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Economic Contribution of Projects Leveraged with AURI Assistance: Fiscal Years 2011-2017

A REPORT OF THE ECONOMIC IMPACT ANALYSIS PROGRAM

Authored by Brigid Tuck

IN PARTNERSHIP WITH THE AGRICULTURAL UTILIZATION RESEARCH INSTITUTE (AURI)

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August 2018

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EXECUTIVE SUMMARY: ECONOMIC CONTRIBUTION OF PROJECTS LEVERAGED WITH AURI ASSISTANCE

According to the Agricultural Utilization Research Institute (AURI), the organization works "with individual entrepreneurs, businesses, cooperatives, commodity groups and farm organizations that have ideas for new uses to benefit Minnesota agriculture."

To meet this goal, AURI conducts several programs, one of which provides hands-on scientific assistance for businesses to develop new products and technologies. These products and technologies, in turn, generate revenues and create jobs within the businesses. Often, businesses served by AURI also make capital investments to commercialize their new product or technology. The revenues, expenditures, and jobs created have an impact on Minnesota's economy.

AURI hired University of Minnesota Extension to quantify the impact of its hands-on assistance area. An economic contribution study measured the direct effect of AURI's business assistance (operating revenues, capital expenditures, and jobs). After conducting a client survey, AURI provided all required data to Extension. Survey respondents represented 50 percent of all client-based projects in AURI's portfolio and 66 percent of total project hours delivered in the program area. Extension then used an input-output model (IMPLAN) to measure the total effect on the state of Minnesota.

Economic Contribution of Annual Operations FY2011-2017: Businesses receiving AURI assistance directly created $76.9 million of economic activity between FY 2011 and 2017. The businesses themselves created 605 jobs and paid an estimated $6.5 million in labor income.

After accounting for indirect and induced effects, the businesses generated a total estimated $141.8 million in economic activity during this period. They also supported 935 jobs and an estimated $26.3 million in labor income. The highest indirect and induced effects were in the wholesale trade, crop farming, and professional and scientific services industries.

Economic Contribution of Projected Annual Operations 2018-2023: Businesses reported plans to create and retain 606 jobs in the next five years. Businesses that received AURI assistance will generate a total estimated potential of $157.8 million in economic activity. This includes 966 jobs and $28.2 million in labor income. The industries with the largest potential effects include crop farming, wholesale trade, and professional and scientific services.

Economic Contribution of Short-Term Capital Investments FY2011-2017: Businesses receiving AURI support between FY 2011 and 2017 invested $89.9 million as a direct result of that assistance. The model estimates that 500 people were directly hired and paid $39.3 million.

In total, capital investments by these businesses created an estimated $168.8 million in economic activity, including support for 1,010 jobs and $68.0 million in labor income. The highest number of supported jobs were in professional and technical services, food services, and administrative and support services.

Economic Contribution of Planned Short-Term Capital Investments 2018-2023: Businesses planned on capital investments of $139.3 million in the next five years. In total, an estimated 1,570 jobs and $261.5 million in economic activity will be created due to AURI's assistance. These impacts will end when the projects finish. For the contribution to occur, the projects must be completed as anticipated by the businesses.

PROJECT OVERVIEW

According to the Agricultural Utilization Research Institute (AURI), the organization works "with individual entrepreneurs, businesses, cooperatives, commodity groups and farm organizations that have ideas for new uses to benefit Minnesota agriculture." To meet this goal, AURI offers three primary services. They are applied research, innovation networks, and hands-on scientific assistance.[1]

For its applied research service, AURI identifies opportunities for adding value to Minnesota agriculture, and then it provides publicly available research on the opportunity. Recent applied research includes a guide for pricing and marketing food products, a report on Minnesota plant based proteins for food, and a report on Minnesota school lunch professionals' opinions on Minnesota food products.[2]

AURI's innovation networks service brings stakeholders together to identify, develop, and promote innovative solutions in agriculture. Networks can be formal or informal, but all focus on advancing new ideas in the field. Innovation networks include the Minnesota Renewable Energy Roundtable, Emerging Opportunities for Fish and Shrimp Production, and the Biobased Road Sealant Forum.

For hands-on scientific assistance, AURI provides one-on-one assistance for businesses working to develop new products and technologies. Businesses may have an idea but need assistance and specific resources to bring their idea from development to commercialization. AURI's scientists offer consulting and technical assistance in the areas of product and process development, product evaluation and testing, and sourcing materials, equipment, and services. To facilitate this assistance, AURI has several laboratories available, including ones for microbiology, food, meat, analytical chemistry, biobased products, and coproducts. In this service area, AURI might help a company develop a new recipe, provide access to technology to prove the feasibility of an idea, or give guidance on the use of new ingredients. AURI's scientific team works closely with a team of economic and business development staff responsible for assessing the preliminary market, technical, and economic feasibility of clients projects The team also actively seeks networking opportunities for clients thereby furthering the project and business objectives.

