenges in terms of educational attainment, literacy, and access to educational resources to improve their condition. These individual challenges impact the ability to receive, process, and act upon information to affect positive change. Extension proactively reaches out to these disadvantaged populations, working to bring carefully designed programs of education and educational materials to effect meaningful improvement in peoples’ lives.

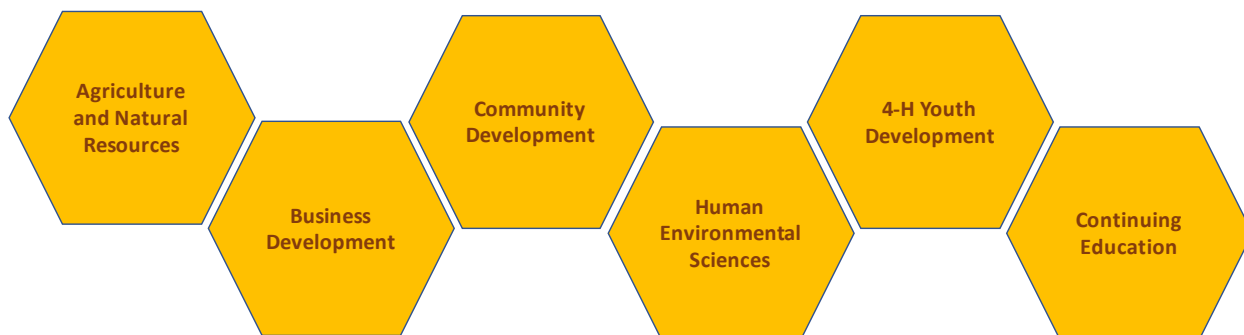
“Extension provides non-formal education and learning activities to people throughout the country — to farmers and other residents of rural communities as well as to people living in urban areas. It emphasizes taking knowledge gained through research and education and bringing it directly to the people to create positive changes.”

National Institute for Food and Agriculture (NIFA). <https://nifa.usda.gov/extension>

Extension at the University of Missouri has a long history of operating “outside the box” in terms of an expansive mission. In the 1960s, under the leadership of C. Brice Ratchford, MU Extension embraced multiple activities beyond the traditional Extension core, including small business development, assistance to manufactures and other employers, and wide-ranging continuing education programs. In 1972, the University of Missouri and Lincoln University established a unified extension program—the nation’s first such partnership between two state Land-grant Universities. Today, MU Extension’s organization reflects this university-wide expanded mission with the Vice Chancellor of Extension and Engagement reporting directly to the Chancellor of the University.

Extension is specially designed to work on all the challenges above to deliver functional, tangible benefits to individuals, families, communities, farmers, and businesses. In pursuit of this mission, MU Extension is organized around the delivery of a diverse set of nonformal educational services and knowledge resources provided through six functional impact program areas (Figure 4).

Figure 4: MU Extension Primary Program Focus Areas



These MU Extension services reach into every Missouri county and every community. They service Missourians young and old, rural and urban, at home and in the workplace. These services are the subject of this chapter, which is organized around each of the six program areas. For each program area, TEconomy provides a definition of the program area, outlines the tangible needs being addressed in Missouri, and provides specific examples and case studies of Extension in action and the positive impacts being generated.

B. Functional Program Area: Agriculture and Natural Resources

1. Description

The University of Missouri's College of Agriculture, Food and Natural Resources (CAFNR) is among the academic global leaders in agricultural sciences research—ranked among the top 15 programs in the world for animal and plant science research.⁹ Research at CAFNR is driven by traditional academic curiosity and, particularly, by the direct mission of CAFNR and MU Extension **to address identified needs, challenges, and opportunities in Missouri agriculture and natural resource sectors**. These needs and research questions are identified through the regular contact that occurs between MU Extension personnel, CAFNR faculty and researchers, producers, commodity groups, industry, and other key stakeholders across Missouri. As noted in Chapter I, Figure 2, there is a two-way flow that occurs with practitioners in the field and MU Extension personnel identifying needs and opportunities and relaying these to the researchers at CAFNR for investigation and innovation—and in terms of CAFNR faculty and scientists making novel discoveries and practice innovations that can be applied within Missouri agriculture, natural resource industries, and other key audiences.

⁹ Data: Thompson Reuters. Cited on MU Extension website at <https://cafnr.missouri.edu/about/>

2. The Need

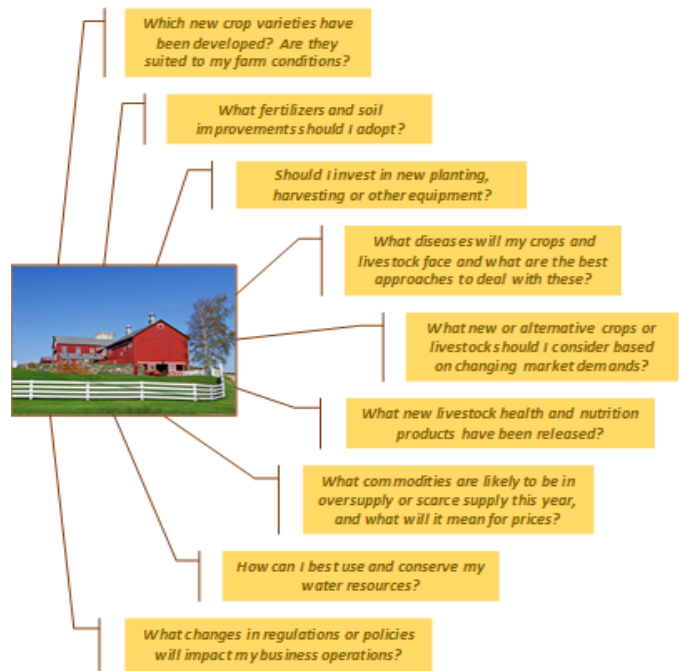
Missouri agriculture and natural resource industries represent a major component of the Missouri economy. Analysis by the Missouri Economic Research and Information Center showed the following for 2014:

“Missouri had an estimated 100,400 agribusinesses (97,700 farms and 2,700 agriculture-related establishments) that directly employed 182,383 workers, paid \$6.4 billion in wages and contributed \$15.2 billion to state GDP. The ripple effect was an increase of \$9.6 billion in additional economic activity. The total impact of agribusiness, including intermediate and induced effects, on the state economy was \$24.8 billion, which represents 8.9 percent of Missouri’s gross domestic product. Agricultural sectors and indirect industries employed 305,256 workers paying about \$12.1 billion in salaries.”¹⁰

Sustaining productivity and output increases in agriculture is a constant challenge given unique characteristics of the industry and its operational environment. Missouri ranks second in the nation (after Texas) in the number of farms in operation, with the latest (2016) National Agriculture Statistics Service data recording 96,800 farm operations in the state. The sector thus comprises thousands of small and midsize businesses that must operate in a uniquely variable and challenging production environment. For agriculture and natural resource sectors to remain competitive, Missouri’s producers must be equipped with the knowledge, skills, tools, and inputs required to produce quality products at competitive prices and that anticipate changing market preferences. The industry, perhaps more than any other industry, requires specialized local research and development (R&D) to remain competitive. In a 2013 report by Battelle, the following is noted:

Unlike producers of the typical manufactured product, agricultural producers have to work within a dynamic production environment that contains great geographic variety and year-to-year variability, uncertainties, and risks. It is also unique in being a production industry driven by the output of over 2 million individual producers (there being 2,181,000 farms in the U.S.)¹¹, so unlike other production sectors (such as automobile manufacturing, aerospace, information technology, chemicals, etc.) the industry does not comprise a few large entities with substantial R&D budgets, but rather comprises millions of smaller entities that

Figure 5: Annual Decision Making in a Complex Environment



¹⁰ Missouri Economic Research and Information Center. April 2016. *“Missouri Economic Research Brief: Economic Contribution of Agribusiness.”* Missouri Department of Economic Development. https://www.missourieconomy.org/pdfs/agribusiness_economic_contribution.pdf.

¹¹ *Farms, Land in Farms, and Livestock Operations 2011 Summary*: Released February 2012, by the National Agricultural Statistics Service (NASS), U.S. Department of Agriculture.

*have to rely on R&D, information and advice produced by external parties. It is a very unique industry.*¹²

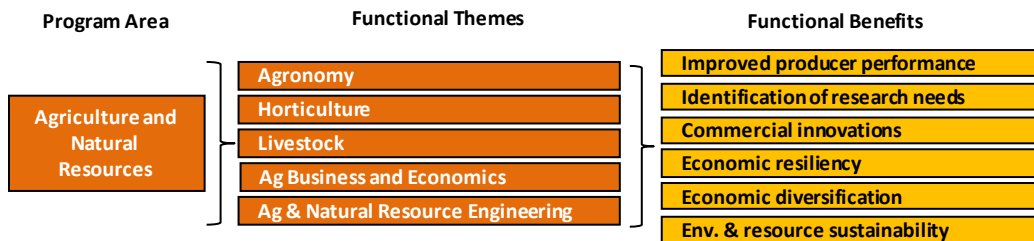
To be successful in this dynamic production environment, a producer needs to make informed decisions across a broad range of variables. Indeed, farmers face an almost overwhelming series of decisions each year that may make or break their bottom line (such as those illustrated in Figure 5). No other category of business faces such a variable and risky series of decisions that must be made and repeated year after year.

Having access to reliable decision support information and advice is crucial to making informed decisions. MU Extension serves as an indispensable advisor on these and other critically important decisions that Missouri farmers and associated industry professionals must tackle each year. Present in every Missouri county, MU Extension professionals are key access points for the information needs of agricultural and natural resource producers, and they are backed up by the full research and knowledge resources of the University of Missouri.

3. Themes, Impacts, and Mechanisms of MU Extension Impact Generation in Agriculture and Natural Resources

In support of agriculture and natural resource industries, CAFNR and MU Extension work together across a diverse range of themes—and these, in turn, engender a variety of positive functional benefits (impacts) for Missouri and Missourians (Figure 6).

Figure 6: MU Extension Functional Impact Themes in Agriculture and Natural Resources



In addition to using the research capabilities of CAFNR and other MU colleges to perform focused research on Missouri needs, MU Extension also develops educational programs and materials based on conducting needs assessments—identifying themes, issues, emerging practices, and technologies that will benefit the growth and resiliency of Missouri agriculture and natural resources and then developing custom curricula and materials based on best practices. These best practices may be derived not only from research at the University of Missouri, but may be sourced from other universities, the USDA’s Agricultural Research Service (ARS), the academic literature, or other reliable resources as identified and evaluated by MU Extension professionals.

Ultimately, the work of MU Extension in support of the agriculture and natural resource sectors of the Missouri economy produces a series of desired functional benefits:

- Improved yield and quality of crop and livestock produced, thereby increasing economic output and return-on-investment for producers.

¹² *Impact & Innovation: Agbioscience in the Southern United States: The Importance of the Southern Region’s Land-grant Extension Service and Experiment Station System.* February 2013. Prepared by Battelle Technology Partnership Practice and BioDimensions.

- Introduction of new crop varieties with premium performance or enhanced responsiveness to emerging market demands.
- Enhanced farm sustainability and financial resiliency.
- Optimized use of scarce resources and inputs to reduce the environmental footprint of agricultural industries across the state.

The Agriculture and Natural Resources program area at MU Extension is staffed by **110 FTE personnel**, with 22.7 percent of these personnel located at the main MU campus in Columbia, and 77.3 percent distributed across Missouri’s counties to work at the local level.

Representing the basic industries sustaining rural and small-town Missouri, the work of MU Extension in building and sustaining resilient agricultural and natural resource sectors is fundamental to the fabric of life and economic performance across the entire geography of the state.

4. Functional Impact Examples for MU Extension in Agriculture and Natural Resources

Discussing every program and activity undertaken by MU Extension in the area of Agriculture and Natural Resources would lead to an excessively long and complex report. Rather than attempting to produce a laundry list of activities, TEconomy in this (and other functional impact discussions) draws upon program examples to illustrate the types and range of functional impacts generated by MU Extension programming. In the case of MU Extension work in Agriculture and Natural Resources, the following examples are illustrative of the high-impact work taking place.

Program Area: Agriculture and Natural Resources
Example 1: Missouri Show-Me-Select Replacement Heifer Program
<p>Missouri ranks second among states in the total number of beef cows, and cow-calf operations are a crucial component of the state’s beef industry. Helping advance profitable operations for Missouri beef producers is a major goal for MU Extension. The economics of cow-calf operations very much depend on maximizing the number of offspring per breeding pair, and MU research to elucidate practices and techniques to achieve such maximization has been an outgrowth of the University’s well-established reputation in animal reproductive sciences, including both basic and applied science expertise. MU Extension’s <i>Missouri Show-Me-Select Replacement Heifer Program</i> (Show-Me-Select) is a great example of Extension programming rooted in taking faculty research and applying it to the needs of farmers across the state. Show-Me-Select assists producers in more effectively managing reproduction, production. The program focuses on practices and strategies (both short- and long-term) to improve reproductive efficiency. In 17 years, more than 700 farms have enrolled over 111,000 heifers in the program. Not only do operations benefit from the long-term effects of improving the genetic stock of their herd, but the program also increases the sale prices of participating heifers. Collectively, data from 128 sales show that more than \$34 million in gross sales have occurred over the 17-year run of the program. Program directors estimate that the total statewide economic impact has exceeded \$75 million.</p> <p>To assure the program reaches as many beef livestock operations as possible, MU Extension does not set any limit on the size of operation that can take advantage of the program. Participating herds have been as small as eight and as large as 8,000 head. Because of Show-Me-Select, beef cattle operations statewide enjoy the benefits of higher-quality herds, and the long-term focus on reproductive quality ensures operations enjoy a legacy of dividends from their participation in the program.</p>
<p>Key Impacts:</p> <ul style="list-style-type: none"> • Improved producer performance through both higher reproduction rates and increased value of genetically improved herds. • Enhanced economic resiliency for a major component of Missouri’s agriculture sector.

Program Area: Agriculture and Natural Resources

Example 2: Forage System Development and the Missouri Regional Grazing Schools

As noted above, Missouri is the second largest cow-calf state in the United States with more than 2 million mature cows. That said, there have been ongoing challenges in the state in terms of sustaining profitability in cow-calf operations. MU Extension research shows that the most significant contributor to a lack of profitability is the significant cost of purchasing livestock feed in winter months—which may total up to half the costs of operations. Based on this finding, MU Extension sought to identify alternatives to purchased winter feed as a means to boost farm profitability.

The result has been development of a Winter-Feeding Systems for Beef Cattle curriculum, developed to teach beef cattle producers forage system development and management techniques. Under this program, cow-calf operations and beef producers can produce forage of their own, rather than depending on purchases from third parties. MU Extension notes the following:

The curriculum uses a variety of educational materials and events to teach producers how to take advantage of forage systems, including as many as 30 three-day grazing schools held each year. In addition to in-person education, the program maintains a website with up-to-date information on beef production and winter-feeding systems in Missouri. Adoption of forage systems for winter feeding of beef cattle allows producers to reduce winter feed costs by up to 30 percent. The practices and techniques in this curriculum are targeted at creating and maintaining a forage system to build a stockpile for winter feeding. Surveys have indicated the number of producers using stockpiled tall fescue, a component of many forage systems, increased from 26 percent in 1998 to 54 percent in 2012. By relying less on purchased feed, producers save about \$62 per cow each year for a statewide savings of \$38 million. In educational programs for this curriculum, 87 percent of participants have rated it as "very good" or "outstanding." Based on recent surveys, more than half of Missouri beef cattle operations now use stockpiled tall fescue for winter grazing. Furthermore, acreage of winter pastures in Missouri has increased more than 10,000-fold since 1998, based on reported seed sales of cereal rye.¹³

Forage and grazing has become a major area of expertise for the University of Missouri and MU Extension. MU Extension runs multiday workshops, known as Regional Grazing Schools, which are co-taught and coordinated by extension agriculture specialists and the Natural Resource Conservation Service (NRCS). The schools follow a multidisciplinary curriculum developed by MU Extension and its agency partners, which uses classroom-style presentations, together with hands-on exercises, on-farm demonstrations, and farmer-to-farmer learning models. MU Extension notes¹⁴ the following:

Over the past 20 years, the program has held more than 600 schools for more than 15,000 producers. Recent survey results show that producers use the grazing system taught at these schools on 1.65 million acres in Missouri. When asked how they have benefited from attending a grazing school, producers report a variety of benefits.

- *Greater carrying capacity (more grazing days)*
- *Less feed and hay used*
- *Improved quality of grass and forage*
- *Less time and labor*
- *Better soil fertility and health*

¹³ University of Missouri Extension Impact Statement recorded in the Land-Grant Impacts Database Portal maintained at Texas A&M University AgriLife Extension Service.

¹⁴ Ibid.

- *Increased health and conception rates in cattle*
- *Ease in handling cattle*

Extension notes that “*Conservative economic estimates show that this program adds at least \$83.6 million to Missouri's economy each year.*”¹⁵

Key Impacts:

- Major production cost savings for cattle operations in Missouri, serving to increase farm profitability.
- Improved levels of farm productivity.
- Improved soil health.

Program Area: Agriculture and Natural Resources

Example 3: Pasture-Based Dairy Program

In livestock and dairy operations, there is a finely tuned relationship between profitable operations and the price and availability of feed. In the 1970s there was a movement in Missouri (and nationwide) toward intensive dairy confinement operations, but over time it was found that the haulage of feed and cost of compliance with confined animal environmental regulations eroded the economics of this model. In response to declining profitability in confined dairy operations, MU Extension developed the Pasture-Based Dairy Program—designed to return to a model using the state’s pasture and forage resources. Led by a multidisciplinary research and extension team, the MU Extension Pasture-Based Dairy Program has become nationally and internationally recognized. The Extension team includes faculty in Columbia and across the state’s regions who have expertise in forage production and management; dairy management, nutrition, and reproduction; and agricultural business and management. The program focuses on improving existing pasture-based dairies, developing new opportunities for start-ups, and helping traditional dairies transition to a hybrid model.

The Pasture-Based Dairy System developed by MU Extension was modeled on rotational grazing production systems developed at the MU Southwest Research Center and Demonstration Dairy. The program was further refined using a co-learning model involving cooperating dairy producers. The system is multidimensional, with the program focuses on forage management, utilization, irrigation, low-cost production, and reproductive strategies for seasonal operations. The system has proven to be sustainable, provided a balance of production volume, margin, and overhead that creates attractive returns; and farmers report that it has improved the quality of life for workers and owners by requiring less workforce time versus conventional confined animal dairies. The program draws upon a broad variety of proven MU Extension tools and teaching methods, using publications (including the *Missouri Dairy Grazing Manual*), online resources, together with workshops, on-farm demonstrations, conferences, and other events.

As a result of implementing the Pasture-Based Dairy System, the decline in Missouri dairy operations occurring through less-favored confined animal models has reversed. Growing from a very low percentage, pasture-based dairying now represents more than 40 percent of dairy cows in Missouri. This sector of Missouri agriculture has even caught the attention of international investors and dairy operators, to the extent that New Zealand dairy companies have become inward investors to Missouri. MU Extension professionals report that, because the pasture-based dairies typically have lower operational costs, lower debt per cow, less capital investment per cow, and higher return on assets than conventional systems, pasture-based dairy systems can produce milk for \$3 to \$4 less per hundred pounds of milk when compared with conventional dairy operations.

MU Extension reports the following:

¹⁵ Ibid.

The dairy industry contributes \$3.12 to Missouri's economy for every dollar of milk sales. Expansion and development of Missouri's dairy operations will continue to revitalize the dairy industry and become economic engines for local economies, providing jobs, increasing tax bases and opportunities for the community. From 2005 to 2014, growth of new grazing dairies created \$100 million in new investment, generated \$40 million in annual milk sales and added 1,110 jobs.¹⁶

Key Impacts:

- Improved producer performance through a system with lower costs of production.
- Enhanced economic resiliency for a major component of Missouri's agriculture sector.
- Improved working hours and quality of life for dairy owners and their workforce.
- Reduced environmental impacts when compared with confined animal dairy operations.

Program Area: Agriculture and Natural Resources

Example 4: Conserving Missouri's Soils

The most valuable asset for agriculture is land, and the productivity of that land very much depends on the quality of soil and preservation of soil resources. Soils are complex structurally, chemically, and biologically; and there is great variability across the nation in the quality and depth of rich topsoil. For a large agricultural production state, Missouri faces highly challenging soil conditions—indeed, soil specialists at MU Extension notes that Missouri has “inches of topsoil—other states have up to 30 feet.”¹⁷ As such, the work of the Soil Health Assessment Center at MU Extension is critically important to agricultural sustainability in Missouri.

One of the expanding strategies for preserving soils is the use of what are termed “cover crops.” These are plants (e.g., clover or radishes) that are grown between seasons of growing primary crops such as corn, wheat, or soybeans. Cover crops help prevent soil erosion, aid in pest and weed control, and can return nutrients back into the soil. MU Extension's North Central Regional Director of Extension Programs for the USDA's Sustainable Agriculture Research Education program was the lead organizer in obtaining recent funding for a multistate cover crops project—which is now a \$6.6 million research initiative to promote soil health through cover crops. The Oklahoma-based Samuel Roberts Noble Foundation is leading the initiative, with MU performing cover crop germ plasm screening and evaluation at MU's Bradford Research Center in Columbia. Missouri has an estimated 600,000 acres of cover crops, and the goal of the research and associated Extension activity will be to increase this acreage through identification and testing of cover crop traits associated with soil health and improvement. Field trials are initially being conducted at sites in Missouri and in Nebraska, Maryland, North Carolina, and Oklahoma. The broad geographic area allows researchers to study how cover crops perform in different environments.

The new work builds upon previous expertise developed at MU Extension in cover crops and soil health. Following the 2011 flood along the Missouri River in northwestern Missouri, USDA's Natural Resources Conservation Service funded an MU Extension project to investigate how cover crops can best benefit soils after flooding and prevented planting. MU Extension faculty and employees planted a variety of cover crops aerially at Graves-Chapple Research Center as part of the study. The project has been assessing which cover crops best protect the soil, improve soil health, and increase yields of cash crops planted into cover crops. As a result of the work, MU Extension has developed recommendations and a chart tool that compares species, seeding rates, and costs. In addition, MU Extension has coordinated a variety of strip trials located at 40 sites across Missouri. These strip trials are seeking answers to ongoing cover crop questions such as the following:

¹⁶ Ibid.

¹⁷ TEconomy's interview notes from meeting with Rich Hoorman and Charles Ellie of the Soil Health Assessment Center.

<ul style="list-style-type: none"> • When should growers terminate cover crops for best results? • Is erosion control or long-term soil health the biggest benefit of cover crops? • Are cover crops giving up nitrogen or tying it up in the soil?
<p>Key Impacts:</p> <ul style="list-style-type: none"> • Improved retention and quality of agricultural top soil in Missouri. • Potentially enhanced yield in primary crops following cover crop utilization. • Enhanced varieties/cultivars of cover crops for utilization by Missouri farmers.
<p>Program Area: Agriculture and Natural Resources</p>
<p>Example 5: MU Extension Pesticide Program</p>
<p>The commercial application of pesticides is regulated by the U.S. Environmental Protection Agency and the Missouri Department of Agriculture’s Bureau for Pesticide Control. These regulatory bodies require that new licensed commercial pesticide applicators must pass an exam given by the Missouri Department of Agriculture before they can be certified. Furthermore, to maintain their license, certified commercial applicators must participate, every three years, in an approved continuing education course on environmentally sound uses of pesticides. The demand for continuing education in this area is significant, with 6,000 commercial applicators currently licensed in Missouri. The MU Extension Pesticide Program comprises the specialized curricula and delivery of educational programming and materials required for becoming newly certified and for maintaining certification.</p> <p>Both certification and recertification training involves two areas of instruction: a core training session which all trainees attend and the specialty category section based on the type of commercial application in which they are involved. Data for a recent year of the program show over 300 aspiring commercial pesticide applicators received certification training, and 1,722 certified commercial applicators attended recertification training. Estimates of the impact of recertification training, conducted in 2012 by the MU Extension pesticide program, show \$54.5 million in output and labor income retained because of recertification.</p>
<p>Key Impacts:</p> <ul style="list-style-type: none"> • Improved performance and retention of human capital in Missouri. • Improved public and worker safety.

As the above examples show, those working in the highly competitive commercial agriculture sector have a highly experienced and responsive organization to turn to in Extension, providing advice, analysis, and access to the latest research and innovations. It should be noted that commercial agriculture is not the only beneficiary of this MU Extension expertise. Noncommercial land owners and home gardeners are also served. Extension provides services for Missourians in growing fruits and vegetables for their families and in landscaping to beautify their homes and communities. Programs are provided across the state, leveraging MU’s expertise in horticulture and associated disciplines to cover subjects including vegetables and fruits, flowers and houseplants, trees and shrubs, landscape management and design, and ground cover and lawn grasses. MU Extension also serves the noncommercial sectors by providing diagnostic resources for plant health and advice and guidance in the prevention and treatment of pests, weeds, and diseases.

<p>Program Area: Agriculture and Natural Resources</p>
<p>Example 6: Missouri Master Gardener Program</p>
<p>The Missouri Master Gardener Program provides in-depth and intensive horticultural training to individuals in Missouri who then volunteer as Master Gardeners to serve their communities. Master</p>

Gardeners help Missourians understand environmental stewardship, manage their property, maximize the beauty and satisfaction of their homes and gardens, and generate home produce for their families and friends. Established in 1983 by the Department of Horticulture as part of MU Extension, the Master Gardener Program also increases awareness across the state regarding how to access MU Extension as a source of unbiased, research-based gardening information.

The scope of the program in Missouri is large and significant. MU Extension reports that almost 10,000 Missourians have participated in the Master Gardener training programs. There are currently more than 2,000 active Missouri Master Gardeners who are serving as Extension volunteers in communities throughout Missouri. “To become a Certified Master Gardener, an individual must attend a 30-hour Core Course training and give 30 hours of volunteer service back to their community in approved MU Extension activities.”¹⁸ Also, “to remain an active Master Gardener, an individual must volunteer 20 hours and attend six hours of continuing education annually.”¹⁹

The demand for information and assistance provided by Master Gardeners varies by setting. In Missouri’s cities, the demand is approximately 85–90 percent for ornamental gardening, whereas in more rural areas of the state, it trends toward 50–50 on food production and ornamental gardening.

Key Impacts:

- Substantial monetary value of hundreds of thousands of volunteer hours contributed across the state. With 2,000 Master Gardeners in the program, if each provided 50 hours of volunteer time over the course of a year, at a value of \$21.57 for a volunteer hour in Missouri,²⁰ this equates to direct economic value of \$2.1 million in services provided to Missourians.
- Landscape beautification and enhanced quality of life in Missouri.
- Reduced negative environmental impacts from suboptimal landscape management.

5. The Functional Economic Impact of MU Extension in Agriculture and Natural Resources: Example of a One-Percent Increase in Production.

As seen above, the ANR programs at MU Extension are dedicated to sustaining and enhancing agriculture and agriculture-related economic activity in Missouri, and to enhancing the non-commercial landscape across the state. Via MU Extension, individuals working in agriculture and related industries have access to research, education, and training. This access helps Missouri producers introduce new production practices, value-added products, and production technologies. It directly improves farm business performance and sustainability in the state. The long-standing work of MU Extension in the agriculture and natural resource sectors, and the dedicated resources of MU Extension, and the University of Missouri research enterprise, applied to improving and growing the agriculture and agribusiness sectors of the state economy, mean that MU Extension’s work has a powerful annual impact on state economic performance.

¹⁸ *Master Gardeners Program Evaluation, Report on Survey Results. Master Gardener Graduates from Fall 2014 and Spring 2015 Courses.* August 1, 2016. <http://mg.missouri.edu/pdf/Master%20Gardener%20-%20Comprehensive.pdf>.

¹⁹ Ibid.

²⁰ Independent Sector. “The Value of Volunteer Time—Missouri Statistics.” <https://www.independentsector.org/resource/the-value-of-volunteer-time/>.

To identify a potential scale of this impact, TEconomy analyzed the effect that every 1 percent increase in total agricultural production would have on the State of Missouri. Given the wide-range of programs provided by MU Extension to the agriculture sector in Missouri, it is highly likely that Extension’s services generate considerably more than a 1 percent gain in agricultural output in the state on an annual basis—however, the use of a conservative 1 percent estimate serves as a baseline for considering the significant impacts of improving agricultural sector performance within the Missouri economy. The impact of a 1 percent agricultural production increase in Missouri is shown below:

The Economic Impact of a 1 Percent Increase in Agricultural Output in Missouri

Use of the IMPLAN Missouri input/output models enables TEconomy to quantify the total effect on Missouri’s economic output, employment, and other variables of an increase in agricultural output. The analysis performed by TEconomy details the impact of a 1 percent increase in output for the agricultural sector overall, and sub-sectors comprising crop production, cattle production and dairy production.

In terms of total agricultural production, a 1 percent increase would generate the following impacts:

- \$192.8 million increase in total Missouri economic output, comprising direct, indirect and induced impact components.
- \$94.8 million increase in value-added within the Missouri economy.
- 1,690 jobs created and supported.
- \$67.7 million annually in additional labor income for Missourians.

Examining the cattle industry subsector (which, as shown in examples herein, has been the subject of intensive MU Extension programmatic activity), shows the potential impact of a 1 percent increase in this subsector. The impact of a 1 percent increase in the **cattle industry** would be:

- \$38.8 million increase in Missouri economic output.
- \$18.1 million in value added within the Missouri economy.
- 454 jobs created and supported.
- \$12.3 million in additional labor income.

For **crop production**, the impact of a 1 percent increase in direct production output would be:

- \$85.2 million increase in Missouri economic output.
- \$42.5 million in value added within the Missouri economy.
- 712 jobs created and supported.
- \$29.6 million in additional labor income.

For the **dairy industry**, the impact of a 1 percent increase in direct production output results would be as follows:

- \$6.3 million increase in Missouri economic output.
- \$3.2 million in value added within the Missouri economy.
- 31 jobs created and supported.
- \$2.3 million in additional labor income.

It also should be noted that expanding the agricultural sector could benefit every county in the state. Agriculture and associated processing industries are distributed across the state and, therefore, the direct and indirect effects of expansion in the sector are felt much more widely than would be the case with narrower, geographically focused sectors.

C. Functional Program Area: Business Development

1. Description

The MU Extension Business Development Program (BDP), housed within the College of Engineering, is an integrated, statewide delivery service of programs focused on helping businesses grow throughout their business life cycle—from concept to startup, growth to renewal, and mature to succession.

Programs delivered include:

- The **Missouri Small Business & Technology Development Centers (MO SBTDC)**, which provide professional business analysis, business consultations, access to technology resources and educational training seminars on a variety of business topics.
- The **International Trade Center**, which provides professional exporting assistance that helps businesses grow by expanding into global markets.
- The **Missouri Procurement Technical Assistance Centers (MO PTAC)**, which assists businesses in obtaining federal, state and local government contracts.
- The **Mid-America Trade Adjustment Assistance Center (TAAC)**, which helps proactively respond to import competition.
- The **Missouri Environmental Assistance Center (MOEAC)**, a one-stop resource for pollution prevention, environmental compliance, and energy-savings assistance.
- The **BDP Workforce Program**, which assists dislocated workers and others seeking information on occupations and job training.
- **Technology Development and Commercialization**, which provides assistance with taking intellectual property from the idea stage to commercialization.

2. The Need:

A vibrant small and medium-sized enterprise sector is a critical component of a healthy economy. New businesses bring industry diversity and job growth to a state. In Missouri, small and medium-sized enterprises (SMEs) make up more than 97 percent of the total number of employers in the state.²¹ Furthermore, the number of business being created in Missouri is increasing. In 2015, 18,342 new business were formed in Missouri, which was a 5.7 percent increase over the 17,437 new business formations in 2014.²²

The importance of SMEs on a state economy is hard to overstate—they are responsible for a large component of the state’s output and employment. However, due to internal inefficiencies and constraints in the business environment, their contribution is often well below their potential. States

²¹ See https://www.sba.gov/sites/default/files/advocacy/MO_0.pdf.

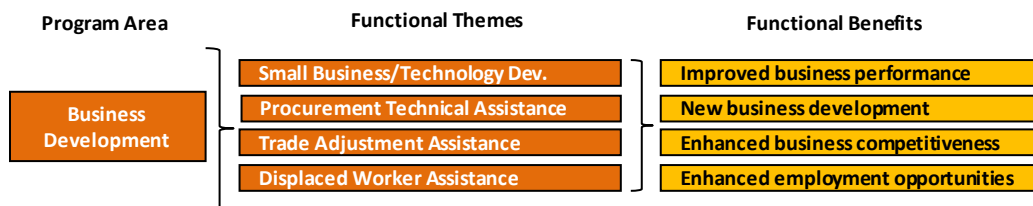
²² Missouri Economic Research and Information Center, *2015 Business Formations in Missouri*. Missouri Department of Economic Development. May 2015.

have found that they can have a significant impact on the economic success of their SME portfolio when they focus their resources on developing initiatives that provide a flexible portfolio of services, including: assisting in the creation of high-growth companies; providing expert business assistance to those companies; facilitating or making direct financial investments; and, speeding the commercialization of technology.

3. Themes, Impacts and Mechanisms of MU Extension Impact Generation in Business Development

MU Extension’s Business Development Programs have successfully leveraged federal and state funds to develop a statewide network of programs that offer a broad but highly integrated suite of services to meet a wide variety of industrial needs. Key functional themes and impact areas for BDP at MU Extension are summarized on Figure 7:

Figure 7: MU Extension Functional Impact Themes in Business Development



At the heart of MU Extension’s BDP work is an emphasis on providing collaborative technical assistance through company engagements that leverage multiple programs. The work is conducted by 78 faculty and staff—with the vast majority of business counselors (82 percent) working in communities and counties across Missouri. A strategic objective of BDP is to provide solutions that are transformational to Missouri businesses by:

- Improving business performance by offering business expertise and advice in areas such as marketing, management, government contracting, international trade, technology advancement, and maintaining global competitiveness.
- Increasing innovation and commercialization by developing Faculty Boot Camps and Pitch Competitions, MU Venture Mentoring Service, and Entrepreneurial Ecosystem Engagement.
- Catalyzing the creation of new businesses by offering assistance related to starting, maintaining and expanding businesses, including high-growth and high-technology firms, through a combination of education, technical assistance and individual counseling sessions.
- Enhancing business competitiveness by working with manufacturers negatively impacted by import competition to help firms develop and implement projects to regain global competitiveness, expand markets, strengthen operations, and increase profitability.
- Increasing revenue by helping businesses secure government procurement opportunities.
- Creating employment opportunities by assisting dislocated workers with job training for in-demand occupations.

BDP work at MU Extension is certainly diverse, but at its heart it is very much focused on improving the productivity and output of small and medium sized enterprises thereby increasing employment opportunities for all Missourians. In the past three years, Business Development Programs have resulted in the following economic impacts:

- 23,927 jobs created or retained
- \$900 million in sales increases
- \$436 million in new investment
- \$1.1 billion in government contracts

4. Functional Impact Examples for MU Extension in Business Development

In the case of MU Extension work in Business Development, several examples are illustrative of the high impact work taking place:

Program Area: Business Development
Example 1: Missouri Small Business & Technology Development Centers
<p>The Missouri Small Business & Technology Development Centers (MO SBTDC) helps Missouri entrepreneurs succeed in private enterprise and promotes statewide economic growth. Those looking to start, improve or grow a business, but lacking the necessary skills or expertise to do so, come to MU Extension for help. The program offers this service through a network of business counselors in MU Extension offices and other public colleges and universities across the state. Working in individualized counseling sessions, specialists address issues related to starting, maintaining and expanding businesses, including high-growth and high-technology firms, through a combination of education, technical assistance and individual counseling. MU Extension's Business Development Program provides research based education, technical assistance and access to supporting research and service networks to help Missouri businesses and organizations build, grow, and improve value generating enterprises.</p>
<p>Key Impacts:</p> <ul style="list-style-type: none"> • Creation of new businesses that generate new products to support consumer demand • Creation of new jobs and wealth for Missourians • Generation of tax revenue for the public's welfare.
Program Area: Business Development
Example 2: Mid-America Trade Adjustment Assistance Center (TAAC)
<p>The Mid-America Trade Adjustment Assistance Center (TAAC) administers the Trade Adjustment Assistance for Firms (TAAF) program, a federal program funded by the U.S. Department of Commerce's Economic Development Administration. TAAF's mission is to boost American manufacturers' ability to compete in a global market of less expensive foreign competition. TAAC implements this mission by providing technical assistance and funding to manufacturers that have been negatively impacted by import competition.</p> <p>The Mid-America TAAC is a partnership of the U.S. Department of Commerce, MU College of Engineering and University of Missouri Extension's Business Development Program. TAAC provides assistance to manufacturing firms in four states— Missouri, Kansas, Nebraska and Iowa—and is administered by the MU Extension Business Development Program.</p> <p>The TAAC helps Missouri manufacturers reposition when faced with cheaper imports of the same products from other countries. TAAC provides consulting/technical assistance to manufacturers to strengthen their competitive abilities by focusing on issues related to production, marketing/sales, finances, management, and IT support systems.</p>
<p>Key Impacts:</p> <ul style="list-style-type: none"> • In FY16, TAAC clients reported: <ul style="list-style-type: none"> ○ An increase of 619 jobs since entering the program—a 13.5 percent increase. ○ Cumulative sales of \$863 million—an increase of 34.6 percent

Program Area: Business Development
Example 3: BDP Assistance in Ferguson, Missouri
<p>The events in Ferguson in August of 2014 resulted in a number of challenges for local businesses and organizations. Many saw sales drop significantly as police closed streets and protests reduced patronage of many local businesses. As a result, the Small Business Administration declared the area an economic disaster zone, which provided access to emergency loans for affected businesses. The St. Louis SBTDC responded with emergency business counseling assistance and established a temporary office on the University of Missouri-St. Louis campus less than two miles from the heart of Ferguson. This expansion brought direct assistance closer to affected businesses. Specialists with the BDP helped fast-track emergency loans to get affected businesses back on their feet, and the St. Louis SBTDC helped provide assistance with marketing, business planning, access to capital and general business coaching for 150 local businesses. By engaging local businesses and helping them recover, the SBTDC and BDP have established an ongoing relationship to help the Ferguson business community regain its footing after the incidents of August 2014 and the ensuing turmoil.</p>
<p>Key Impacts:</p> <ul style="list-style-type: none"> • Creation of a \$1 million small business recovery fund, in partnership with the St. Louis Economic Development Partnership, to grant affected business up to \$10,000 to aid in recovery. • Counselors offering affected businesses guidance in applying for modest, non-SBA or EDP grants and in referring businesses to qualified attorneys and accountants to help with complex insurance paperwork. • Reduction in the number of local businesses might not have been able to continue to operate due to the economic hardships.

5. The Functional Economic Impact of MU Extension in Business Development: Example of a 1 Percent Increase in Funding.

As noted above, MU Extension’s work in Business Development generates a variety of positive impacts across the state on an annual basis. Business Development Programs are focused on helping businesses grow throughout their business life cycle by improving business performance, increasing innovation and commercialization, and enhancing business competitiveness. The ability for these programs to generate additional impacts is hampered by primarily only one key variable—the financial capacity to work with additional companies in need of assistance.

Unlike other programmatic areas of MU Extension that can disseminate knowledge through a wide variety of means thereby impacting a larger number of stakeholders, the Business Development Programs are constrained by their ability to have adequate resources to provide direct one-on-one technical assistance to companies. For example, while ANR’s Regional Grazing Schools can provide forage and grazing in large workshop settings as well as provide information on-line and through literature resources to promote best practices for livestock production, Business Development Counselors typically must meet individually with the management of a company to provide strategic business assistance that will be relevant to the company’s specific needs. This type of technical assistance does not lend itself to large groups settings; therefore, the ability to work with additional companies requires additional resources.

To illustrate the potential impact of adding capacity to the suite of Business Development Programs, TEconomy used input/output analysis to model the potential economic effect of increasing funding for these programs. The scenario modeled estimates the impact of a hypothetical 1 percent funding increase based on the key assumption that the investment of an additional \$60,000 will result in the

creation of an additional 80 jobs, estimated from the reported impact these services have had over the last 3 years at their current level of funding.

Based on the analysis, TEconomy finds that a 1 percent increase in funding for Business Development Programs would be expected to create, because of the multiplier effect, an additional \$70.5 million in economic output for the State of Missouri and the creation of 242 new jobs (direct, indirect, and induced).

D. Functional Program Area: Community Development

1. Description

While two-thirds of Missouri is agricultural land, one-third is dedicated to other state, community, and commercial uses.²³ MU Extension provides important research and services for communities wrestling with development and sustainability issues. MU Extension's Community Development Program works collaboratively with communities to foster economic development and create capacity for sustainable communities and quality jobs through leadership development, community decision making, community emergency preparedness and focusing on inclusive communities. From small rural communities to Missouri's largest cities, MU Extension is active in the applied delivery of service and assistance.

Areas of programmatic emphasis include:

- **Diversity and Inclusion**—working to enhance the capacity of communities to work effectively with a broad range of individuals with different issues, languages, and cultures.
- **Economic Viability**—partnering with communities to identify and implement strategies for community economic development.
- **Emergency Preparedness**—providing education and technical assistance to individuals, families, local governments, businesses, schools and organization in preparing and responding to natural and man-made disasters.
- **Leadership/Organizational Development**—providing leadership learning experiences to meet individual community needs.
- **Local Government Planning and Public Policy**—using a variety of tools, enhancing local capacity to make sound policy choices.
- **Local History and the Arts**—providing expertise and support to promote and foster art-based community and economic development historical programs.

2. The Need:

Building sustainable communities requires education for capacity building to help communities and organizations increase volunteerism; nonprofit, private and public investment; and efficiency to create sustained economic value and development. Many community leaders, local elected officials and volunteers do not fully understand several factors that influence the community and the local economy. Knowledge of strategies for development, collaboration and planning can help these groups have a positive effect on the future of the community. To build sustainable communities, research has shown participants need to learn about their communities, build leadership skills and have an opportunity to affect outcomes.

²³ See <http://www.farmlandinfo.org/statistics/missouri>.

3. Themes, Impacts and Mechanisms of MU Extension Impact Generation in Community Development

MU Extension Community Development programs result in engaged citizens, expanded leadership, broader inclusion of community members, buy-in from the community, adoption of policies, implementation of plans, sound proposals put before voters, and increased economic activity. Key functional themes and impact areas for Community Development at MU Extension are summarized on Figure 8:

Figure 8: MU Extension Functional Impact Themes in Community Development



In FY15, the Community Development Program’s 78 faculty and staff worked collaboratively with 30 communities and 195 additional organizations and partners to foster economic development and build capacity for sustainable communities and quality jobs through leadership development, community decision-making, community emergency preparedness and focusing on inclusive communities. Community Development professionals offered 11 in-depth leadership courses and approximately 60 conferences, workshops and short courses, in addition to providing web-based and social media resources, facilitation, coaching and consultation. These efforts led to:

- \$6.8 million in grants and other resources acquired by communities and organizations
- \$393,560 in volunteer hours generated by community development programs to conduct programs
- \$523,448 in volunteer hours generated by communities and organizations as a result of programmatic activities adopted
- 77 community and organizational plans developed
- 69 community/organizational programs and activities initiated or completed.

4. Functional Impact Examples for MU Extension in Community Development

In the case of MU Extension work in Community Development, several examples are illustrative of the high impact work taking place:

Program Area: Community Development
Example 1: Community Emergency Management Program
In the first quarter of 2017, five natural disaster events occurred across the United States with losses exceeding \$1 billion each. This places the nation on pace to exceed the number of natural disasters that occurred in 2016 (15 events) which at the time represented the second highest total number of events observed in one year since 1980. ²⁴ The World Economic Forum reports that natural disasters caused a total of \$1.5 trillion in damage worldwide between 2003 and 2013, causing more than 1.1 million deaths and

²⁴ NOAA National Centers for Environmental Information (NCEI) U.S. Billion-Dollar Weather and Climate Disasters (2017). <https://www.ncdc.noaa.gov/billions/>

affecting the lives of more than two billion people.²⁵ In just the past few years, Missouri has experienced a number of natural disasters, from floods to winter storms to tornados to droughts.

While unfortunately it is not possible to stop the occurrence of natural disasters, it is possible to mitigate their impact through emergency management preparedness and postevent recovery. MU Extension plays an active and vital role in community emergency management preparedness and postevent recovery, which has significant impact on communities throughout the state. MU Extension collaborates with communities to build preparedness for and help recover from severe weather events to create resilient communities. Staff hold workshops on postdisaster homeownership, severe weather, safe food and drink in disaster situations, farm and business recovery, and mental health issues associated with the previous year's drought. MU Extension also distributes information through regional offices, county fairs, multiagency resource centers, TV, websites, print services, radio and social media. Extension specialists are primary instructors in Community Emergency Response Team (CERT) courses and Teen CERT courses. Extension specialists are regularly called upon to facilitate unmet-needs committees, Community Organizations Active in Disaster (COAD) and Long Term Recovery Committees (LTRC). MU Extension also actively participates in the governor's Disaster Recovery Partnership and, works with SEMA, and develops the COAD Manual for communities.

The MU Extension community emergency management programs result in engaged citizens, expanded leadership, broader inclusion of community organizations, community buy-in, adoption of policies, implementation of plans and development of resilient communities that help reduce loss, displacement and trauma during and after disasters.

Key Impacts:

In FY15 alone:

- \$10,118 in volunteer hours generated by Community Development Extension to conduct programs
- Missouri River corridor continued significant recovery
- 10 community and organizational disaster plans developed or updated by work with COAD
- 38 MU Extension county offices updated disaster plans for the county operation
- More than 50 local and regional COADs working statewide in preparedness and recovery.

Program Area: Community Development

Example 2: The Extension Community Economic and Entrepreneurial Development (ExCEED) Program

Harvard Business School's Institute for Strategy and Competitiveness has found that "Current policies to improve the disappointing economic performance of rural regions are, by and large, not working. Not only is the performance of rural regions lagging, but the gap in performance levels between rural and urban areas seems to be widening."²⁶

Recognizing that regional economic development can be strongly affected by purposeful action, MU Extension created the Extension Community Economic and Entrepreneurial Development (ExCEED) program to help fosters regional collaboration to invigorate local economies by developing local leadership, creating an entrepreneurial culture, and retaining local wealth. ExCEED partners with rural communities to identify and implement new strategies for community economic development with a collaborative learning model, assessing local strengths and assets, and creating local plans. Working collaboratively with MU Extension on an asset- and place-based approach to fostering community

²⁵ See: <https://www.weforum.org/agenda/2015/12/how-much-do-natural-disasters-cost-the-world/>.

²⁶ See: http://www.isc.hbs.edu/Documents/ced/EDA_RuralReport_20040621.pdf.

economic development and an entrepreneurial mindset results in economically viable rural communities and regions for future generations.

Key Impacts:

An in-depth study of ExCEED, conducted by MU Extension, found that when the community of Brookfield invested time and energy into implementing an ExCEED project within their community, the investment paid off in numerous ways including two industrial expansions resulting in 75 new jobs and \$4.1 million in new investments in facilities and equipment. The city also received \$150,000 in tax credits from the Missouri Development Finance Board for the Downtown Brookfield Twin Parks Project. The Brookfield Area Growth Partnership hosted a community planning retreat for more than 20 community leaders to lay plans for the next five years. The resulting priority focus areas were a comprehensive plan for the city, a community funding foundation, public outreach, addressing drug issues, and workforce and youth development. Leadership Brookfield began its 10th year of training local youth and adult leaders. Approximately 150 locals have completed the class so far, becoming a model for local leadership training in Missouri.

Program Area: Community Development

Example 3: EXCEL: EXperience in Community Enterprise and Leadership

Excellence in Community Elected and Appointed Leadership (EXCEL) is a leadership and team development program delivered throughout Missouri within local communities. The coursework covers topics including Personal Leadership Assessment, Situational Leadership, Conflict Management and Dispute Resolution, Problem-Solving in Teams, Communications, Short- and Long-Term Planning, and Foundations for Organizational Development. EXCEL's primary objectives are to (1) provide opportunities for people to assess their individual public leadership and personal development needs, (2) develop a logical continuing education program for local leaders based on assessed needs, and (3) assist them in locating educational resources. Services include individual assessment, individual and group curriculum development, consulting, teaching, and networking.

Key Impacts:

More than 7,500 people representing approximately 60 towns throughout Missouri have participated in 40 locally based, EXCEL-type leadership development programs. Some of those associated with the various programs gave their views on EXCEL's effectiveness:

- "The county fair was reborn and is phenomenal now. Many fair board members were EXCEL participants."
- "The local United Way now raises three times as many funds as three years ago. Most members of their board are graduates. The board seems better organized, more focused, and makes better use of resources."
- "A campaign for passing a school levy was directed primarily by past participants of the program."
- "At least a couple of big projects have been initiated by alumni, such as raising \$3 million for the YMCA."
- "Racial and ethnic barriers are being crossed."

5. The Functional Economic Impact of MU Extension in Community Development: Example of a One-Percent Reallocation of Government Expenditures.

As noted above, MU Extension’s work in Community Development generates a variety of positive impacts across the state. Significant Community Development efforts are focused on building capacity for sustainable communities through leadership development that results in better community decision-making. This in turn leads to better resource allocation and more impactful government expenditures. To illustrate the potential impact of community development leadership training activities, TEconomy used input/output analysis to model the economic effect on Missouri of a savings in local government expenditures, hypothesized as occurring through the training and planning assistance provided by MU Extension. The scenario modeled estimates the impact of a 1 percent savings in local government expenditures with the key assumption that the money is reallocated to tax cuts for households, public infrastructure construction projects, and education support in equal proportions. The model also assumes that the tax cut is spread equally across household income brackets.

Based on the analysis, TEconomy finds that a 1 percent savings in local government expenditures as a result of leadership training and other community development programs would result in \$12.1 million in increased output even when taking into account the offsetting decrease in local government spending.

E. Functional Program Area: Human Environmental Sciences

1. Description:

Human Environmental Sciences (HES) Extension at the University of Missouri embraces a range of programming targeted towards helping Missourians “improve quality of life in all environments including where they live, work, learn and relax.”²⁷ Programs in HES are rooted in both social and natural sciences to provide unbiased, research-based information to target populations. The type of activities undertaken by HES at MU Extension fall under the rubric of the discipline of Family and Consumer Sciences (FCS)—the “standard” term for this type of work nationwide. As noted by Battelle in a review of FCS as a discipline:

“Extension faculty in land-grant university Family & Consumer Sciences Extension are engaged in frontline research and education focused on helping individuals, families, and communities reach their full potential. Family & Consumer Sciences Extension is a highly pragmatic and proactive discipline focused on tangible results, with an active focus on nutrition, physical activity, health and well-being, human development, and personal financial management.”²⁸

Human Environmental Sciences

The American Association of Family & Consumer Sciences (AAFCS) describes Family & Consumer Sciences as the:

“...comprehensive body of skills, research, and knowledge that helps people make informed decisions about their well-being, relationships, and resources to achieve optimal quality of life.”

The National Institute of Food and Agriculture (NIFA) describes Family & Consumer Sciences similarly, adding that it is the:

*“... integrative, multidisciplinary field of science that studies relationships among humans and their environments to foster quality of life, strengthen communities, and achieve a healthy sustainable world.”*²⁸

²⁷ <http://extension.missouri.edu/hes/aboutus.htm>.

²⁸ Anne Kemerer and Simon Tripp, 2015. “Analysis of the Value of Family & Consumer Sciences Extension in the North Central Region.” Battelle Technology Partnership Practice. November 2015.

At the University of Missouri, HES Extension is focused primarily in:

- Food Safety
- Housing & the Built Environment
- Nutrition, Health & Physical Activity
- Personal Financial Management
- Strengthening Families.

It is important to note that HES Extension differs from social service organizations in that it targets **prevention education** before significant problems arise or just as difficulties emerge, whereas “social service organizations typically provide intervention services to those who have been clearly identified as having that need. Preventing problems before they happen, through education, is more effective and more economical than intervention or remediation after unhealthy behaviors have become entrenched.”²⁹

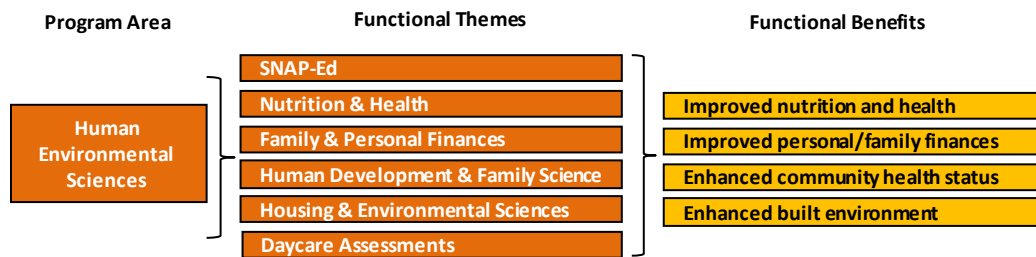
2. The Need:

Despite Missouri being part of the World’s largest national economy, there are many thousands of Missourians who face daily challenges and unmet basic needs. U.S. Census data released in 2016 show 875,704 Missourians falling at or below the federal poverty level, including 277,687 children³⁰. The University of Missouri’s Interdisciplinary Center for Food Security reports that, in 2016, “7.9 percent of Missouri households struggle with hunger. An additional 8.9 percent of households report reducing the quality, variety, or desirability of their diets due to insufficient resources. In total, approximately 980,000 Missourians experience food insecurity at some point in the year.”³¹ Missouri also faces comparatively high levels of health risk behaviors and unhealthy lifestyle choices, with 32.4 percent of Missourians obese, 27 percent physically inactive and 22.3 percent smokers.³²

3. Themes, Impacts and Mechanisms of MU Extension Impact Generation in Human Environmental Sciences

Human Environment Sciences (HES) covers many areas that have been part of the field of Family and Consumer Sciences since its inception, and others which reflect the growing recognition of the importance of social and economic issues to the well-being of individuals, families, and communities across Missouri. Key functional themes and impact areas for HES at MU Extension are summarized on Figure 9:

Figure 9: MU Extension Functional Impact Themes in Human Environmental Sciences



²⁹ Ibid.

³⁰ <http://www.communityaction.org/missouri-poverty-facts/>.

³¹ <http://foodsecurity.missouri.edu/>.

³² 2016 America’s Health. United Health Foundation. <http://www.americashealthrankings.org/explore/2016-annual-report/state/MO>.

At the heart of MU Extension’s HES work are programs to:

- Provide Missourians with knowledge and educational content that helps them lead healthier lives. In this regard, MU Extension provides education to low income families, children and youth regarding food access, food choice and a healthy, balanced diet. Programs are provided for Missourians across the age spectrum on how to lead more active and healthy lifestyles, how to manage and prevent chronic diseases (such as diabetes), and how to be a well-informed consumer in terms of health insurance and healthcare options.
- Provide Missouri businesses, schools and food preparation professionals, together with families and individuals, with the latest education in safe food handling and preparation skills. This helps to prevent avoidable transmission of food-borne illnesses, and saves the state millions in avoided healthcare costs and lost individual and caregiver productivity.
- Provide education for Missourians in terms of financial literacy, budget management, saving for retirement, and other money-management skills to improve family and individual finances for those in both urban and rural settings.
- MU Extension faculty and staff in Human Development and Family Sciences provide education and training for mothers-to-be to help give birth to healthy babies, improve early childhood development and early childhood education, and enhance the quality of professional childcare across the state.
- Provide education for homeowners and renters to help reduce energy consumption, maintain a healthy home environment, adapt their home to special needs associated with disabilities and aging, and conduct preventive maintenance.

HES work at MU Extension is certainly diverse, but at its heart it is very much focused on improving the health, wellbeing and quality of life of Missourians across the state. The work is conducted by a faculty and staff in the HES area totaling 256 personnel. 19 percent of these personnel are located in Columbia, with the majority of team members in communities and counties across Missouri.

4. Functional Impact Examples for MU Extension in Human Environmental Sciences

In the case of MU Extension work in Human Environmental Sciences, several examples are illustrative of the high impact work taking place:

Program Area: Human Environmental Sciences
Example 1: SNAP-Ed, the Family Nutrition Program of Missouri.
<p>The non-partisan Center on Budget and Policy Priorities (CBPP) notes that: <i>SNAP is heavily focused on the poor. About 93 percent of SNAP benefits go to households with incomes below the poverty line, and 58 percent go to households below half of the poverty line (about \$10,080 for a family of three in 2016). Families with the greatest need receive the largest benefits. These features make SNAP a powerful antipoverty tool.</i>³³</p> <p>As reported by TEconomy³⁴, “to help SNAP recipients make informed, healthy choices, the federal government includes funding for the Supplemental Nutrition Assistance Program – Education (SNAP-Ed).</p>

³³ Reported in Simon Tripp, Ryan Helwig, Joseph Simkins, Martin Grueber, David Friedrich and Deborah Cummings. 2016. “SNAP-Ed FY2015: Supplemental Nutrition Assistance Program Education through the Land-Grant University System. A Retrospective Review of Land-Grant University SNAP-Ed Programs and Impacts.” Prepared by TEconomy Partners LLC for Cooperative Extension Service Directors/Administrators through the National Land-Grant University SNAP-Ed Assessment. April 2016. Available online at: <https://articles.extension.org/sites/default/files/FY2015%20SNAP%20Ed%20Report%20Final.pdf>.

³⁴ Ibid.

SNAP-Ed [called the Family Nutrition Program in Missouri] is a research-based federal nutrition education and obesity prevention program that is overseen by state agencies, and managed and delivered through implementing agencies at state and local levels.” In Missouri, MU Extension is the leading provider in the state of nutrition and physical activity education for SNAP recipients and SNAP-eligible individuals.

No single intervention or program can affect the type of change in knowledge, attitudes and behaviors needed to promote healthy lifestyle choices. Rather, MU Extension and colleagues at other land-grant universities, have developed a series of activity and action domains that address four areas of critical importance to SNAP-Ed—these include:

- Educating SNAP-Ed recipients on dietary quality and nutrition choices
- Teaching about effective shopping behavior and food resource management
- Addressing food access and food security issues
- Enhancing understanding of the need for physical activity and the avoidance of a sedentary lifestyle.

The MU Extension HES Family Nutrition Program (FNP) serves at least 50 percent of SNAP recipients in all 114 Missouri counties and the City of St. Louis. The demand for the program is evidenced by the numbers of persons serviced annually through the MU Extension programing, with over 200,000 Missourians provided with direct education annually and an additional 400,000 served by MU Extension indirect educational program activities (including health fairs, newsletters, food pantries, phone calls and mailings.) More than 1,500 schools and agencies statewide cooperate and collaborate to provide this educational service.

MU Extension has evaluated results obtained through FNP programs, and the results from pre- and post-education surveys of program participants indicate positive results being achieved. Data reported by MU Extension indicate that: 99 percent of youths recognized MyPlate (a key recommendation tool for dietary content); 63 percent of youths read labels on food packages; 71 percent of adults more frequently used the Nutrition Facts label to make food choices, and 56 percent of adults thought about healthy food choices when deciding what to feed their family. Surveying also found that 58 percent of adults made dietary improvements. By focusing on educating participants on the value of nutrition and physical activity, the FNP helps improve public health, thereby reducing the incidence of obesity, diabetes and other diet-related chronic health problems in Missouri's low-income populations, and reducing the economic burden created by health consequences arising from those diseases.

Key Impacts:

- Improved use of SNAP benefits by recipients across Missouri
- Healthier diet and physical activity behaviors among SNAP-recipients and SNAP-eligible individuals. Results in better health and ability to perform effectively at school and at work.
- Reduced costs for the state in terms of chronic healthcare costs associated with improper diet and lack of sufficient exercise

Program Area: Human Environmental Sciences

Example 2: Financial Education and the Missouri Taxpayer Education Initiative

People spend a great deal of time working to earn an income, but research shows most Americans paying only limited attention to managing income, family budgets and financial planning for the future. In a research paper published by the National Bureau of Economic Research it is noted that:

Increasingly, individuals are in charge of their own financial security and are confronted with ever more complex financial instruments. However, there is evidence that many individuals are not

well-equipped to make sound saving decisions. This paper demonstrates widespread financial illiteracy among the U.S. population, particularly among specific demographic groups. Those with low education, women, African-Americans, and Hispanics display particularly low levels of literacy. Financial literacy impacts financial decision-making. Failure to plan for retirement, lack of participation in the stock market, and poor borrowing behavior can all be linked to ignorance of basic financial concepts.³⁵

Low levels of “financial literacy” are an issue for many Missourians. In recognition of this, MU Extension operates a range of programs targeting several key aspects of personal finance that have a large impact on family incomes and budgets. Two examples of this work are activities are the Missouri Taxpayer Education Initiative and the Health Insurance Education Initiative operated by MU Extension.

Since filing taxes is an annual requirement for all adult Missourians, and can have a significant impact on personal “take home” income, it represents both a high impact area relating to financial literacy and a gateway for MU Extension to engage Missourians in thinking about their financial education through taxpayer assistance. As reported by MU Extension:

The initiative works in local communities to prepare and electronically file state and federal income tax returns and Missouri Property Tax Credit claims for low- to moderate-income individuals. Faculty and staff work with clients to impart financial information and build long-term relationships to support ongoing financial education. Over the past 10 years, University of Missouri Extension has helped individuals and families file 43,824 federal returns, with a total federal refund of more than \$39 million. Assuming that the average tax return costs \$200 to prepare, this program has saved Missouri residents roughly \$8.76 million in tax preparation costs. This effort would not be possible without the support of more than 20 partners, including United Way, local electric cooperatives, community action agencies and other organizations. The Missouri Taxpayer Education Initiative helps low- to moderate-income individuals and families understand state and federal tax systems, which can be difficult to navigate. Using taxpayer assistance as a gateway to broader financial education, the initiative helps to improve financial literacy and understanding among Missouri's low- to moderate-income populations.³⁶

The MU Extension Health Insurance Education Initiative is a statewide program designed to provide individuals and families with the facts, resources and skills training they need to make informed health insurance decisions. The Affordable Care Act mandate for all adults to have health insurance coverage created significant needs across Missouri for individual education regarding a decision many were unfamiliar with. The complexity of the health insurance market, and the implications of premiums, deductibles and variations in coverage can be significant challenges for many to navigate. The Health Insurance Education Initiative was launched by MU Extension in October 2013 to specifically provide guidance in relation to ACA mandates and choices. Over 90 extension faculty have received training to deliver local programs about how the Affordable Care Act affects individuals, families and businesses. These faculty have then enabled MU Extension to deliver 330 educational workshops across the state, reaching more than 3,750 Missourians. An additional 780,000 Missourians have received information via other MU Extension events and outreach activities, and via newspaper articles, television stories, radio spots, podcasts, websites and email efforts coordinated by Extension.

³⁵ Annamaria Lusardi. 2008. “Financial Literacy: An Essential Tool for Informed Consumer Choice?” NBER Working Paper No. 14084. Issued in June 2008.

³⁶ University of Missouri Extension Impact Statement recorded in the Land-Grant Impacts Database Portal maintained at Texas A&M University AgriLife Extension Service.

MU Extension professionals in financial planning also provide guidance through the development of curricula materials and online educational resources available for access by Missourians. Examples include the following:

- Making Money Count, a Curriculum for Managing Personal Finances
- Solutions for Better Living in These Tough Economic Times
- Financial Recovery and Risk Management
- Managing Your Money
- Credit in the Family Budget
- Planning the Late-career, Retirement-mode Years: Business Management for Farmers.

Key Impacts:

- Improved financial literacy for individuals and families across Missouri
- Enhanced family incomes through improved budgeting, financial planning and tax planning
- Improved family well-being and stress reduction associated with financial challenges.
- Improved levels of health insurance coverage for Missourians, reducing catastrophic financial impacts from serious health events, reducing emergency room use for basic health needs, and improving access to preventive care and health maintenance services.

Program Area: Human Environmental Sciences

Example 3: Stay Strong, Stay Healthy

As noted by medical researchers:

Aging is associated with a number of physiologic and functional declines that can contribute to increased disability, frailty, and falls. Contributing factors are the loss of muscle mass and strength as age increases, a phenomenon called sarcopenia. Sarcopenia can result or be exacerbated by certain chronic conditions, and can also increase the burden of chronic disease. Current research has demonstrated that strength-training exercises have the ability to combat weakness and frailty and their debilitating consequences. Done regularly (e.g., 2 to 3 days per week), these exercises build muscle strength and muscle mass and preserve bone density, independence, and vitality with age. In addition, strength training also has the ability to reduce the risk of osteoporosis and the signs and symptoms of numerous chronic diseases such as heart disease, arthritis, and type 2 diabetes, while also improving sleep and reducing depression.³⁷

In recognition and response to the need to increase older adult strength and associated fitness, MU Extension faculty in Nutrition and Exercise Physiology developed *Stay Strong, Stay Healthy* (SSSH)—an 8-week strength training program for middle-aged and older adults. The program is delivered by Extension Specialists and also by MU students trained by the Nutrition and Exercise Physiology faculty and certified for program delivery. As reported by MU Extension:

The program is designed to increase aging adults’ access to a safe, structured and effective strength training program. At each session, a prescribed set of eight upper- and lower-body strengthening exercises are done. Participants are made to feel comfortable regardless of their current fitness level so they can safely participate and gradually build the strength beneficial to health and an increasing ability to live independently longer. Over the past year, 390 participants completed the class. 94 percent thought that their health was better because of the program. 88 percent felt physically stronger. 85 percent felt they had more energy. 96 percent were very satisfied with the class. 91 percent felt more flexible. Participants completed five fitness

³⁷ Seguin R. and Nelson ME. 2003. “The benefits of strength training for older adults.” American Journal of Preventive Med. 2003 Oct;25(3 Suppl 2):141-9.

*assessments at the beginning and end of the 10- week class series. The fitness assessments measure strength, flexibility, and balance. 76 percent improved in three to five fitness assessments.*³⁸

With results in hand proving the effectiveness of the *Stay Strong, Stay Healthy* program, and demand for continued participation from “graduates” of the original 8-week programs, MU Extension developed *Advanced Stay Strong, Stay Healthy* as a follow-up program). Advanced SSSH challenges middle-aged and older adults with new and different exercises, specifically targeted at improving activities of daily living and overall health. Resistance exercises using body weight, hand weights and ankle weights are used. Again, the reported results showed highly positive outcomes, with 97 percent of participants saying they thought their health was better because of the program. 76 percent added other physical activities to their exercise routine. 73 percent were confident or very confident they would continue the strength training exercises they learned in the program. A three-month follow-up survey had a 51 percent response rate and revealed: 79 percent continued to lift weights at home, in a group, or at a gym. 76 percent agreed or strongly agreed that their ability to do everyday tasks has improved, and 78 percent described their health as “somewhat improved” or “a lot more” improved after completing the program.

To-date over 8,000 adults have participated in the SSSH/ASSSH programs. Other Extension services outside of Missouri have taken note of the success, with the program now extended to Kansas and South Dakota, and nine additional states investigating the program.

Key Impacts:

- Improved health of middle-aged and older adults 60+ across Missouri, thereby promoting improved quality-of-life and reduced demand and associated costs for provision of healthcare services.
- Target of boosting the length of time that older persons can maintain independent living and avoid the personal and societal costs of requiring the support of care-givers or moving to assisted living.

Program Area: Human Environmental Sciences

Example 4: Building Strong Families

According to analysis by the Pew Research Center fewer than half (46 percent) of U.S. kids younger than 18 years of age are living in a home with two married heterosexual parents in their first marriage. Pew reports that this represents a significant change from 1960, when 73 percent of children fit this description, and 1980, when the percentage stood at 61 percent.³⁹ The trend is not benign, since social science research has found significant negative impacts associated with it. Decades of research findings indicate that family structure has a substantial impact, for example, on a child’s socioeconomic attainment. Children from single-parent families are more likely to have low socioeconomic attainment than those from two-parent families. Single-parent family structures increase children’s risk of dropping out of high school and increase the likelihood that they will be a single parent—both of which are correlated with low socioeconomic status.⁴⁰

³⁸ University of Missouri Extension Impact Statement recorded in the Land-Grant Impacts Database Portal maintained at Texas A&M University AgriLife Extension Service.

³⁹ Pew Research Center analysis of American Community Survey (ACS) and Decennial Census data. <http://www.pewresearch.org/fact-tank/2014/12/22/less-than-half-of-u-s-kids-today-live-in-a-traditional-family/>.

⁴⁰ See for example: <http://www.journals.uchicago.edu/doi/abs/10.1086/228148> and <https://eric.ed.gov/?id=ed375224> and <http://www.popline.org/node/323417>.

MU Extension produces a range of educational programming, materials and online resources focused on strengthening families of all kinds across Missouri. The *Building Strong Families: Challenges and Choices* program, for example, is designed to help families “find and build on their strengths and learn skills to create a stronger family unit through improved relationships and positive communication. The program covers 13 topics and uses hands-on activities to engage participants.”⁴¹

MU Extension reported data show 27,589 adults and 7,300 youths having participated in the program. Follow-up surveying of participants has shown strong impacts being generated, with MU Extension reporting:

“93 percent learned at least one specific skill in each topic area. (e.g., “I learned to take more time with each individual child.”). 70 percent learned at least two specific skills in each topic area. (e.g., “I learned about healthy portion sizes and how to recognize fraud”). 79 percent set goals related to strengthening their families or their own skills. (e.g., “I will organize my bills, and I will spend more time with my family.”) Participants gained a better understanding of how to build stronger relationships and improve communication with family members. Adult participants who made changes in their families reported these changes: they enjoy increased satisfaction with relationships; their families are better at helping one another, communicating and getting along; and, they see greater value in their children and families and the relationships they had with them.”⁴²

Key Impacts:

- Improved family resiliency
- Potential reduction in social challenges associated with broken families.

5. The Functional Economic Impact of MU Extension in Human Environmental Sciences: Example of Enhanced Health of Missourians on Healthcare Cost Savings

As noted above, MU Extension’s work in Human Environmental Sciences generates a variety of positive impacts across the state. Significant HES work is focused on improving the health of Missourians—through both dietary modification and increased physical activity—both of which are well-documented as improving cardiovascular health and keeping at bay diseases such as stroke and hypertension. To illustrate the potential impact of healthcare improvement, TEconomy used input/output analysis to model the economic effect on Missouri of a reduction in several diseases and health disorders associated with diet and exercise. The scenario modeled estimates the impact of a 1 percent decrease in the total number of hospital inpatient visits for 25 selected conditions related to diet and exercise, and derives a dollar savings estimated from data on the mean cost of visits. Data are derived from state statistics from HCUP State Inpatient Databases [2014], recorded by the Agency for Healthcare Research and Quality (AHRQ), based on data collected by the Missouri Hospital Industry Data Institute and provided to AHRQ.

Based on the analysis, TEconomy finds that a 1 percent decrease in hospital inpatient stays in Missouri (for diseases that are associated with poor diet and/or lack of exercise) would result in \$17.4 million in cost savings.

⁴¹ University of Missouri Extension Impact Statement recorded in the Land-Grant Impacts Database Portal maintained at Texas A&M University AgriLife Extension Service.

⁴² University of Missouri Extension Impact Statement recorded in the Land-Grant Impacts Database Portal maintained at Texas A&M University AgriLife Extension Service.

F. Functional Program Area: 4-H Youth Development

1. Description

4-H Youth Development seeks to instill integrity, service, leadership, a sense of duty, and personal growth in the youth it serves. It is in these efforts that the 4-H Center for Youth Development can be seen to build a basis for positive personal and societal economic impacts. Specific life skills development activities are built into 4-H Youth Development projects, activities, and events with the goal of helping youth become contributing, productive, self-directed members of society. 4-H Youth Development projects are designed to be in-depth learning experiences for 4-H members.

While often thought of as a rural program, the 4-H Center for Youth Development serves a much broader audience. One out of every five Missourians aged 5 to 18 (229,957 youth) were enrolled in 4-H Youth Development programs in 2016. Missouri's 4-Hers come from both rural and urban settings, with 24 percent of participants residing in suburbs and 15 percent in cities with populations larger than 10,000.

2. The Need:

According to the National Center for School Engagement, "at-risk youth" are youth who are exposed to factors that may increase their tendency to engage in problem or delinquent behaviors.⁴³ This definition covers self-destructive behavior, as well as costs to society related to crime and antisocial behavior. Sadly, with the rise in opiate and other drug addictions, peer influences, and broken homes, the number of at-risk youth is increasing across the nation, including in Missouri.

Over the years, 4-H Youth Development programs have been found to have a positive impact on youth. Research conducted at Kansas State University, with oversight by a National Impact Project Steering Group⁴⁴ found that participation in 4-H Youth Development programs impact youth in the following ways:

- The opportunity to value and practice service for others
- An opportunity for self-determination
- A positive relationship with a caring adult
- A physically and emotionally safe environment
- An inclusive environment
- Engagement in learning
- Opportunity for mastery
- An opportunity to see oneself as an active participant in the future.

Research shows convincing evidence that participation in 4-H Youth Development programs engenders positive self-esteem, personal responsibility, and an engagement with and responsibility toward community. Participants from at-risk backgrounds who achieve such positive outcomes through 4-H Youth Development programs are, of course, less likely to succumb to external peer pressures and the low self-esteem issues that so often lead to antisocial and self-destructive behavior.

⁴³ See <http://schoolengagement.org/school-engagement-services/at-risk-youth/>.

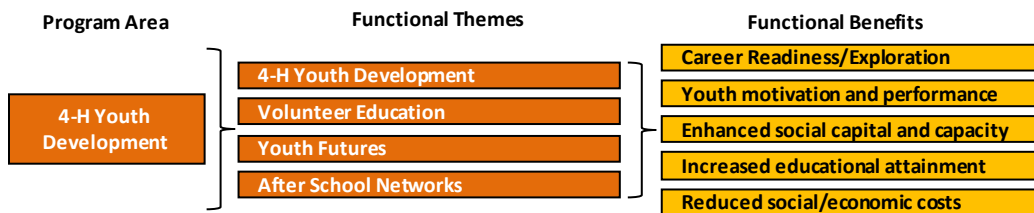
⁴⁴ *Prepared and Engaged Youth Serving American Communities: National 4-H Impact Assessment Project*, <http://www.national4-hheadquarters.gov/about/impact/impact1.pdf>.

Richard M. and Jacqueline V. Lerner at Tufts University lead a team which has conducted the preeminent research on the youth development impacts of 4-H Youth Development programs nationwide. The *4-H Study of Positive Youth Development (PYD)* is a longitudinal study repeated annually from 2002 to 2010 which surveyed more than 7,000 adolescents across 42 states in grades 5-12. Findings from the 2013 study, which examined youth development across all eight waves, suggest that 4-H youth are four times more likely to make contributions to their communities in grades 7-12 than youth participating in other out-of-school activities. The same study also finds that 4-H youth are about twice as likely to be civically active. Therefore, the role that 4-H Youth Development programs play in both encouraging community service and discouraging risk behaviors through its programming and activities, positively impact the economy of Missouri over the long-term.

3. Themes, Impacts and Mechanisms of MU Extension Impact Generation in 4-H Youth Development

While 4-H Youth Development programs are often viewed as one single youth development program, the reality is that the range of programmatic activities and functional benefits associated with the Center for 4-H Youth Development is quite diverse. Key functional themes and impact areas for 4-H Youth Development at MU Extension are summarized on Figure 10:

Figure 10: MU Extension Functional Impact Themes in 4-H Youth Development



The 4-H Center for Youth Development provides an important source of skill and leadership building through both school programs and out-of-school activities. The 4-H Center for Youth Development programs are delivered by 169 faculty and staff—with the vast majority of personnel working in every county across Missouri. However, 4-H Youth Development programming would not be possible without the numerous volunteers who provide programming and mentorship across the state. In 2016, 9,138 volunteers donated an average of 200 hours each.

While 4-H Youth Development provides important programming across the entire State of Missouri, its efforts may be especially vital to rural and urban students whose schools have limited funding to provide an abundance of extracurricular opportunities. Research finds that structured and collaborative extracurricular activities promote good mental health, build positive skills and values, and reduce the potential for youth to engage in negative behaviors.⁴⁵ For some students, 4-H Youth Development programs may be the most important, if not the only source of structure extracurricular activities that promote positive development.

Research also suggests that participation in 4-H Youth Development programs boosts academic achievement and college readiness. The *4-H Study of Positive Youth Development (PYD)* suggest that:

- 4-Hers have higher academic competence in grades 7, 9, 11, and 12.

⁴⁵ <http://onlinelibrary.wiley.com/doi/10.1002/pits.10136/abstract>.

- 4-Hers are nearly twice as likely to participate in STEM programs during out-of-school time compared with students in other out-of-school activities.
- Importantly, the latter effect is even more pronounced for girls, which is significant given that girls’ interest and participation in STEM fields tends to decrease compared with that of boys at every stage of education.⁴⁶

Two state-level studies matched 4-H records to state education data to examine the relationship between 4-H participation and academic achievement. One study matched 4-H participation records to Florida education documents to assess 4-H participation impacted within-person performance on state math and reading test scores over time. This study found that:

- 4-H participation was associated with a small increase in average reading score performance.
- 4-H participation is associated with a greater chance of achieving a passing score on either test.
- The benefits of 4-H participation are cumulative.

Another study in Minnesota found that 4-H youth:

- exhibited higher attendance
- scored higher on math and reading proficiency, and
- graduated high school at significantly higher rates than non-4-H students.

4. Functional Impact Examples for MU Extension in 4-H Youth Development

In the case of the MU Extension 4-H Center for Youth Development, several examples are illustrative of the high impact work taking place:

Program Area: 4-H Youth Development
Example 1: 4-H Youth Futures College within Reach Program
<p>Colleges and universities want to recruit and retain under-served audiences, such as first-generation college students, ethnic minorities, and students from working-class families. Many under-served youth, though, are less prepared for college—academically, psychologically and financially—than those who come from college-educated families. Research indicates only 15 percent of students drop out of college because of academic failure; most leave because of personal, financial or social problems. The ability to handle the demands of college during the first year is crucial to success in college. Furthermore, first-generation college students are twice as likely as those with a parent with a college degree to leave before their second year. But many under-served youths must overcome additional obstacles on the path to a college degree.</p> <p>The 4-H Youth Futures College Within Reach Program promotes college as an attainable goal for high school youths who are not typically encouraged to attend college, such as first-generation college students. 4-H Youth Futures is an extensive college orientation program that includes ongoing local mentoring and a college orientation conference on the University of Missouri and Lincoln University campuses. The goal of the program is to help under-served youth attend and stay in college.</p> <p>Since the inception of Youth Futures in 2002, 550 youth have participated in the program. There are currently 130 participants in high school. Of the 297 students that graduated from high school between</p>

⁴⁶ <http://www.aauw.org/what-we-do/stem-education/>.

2002 and 2013⁴⁷, 128 (43 percent) have graduated from college and 121 (41 percent) are enrolled in college as of 2015. Youth Futures is one of the few 4-H Youth Development programs in some of its target areas. Due to its success, its design has been replicated in Alabama, Kansas, and Illinois under the National 4-H Council.

Key Impacts:

- 128 participants have earned bachelor's degrees to date, thereby increasing their individual earnings by an average of \$2.4 million over a person's lifetime.
- 4-H Youth Development has therefore contributed to these underrepresented youths improving their lifetime earnings by an average of \$307.2 million.

Program Area: 4-H Youth Development

Example 2: Connecting Youth to Higher Education

Young people who go on to complete higher education are more likely to enjoy a higher quality of life than youths that end their education at high school. Factors that contribute to a higher quality of life include financial success, better consumerism, more leisure time, good health, and higher levels of civic engagement and community involvement. MU Extension 4-H Center for Youth Development connects more than 8,500 young people ages 8 to 18 to University of Missouri campuses and faculty each year. Missouri 4-H members are twice as likely to have been on a college campus as their non-4-H peers. The University of Missouri is by far the most frequently visited campus, and the 4-H Center for Youth Development is the second most reported reason to be on the MU campus. Being on a campus is a predictor of youth going on to higher education.

Key Impacts:

- Youths that earn their bachelor's degree increase earnings by an average of \$2.4 million over their lifetime.
- If 70 percent of the 8,737 members participating in 4-H Youth Development events on the University of Missouri campus go on to earn a bachelor's degree, 4-H Youth Development would help them earn a total of \$14.68 billion more in lifetime earnings.

Program Area: 4-H Youth Development

Example 3: Missouri 4-H Life Program

Integral to many 4-H Youth Development programs is the goal of building stronger life skills for youth—promoting their future success and reducing the likelihood of risk behaviors. One such program which aims to promote positive youth development in the face of adversity is the Missouri 4-H LIFE program. Since its creation in 2000, the 4-H LIFE program has provided an opportunity for participant youth to maintain positive relationships with parents in Missouri correctional facilities and develop life skills to reduce their chances of entering the juvenile justice system or developing behavioral problems.

There are about 1.7 million youths in the United States who have at least one parent in prison. Research shows these youths are more likely to exhibit low self-esteem, troubled behavior at school and at home, and isolation or withdrawal. They are also at a significantly higher risk for behavioral problems and involvement with the juvenile justice system. There has been a push for programming targeting

⁴⁷ Missouri 4-H Youth Futures Land-Grant-Impacts template 2015.docx. Statement was published in 2015.

incarcerated parents, but many programs focus only on skill development, provide few opportunities to engage in meaningful parenting and do not involve family outside of the institution. Recognizing the need for holistic programs that focus on maintaining positive relationships between incarcerated parents and their children, MU Extension, the 4-H Center for Youth Development, and the Missouri Department of Corrections jointly developed the Missouri 4-H LIFE Program to promote child-centric family visits between incarcerated parents, their children, and children's caregivers. These comprehensive visits take place in the prison visiting room and consist of preapproved, hands-on 4-H Youth Development club activities and projects designed to promote citizenship, positive leadership and healthy living. Incarcerated parents must meet stringent criteria to participate in 4-H LIFE, including active, ongoing participation in monthly parenting and leadership classes.

Since the inception of 4-H LIFE in 2000, nine additional correctional facilities in Missouri have adopted the program. Evaluations have consistently shown that the 4-H LIFE Program leads to stronger life skills for youths and higher-quality visits for families with an incarcerated loved one. By helping children develop valuable life skills while preserving their relationship with an incarcerated parent, 4-H LIFE works to reduce a child's chances of becoming entangled in the juvenile justice system or developing behavioral problems. With 96 percent of incarcerated individuals returning to family after leaving prison, it is crucial that family bonds are still intact upon a parent's re-entry into society and family life.

The National 4-H Council has selected 4-H LIFE as one of three "best practice" programs to be replicated as part of the National 4-H Mentoring Program, funded since 2009 by the Office of Juvenile Justice and Delinquency Prevention (OJJDP). The OJJDP currently has replication sites in Alabama, Georgia, Louisiana, New Hampshire and Washington, D.C.

Key Impacts:

- By teaching inmates' children leadership skills and healthy lifestyle choices, the program helps them avoid entanglement in juvenile and adult criminal justice systems.
- The annual projected taxpayer savings of keeping participants out of the justice system is \$89,170 per child.
- In 2014, the Missouri 4-H LIFE Program worked with 180 children and 235 of their qualified adult family members.

Program Area: 4-H Youth Development

Example 4: The Afterschool Program

Based on the National Assessment of Educational Progress (NAEP) or The Nation's Report Card™, The Education Trust concluded that by grade 12, minority students are “about four years behind other young people. Only 24 percent of black children and youth are in afterschool programs. 29 percent are totally unsupervised after school, while 19 percent are cared for by a sibling. Black parents have the highest level of demand for afterschool care for their children, with 61 percent of parents stating that their child would like to participate in an afterschool program if one were available in their area. Hispanic and black high school students are more likely to drop out in every state; their college matriculation rates are also below those of whites. Comparing the highest level of education, the gap persists. Only 15 percent of black students attend schools with adequate resources and high performance; 42 percent attend under-resourced schools with poor performance. Only 3 percent of black male students are enrolled in gifted and talented programs. Schools with a high concentration of minorities have fewer experienced teachers.

The Afterschool Program is designed to expand the pool of African-American students in Science, Technology, Engineering, Agriculture and Math (STEAM). The program offers underserved and underrepresented students access to educators uniquely qualified to advance their academic and

economic opportunities. The program helps to develop youth and community leaders with positive self-perceptions who are prepared to tackle the social ills facing their communities. Programming is offered near underserved communities and is intentionally designed to remove barriers to involvement and parental support, by providing transportation and being offered at no cost. This 36-week program is conducted in the fall and spring semesters, providing youth a safe and positive environment with adult role models who care about their success.

Youth ages 8-18 are engaged in over 25 STEAM-related subjects for three hours each school day. Students have access to tutors, volunteers and support staff to strengthen basic education needs. Students are supported through interactive common core learning software in reading comprehension, literacy and mathematics. A by-product of the success of the Afterschool program is an increased pool of potential STEAM students who are ready to matriculate and graduate, intentionally selecting careers in STEAM-related fields.

Key Impacts:

- Parents of all Afterschool program participants reported an increase in their child’s overall positive attitude, attitude toward school and getting along with parents.
 - 59 percent of student participants reported increase in overall confidence.
 - 50 percent of participants reported an increase in self-esteem
 - 63 percent reported doing better in school due to involvement in the Afterschool program.

5. The Functional Economic Impact of MU Extension in 4-H Youth Development: Example of a 3 Percent Reduction in Substance Abuse Disorders.

Substance abuse is rampant across the United States. According to the Surgeon General, 27 million Americans were current users of illicit drugs or misused prescription drugs and 66 million reported binge drinking in 2015. Overall, 20.8 million Americans aged 12 and older had a substance use disorder that same year.⁴⁸ The National Institute on Alcohol Abuse and Alcoholism estimates that 10 percent of U.S. adults have a substance use disorder at some point in their lives.⁴⁹ Tragically, only 11.2 percent of Americans who need treatment for substance abuse in a specialty facility actually receive it.⁵⁰

The societal cost of substance abuse is staggering. The National Institute on Drug Abuse estimates that alcohol, tobacco, and illicit drug use costs the United States \$740 billion annually.⁵¹ Roughly 70 percent of the cost of substance abuse is due to losses in productivity, with incarceration and health care costs comprising much of the rest.⁵² With an estimated 20.8 million people suffering from substance abuse every year and annual societal costs of \$740 billion, the average individual cost of substance abuse is estimated to be approximately \$35,000 per year.

Research suggests that substance abuse in late childhood and early adolescence leads to greater involvement with drugs later in life.⁵³ Because most illicit drugs use begins during the teenage years⁵⁴, It

⁴⁸ <https://addiction.surgeongeneral.gov/system/files/report-highlights.pdf>.

⁴⁹ <https://www.nih.gov/news-events/news-releases/10-percent-us-adults-have-drug-use-disorder-some-point-their-lives>.

⁵⁰ <https://www.drugabuse.gov/publications/drugfacts/treatment-statistics>.

⁵¹ <https://www.drugabuse.gov/related-topics/trends-statistics>.

⁵² <https://dmh.mo.gov/docs/ada/burdenofsaonmissouri.pdf>.

⁵³ <https://www.drugabuse.gov/publications/preventing-drug-abuse-among-children-adolescents-in-brief/chapter-1-risk-factors-protective-factors/when-how-does-drug-abuse-start-progress>.

⁵⁴ <https://www.drugabuse.gov/publications/drugs-brains-behavior-science-addiction/preventing-drug-abuse-best-strategy>.

is therefore vital that effective interventions are implemented in childhood and adolescence to inhibit the development of unhealthy behaviors related to alcohol, tobacco, and illicit and prescription drugs. As previously illustrated, 4-H Youth Development programs play an important role in providing structure in the lives of youth, particularly in areas that are economically disadvantaged or places with limited opportunities for extracurricular activities. Studies show that 4-H Youth Development programs have lifelong positive impacts on participants' self-confidence and promote positive youth development beyond that of other extracurricular activities. Most importantly, 4-H Youth Development programs teach youth valuable life skills that empower them to make healthy choices and offers drug prevention education to educate participants on the dangers and risks of substance abuse.

If Missourian 4-Hers face the same lifetime chances of having a substance abuse disorder as the national population, then roughly 23,000 (10 percent) of the 229,957 participants are at-risk for substance abuse at some point in their lives. **If 4-H Youth Development programs can prevent even 3 percent⁵⁵ of these 23,000 youths from developing a substance abuse problem later in life, these preventive efforts could save more than \$24 million for each year that those 700 individuals do not have a substance abuse disorder. This amounts to nearly \$500 million in savings over 20 years. Small decreases in the rate of substance abuse can have a dramatic impact on the societal costs of these disorders due to large losses in productivity and the high costs of criminal justice and health care.**

G. Functional Program Area: Continuing Education

1. Description

Everyone in the United States undertakes some level of formal education—whether mandatory K-12 education and the pursuit of a high school diploma, or onwards into higher education at an undergraduate, graduate or professional level in pursuit of a degree. In reality, however, a graduation event from formal education is seldom an end to learning, but rather a certificate of entry to the next phase of life—typically work life. And, in today's workplace, the pace of technological, practice, process, market and competitive change will typically dictate a need for ongoing learning and professional development. The reality is that few careers are static, and most will require lifelong learning to stay abreast of change and to maintain personal productivity, competitiveness and effectiveness.

As industries and professions evolve and change, continuing education is required for workers to stay current with the latest skills, knowledge and new technologies required within their field of work. As a leading provider of educational services, MU Extension plays a very important role in Missouri continuing education for a broad range of professionals. As noted by MU Extension:

“MU Extension partners with several of the University's schools and colleges to deliver noncredit continuing education courses, programs and training in a variety of professional trades that contribute to the success of public-sector organizations and private industries throughout Missouri and the nation.”⁵⁶

While MU Extension is totally dedicated to “education” in terms of its fundamental mission of extending university knowledge and research-based best practices and innovations to those who may utilize this knowledge across Missouri, it also offers a series of specific Continuing Education programs, especially in

⁵⁵ RAND estimates that school-based drug prevention programs can reduce lifetime use of drugs by as much as 3 percent (https://www.rand.org/content/dam/rand/pubs/testimonies/2005/RAND_CT237.pdf)

⁵⁶ <http://extension.missouri.edu/education/professional.aspx>.

noncredit courses for professions that require Continuing Education Units (CEUs) for ongoing professional certification and licensure requirements and as proof that they are staying up-to-date in key subject matter and skills. At MU Extension, continuing education programs are conducted for professionals in a broad variety of areas, including for example in: continuing medical education and physician lifelong learning; nursing; veterinary medicine; fire and rescue training and law enforcement.

2. The Need:

Whether required, or voluntary, continuing education meets multiple individual and societal needs, and holds numerous advantages for participants:

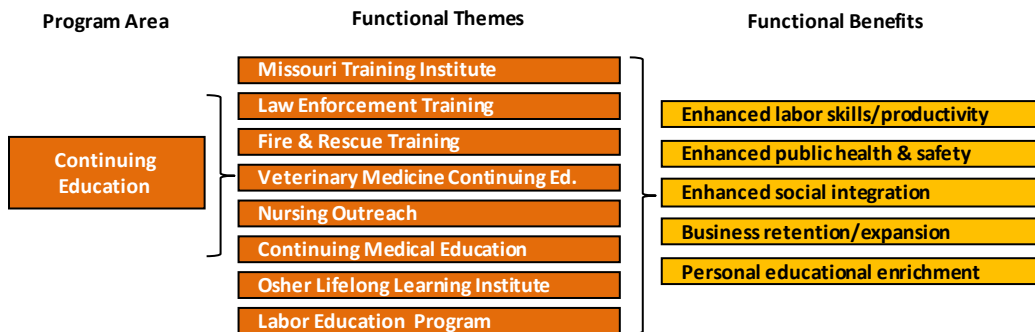
- Ensuring individual capabilities keep pace with the current standards of others in the same field.
- Providing a competitive edge for career advancement, job mobility and increased earnings.⁵⁷
- Increased job security, with higher levels of education tending to link to better job security, and credentials earned staying with individuals for life.
- Enhanced confidence and satisfaction in the workplace and access to networking opportunities with other continuing education course participants.
- Continuing education helps advance the body of knowledge and technology within a profession, and brings benefits to those the profession serves through better qualified providers with state-of-the-art knowledge and skills.

MU Extensions’ specially crafted and professionally delivered continuing education services are thus important in delivering benefits not only to individual participants, but also to their profession overall and the public served by these professions.

3. Themes, Impacts and Mechanisms of MU Extension Impact Generation in Continuing Education

MU Extension’s work in continuing education (Figure 11) includes significant programs directed towards fast moving life-science professions in human and veterinary medicine. Keeping up with constant change in healthcare practice, drug and diagnostic advancements, genetic tests, emerging diseases, regulations, etc. is a constant requirement for being a professional practitioner in these disciplines, and the maintenance and advancement of skills and knowledge in healthcare professions is very much in the public interest. Similarly, the skills and knowledge of those in public safety professions also represent a public good, and MU Extension has specific programs focused on continuing education for law enforcement, fire and rescue personnel.

Figure 11: MU Extension Functional Impact Themes in Continuing Education



⁵⁷ While experience is also a great teacher, reliance on only that does risk a tendency to do what we have done before whereas focused continuing education can open-up to new areas of knowledge, skill and opportunity.

As noted above, continuing education is not just a requirement for success in public safety and healthcare professions, it is also a general need for those in business and other areas of work where advancement and change are taking place. The MU Extension Missouri Training Institute is a core provider in this latter regard, providing supervision, business management and human resource management continuing education programs to meet the needs of Missouri businesses and other organizations requiring skilled management.

With skilled human capital being the most important resource for modern economic performance, the work of MU Extension in continuing education and associated programing engenders a range of positive benefits for the state, including:

- Personal Returns—increasing income, job security, career satisfaction and career mobility for Missouri workers.
- Economic Returns—Increased labor productivity and output for Missouri businesses and enhanced GSP for the Missouri economy
- Social Return—Enhanced quality of healthcare, public safety and other services provided by continuing education recipients, and improved societal integration of various populations.

4. Functional Impact Examples for MU Extension in Continuing Education

In the case of MU Extension work in Continuing Education, several examples are illustrative of the high impact work taking place:

Program Area: Continuing Education
Example 1: Missouri Training Institute
<p>The Missouri Training Institute has a 30-year track record in delivering MU Extension continuing education programing to the broadest audience in the state. Available and suited to the needs of any business, non-profit organization or government agency, the Institute provides a diverse range of professionally developed courses, seminars and associated information resources. The Institute operates within the Robert J. Trulaske, Sr. College of Business, leveraging the management and business skills of the faculty, and examples of programing provided by the Institute include:</p> <ul style="list-style-type: none"> • Conflict resolution • Business communications and writing • Public speaking • Customer service • Project management and time management • Interviewing and candidate election skills • Techniques for coaching and mentoring employees • Teamwork and building effective relationships • Leading change • Quality and Baldrige requirements <p>The Institute is also able to provide custom program development for employers whereby qualified curriculum designers work with an industry’s subject matter experts to develop training sessions specifically targeted to their staff and organizational needs.</p> <p>In addition to the business and management skills development programs outlined above, the Missouri Training Institute also offers a range of literacy courses, aimed at helping to raise-up the basic capabilities of under-educated Missourians to participate in modern society and workplaces. Key program examples include programing for those for whom English is a second language, together with STEM education</p>

programs seeking to increase math and science literacy across the state. The Institute also serves these public interests by training-the-trainers, providing continuing education courses for teachers across the state. This latter work is conducted under a grant from the Missouri Department of Elementary and Secondary Education whereby the Missouri Training Institute conducts programs to maintain certifications (requiring 20 hours of professional development training annually) for teachers providing English as a Second language and Adult Education and Literacy programs statewide.

In fiscal year 2016, the Missouri Training Institute enrolled almost 12,000 people in its 421 programs. Postprogram analysis by the Institute with participants show a very high degree of satisfaction with the quality of education provided. Evaluations in 2016 showed a mean score of circa 4.7 on a 5-point scale by participants in terms of “program quality” and over 99 percent of respondents gave the robust response that they would “recommend the program to others.”⁵⁸ The breadth of programing, level of participation, and quality of delivery is impressive given that the Institute operates with a core staff of just 6.5 FTE personnel. The Institute expands its reach by partnering with regional faculty within MU Extension, with regional faculty recently trained to provide the Supervisory Series curriculum at a local level across Missouri. It is also notable that the Missouri Training Institute is self-sustaining, maintaining its operations through grants and contracts.

Key Impacts:

- Improved performance of human capital in Missouri
- Improved incomes, job satisfaction and career mobility for Missourians
- Enhanced provision of healthcare and public safety services across Missouri
- Enhanced employability through re-skilling and enhancing educational attainment.

Program Area: Continuing Education

Example 2: MU Fire and Rescue Training Institute (MU FRTI)

MU FRTI has the mission of providing continuing education and training for fire service and emergency responders in the State of Missouri, and serves out-of-state professionals in these fields. MU FRTI has high demand, with over 13,000 enrollments across its programs in a typical year. The Institute’s work provides 80 percent of the training at a local level with MU FRTI professionals traveling across the state to deliver programs. This local level work has been facilitated by the Institute acquiring and developing props and specialized training equipment, and through the utilization of in-service Adjunct faculty who have the necessary qualifications, experience, and certifications to conduct the training.

Through firefighter specific programming, the Institute serves over 5,000 students annually, and is the largest component of the Institute’s work. MU FRTI also conducts training in rescue skills and the specialized skills required to respond appropriately to major disaster events. Rescue training provided by MU FRTI reached 2,000 students in the most recent year, and as with fire training, the rescue training is predominantly delivered at the local level.

As technologies, materials and physical environments change, the work of fire fighters and rescue personnel becomes more complex. Hybrid and electric vehicles, or other alternative fuel vehicles, for example, have required the development of specialized protocols in fires and accidents. Similarly, different construction materials, hazardous cargoes and other factors must be considered in professional training. MU FRTI works to assure that public safety professionals in Missouri have the correct knowledge and technical skills to respond appropriately. In response to special needs, the MU FRTI also conducts Special Projects, serving over 3,000 students in Missouri and other locations, focused in areas such as industrial incident response, aircraft rescue, grain bin rescue and Emergency Medical Training. The demand for these

⁵⁸ Missouri Training Institute. “FY2016 Annual Report.” October 3, 2016.

special services is high, with Grain Bin Rescue training, for example, alone provided to 500 students in FY2016.

The broad range of services provided by the MU FRTI is coordinated by a central staff of 13 full-time and 12 part-time personnel, supplemented by 130 Adjunct Instructors. Approximately 25 percent of these personnel are located in Columbia, with the majority distributed in communities across the state able to support training and consultations at the local level. Delivery of programming has become more challenging in recent years, with the program Director noting that in the past three years total staffing levels have had to be reduced by 28 percent. The State subsidy funding to FRTI has decreased 57 percent during the past six years, while federal funding was eliminated this year. This creates an increasingly challenging environment into the future given that most of the constituent base across the state are volunteers with limited resources available to pay for training.

Key Impacts:

- Improved response of Missouri fire and rescue personnel to emergency events and specialized emergency situations statewide.
- Enhanced public safety, property protection and community wellbeing.

Program Area: Continuing Education

Example 3: University of Missouri Law Enforcement Training Institute

The MU Extension Law Enforcement Training Academy provides a variety of important education and training programs in support of frontline police officers and others involved in law enforcement and associated public safety work in the state. Key programs offered include:

- **Basic Police Academy**—providing 700 hours of basic police officer training as required for licensure as a peace officer in the State of Missouri. At 700 hours, the program goes beyond the minimum usually required (600 hours) and also the training is continually adjusted and updated to reflect professionally and community identified needs and issues assuring that police officers graduate ready to handle the realities of the job.
- **Continuing Education for Police Officers**—Support for onsite continuing education is provided by the MU LETI, but the Institute has also been innovative in developing a new series of online, e-learning continuing education courses. The new curricula include online courses in: conflict resolution; crisis intervention; mental health response; officer health and wellness; racial profiling; racial sensitivity in Missouri; responding to anxiety disorders, and unbiased policing. In part, the development of these online resources is in response to budget challenges for law enforcement departments across Missouri, and a demand for lower cost training options.
- **School Protection Officer Academy**—It is a modern reality that active shooter and other public safety events threaten our schools. The MU LETI has responded to this threat by developing training curricula for school protection officers designed to deter armed intruder incidents and improve the ability to respond effectively to incidents that might occur. The program is designed to train teachers and school administrators to be certified protection officers as a supplementary job responsibility.
- **Animal Cruelty Investigator Training**—provides training and education in investigative skills for civilian or law enforcement personnel who investigate cases of animal neglect and cruelty. Founded in 1990, the National Animal Cruelty Investigations School was the first of its kind, offering a combination of specialized veterinary and law enforcement training.

Key Impacts:

- Enhanced public safety, property protection and community wellbeing.
- Improved response to emergencies and actively occurring events.
- Reduced continuing education costs for law enforcement agencies and their communities.

Program Area: Continuing Education
Example 4: MU Conference Office
<p>A unique asset to MU Extension is the MU Conference Office. The Conference Office provides full-service, one-stop event planning for groups ranging in size from five to 5,000 attendees anywhere in the world. The 15-person staff is available to handle the complete management of any conference, from budgeting, contract negotiation, menu selection, seating arrangements, name badges and proceedings to final reconciliation of the income and expenditures.</p> <p>The office’s diverse clientele includes state and federal agencies, private industry, not-for-profits, faith-based groups, and youth and athletic associations, as well as University academic and administrative departments. By offering this service, both the University and the State of Missouri benefits from having the ability to attract leading conferences and thought leaders, which in turn provides networking opportunities for researchers and industry professionals to transfer knowledge with personal interaction for relationship-building experiences. Specifically, the MU Conference Office creates opportunities to:</p> <ul style="list-style-type: none"> • Learn from experts from around the world regarding new research, technologies, and advancements in given fields of studies • Benefit from educational and networking opportunities • Talk one-on-one with information providers • Develop a life-long-learning and continuous improvement mentality • Participate and be involved in engagement possibilities to further develop MU’s reputation in academic fields.
<p>Key Impacts:</p> <p>In FY 2016, the Conference Office collaborated with five University of Missouri colleges and schools, seven administrative units, five federal and state agencies, and six associations and entities to deliver 63 conferences that generated \$3.14 million in gross revenue. Conferences were attended by 18,364 national and international participants, of whom 12,215 were Missourians. Twenty-one of the conferences were held in Columbia and generated over \$395,000 in direct support of the local economy for food, beverage, facility rental, lodging and local transportation expenditures. This does not include event dollars where conference participants paid their own lodging, meals and shopping.</p>

5. The Functional Economic Impact of MU Extension in Continuing Education: Example of Increased Productivity in the Healthcare Sector

The Continuing Education programs of MU Extension work to enhance the capabilities and job performance of participants. To evaluate the potential economic impact of continuing education, TEconomy used input/output analysis to model the economic effect on Missouri of an increase in worker productivity within the healthcare sector. With MU Extension programs providing continuing education for the frontline healthcare workforce in Missouri, MU Extension is focused on enhancing human capital performance in patient care. The scenario used models a 1 percent increase in economic output dollars per worker for healthcare worker sectors, not including medical and diagnostic labs or dentists. A key assumption in the analysis is that demand for services remains at current levels, i.e. all productivity gains result in savings on healthcare.

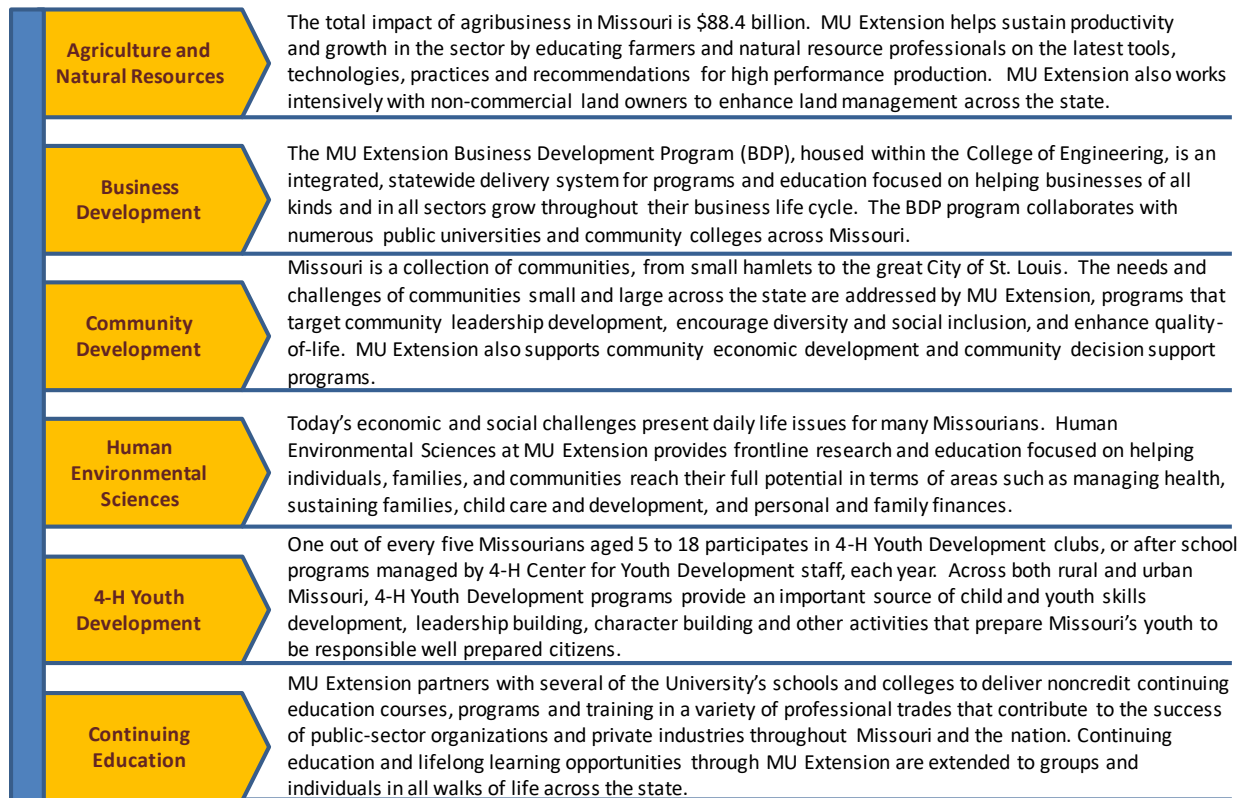
The results of the analysis show that a 1 percent increase in frontline healthcare workforce productivity, hypothesized as resulting from continuing education, would result in an average healthcare cost saving of \$993.71 per healthcare worker. **Based on Missouri healthcare labor costs, the total saving in the state from a 1 percent productivity increase in worker output being associated with continuing education of the healthcare workforce totals over \$352.8 million.**

Conclusion

TEconomy finds MU Extension to be a significant economic catalyst for the State of Missouri. Simply in terms of expenditure impacts, MU Extension generates \$176 million of Missouri economic output and more than 1,550 jobs for Missourians. These expenditure impacts are, however, eclipsed in their importance by the benefits accruing to the state through the wide array of services provided through MU Extension’s network of programs and initiatives.

MU Extension is first and foremost a training organization with a uniquely practical mission—strengthening the economic conditions of Missouri’s agricultural and livestock producers, industries, communities, and individual citizens through research-based educational programming. MU Extension’s purpose is to produce positive economic and social impacts for the State of Missouri— impacts that include the following:

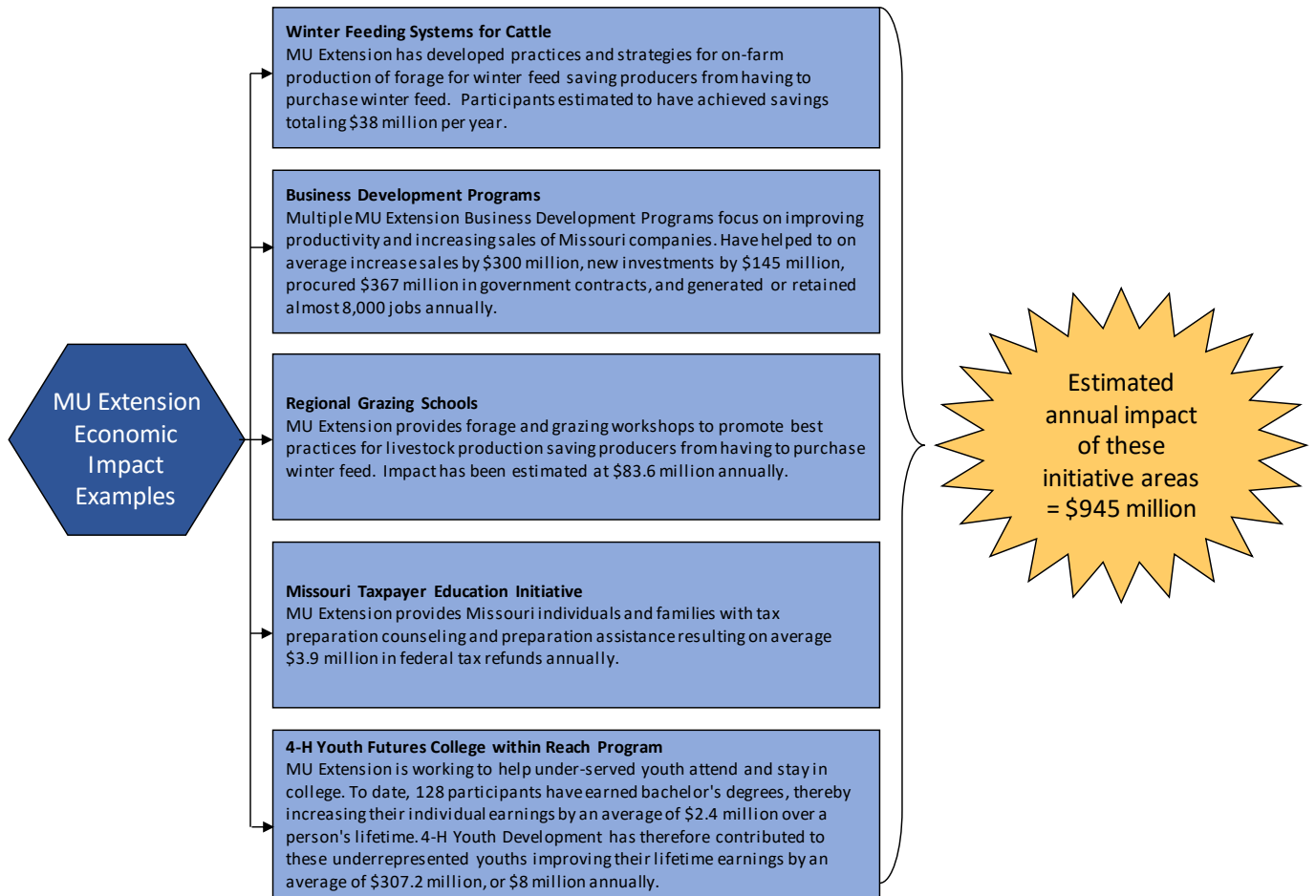
Figure 12: Core Program Impacts Within MU Extension



These impacts are categorized by economists as “forward linkage impacts,” which, rather than being related to institutional spending, are related to institutional mission and function. It is these impacts that are making a difference every day in the lives of Missourians in every county of the state.

Case studies used to assess the impact of just a few of these initiatives finds positive benefits for the Missouri economy that total nearly a billion dollars on an annual basis (Figure 13).

Figure 13: Examples of MU Extension’s Impact



Overall, the investment in MU Extension clearly provides a very strong return on investment for the state. For an annual total investment of \$86.2 million (2016), MU Extension initiatives are generating dividends in just the five programs highlighted in Figure 13 with economic impacts alone totaling nearly \$950 million in an average year, more than a ten-fold return.