Report Focus

This report focuses on the economic activity generated by businesses receiving hands-on scientific and business development assistance from AURI. Businesses indicated the activity resulted from their interactions with AURI.

Often, businesses bring products and technologies to commercialization with assistance from AURI. These products and technology create revenues and jobs within the assisted businesses. The businesses served by AURI may also make capital investments to reach commercialization. The resulting revenues, expenditures, and jobs created have an impact on Minnesota's economy.

AURI was interested in quantifying the contribution of its hands-on scientific assistance program in Minnesota. Thus, the organization hired University of Minnesota Extension to conduct an economic contribution study to measure the direct effect of AURI's business assistance. AURI provided all required data to Extension. Extension then used an input-output model (IMPLAN) to measure the total effect on the state of Minnesota.

[1] To learn more about AURI and its services, visit auri.org.
[2] https://www.auri.org/help/research/research-reports/

AURI's Focus Areas

AURI provides hands-on scientific assistance in three primary focus areas: biobased and renewable energy, coproducts, and food products.

The biobased and renewable energy focus area primarily focuses on transforming Minnesota's agricultural products into new and innovative products. AURI has identified "a growing opportunity for Minnesota businesses to use agricultural products to replace traditional petroleum-based ingredients in materials such as plastics, films, building materials, lubricants, and sealants." In addition, AURI notes, "The production of renewable energy from agricultural products remains an exciting opportunity."[3] In 2017, this focus area accounted for 13 percent of all projects and initiatives.[4]

Focus Area: Biobased and Renewable Energy

Examples: Pellets from crop residue and corn heating a greenhouse, manure becoming gas and electricity, wheat straw fiber in windows and doors, corn helping to fight forest fires

The coproducts focus area primarily aims to turn waste or coproducts of the manufacturing processing into a marketable product. For example, soybean meal is a byproduct of removing the oil from soybeans. The oil is then used in items such as soap and biodiesel. The meal is often fed to animals. For instance, AURI's scientific assistance helped one company develop a soybean meal with increased digestibility. In 2017, the coproducts focus area accounted for 27 percent of all projects and initiatives.

Focus Area: Coproducts

Examples: Soybean meal developed into a feed more digestible by animals, less expensive alfalfa feed pellet with improved nutrition developed

[3] www.auri.org/focus-areas
[4] From AURI 2017 annual report, retrieved from http://www.auri.org/assets/2018/01/AUR-048_2017_AnnualReport_Digital_Final-2.pdf

Finally, the food products focus area strives to provide small businesses and agricultural producers in Minnesota with the opportunity to create new foods. AURI aims to assist businesses that want to develop foods that meet the needs of today's consumers—foods that are health-conscious, convenient, and safe. In 2017, the food products focus area accounted for 55 percent of all projects and initiatives.

Focus Area: Food

Examples: Sunflower oils, healthy snacks, infused apple juices and ciders, artisan cheeses, and turkey sausages

DATA COLLECTION

AURI staff provided the data required for this analysis by surveying previous clients that received more than five hours of service between fiscal years (FY) 2011 and 2017.[5] Responding clients represented 50 percent of all client-based projects in AURI's portfolio and 66 percent of total project hours delivered in the program area. Clients estimated the following:

1) The number of jobs created or retained due to project assistance.
2) The number of jobs likely to be created or retained in the next five years resulting from AURI's assistance.
3) Capital investments made due to the project assistance.
4) Future capital investments likely in the next five years, as a result of AURI's assistance.
5) New gross annual sales resulting from AURI's assistance.
6) Tons of commodity utilized each year.
7) Dollars contributed towards the project from non-AURI sources.

In total, 117 clients responded to the survey for a response rate of 34 percent.

ECONOMIC CONTRIBUTION

Economic contribution is measured in direct, indirect, and induced effects. AURI directly assists businesses in the development of new products and technology. The new products and technologies, if successful, then generate revenues and create jobs at the businesses. These are the direct effects.

[5] Fiscal year 2011 to 2017 covers the period from July 1, 2010 to June 30, 2017.

The spending by businesses for these related products and technology, in turn, generates additional economic activity. These are the indirect and induced effects.

Businesses receiving AURI assistance can contribute to the economy in two ways. First, the businesses may create jobs to make the new product and earn revenues from the product's sale. Second, the businesses may make investments in equipment and facility space. Jobs created and revenues generated create on-going economic activity. Investments in capital improvements create short-term economic activity. Thus, this analysis separates the two components.

Direct Effects of AURI-Assisted Projects

This report first examines the direct effects of AURI-assisted projects. Direct effects are separated into annual operational contributions and capital investments.

Annual Operational Direct Effects of AURI-Assisted Projects

Businesses receiving AURI assistance between FY 2011 and FY 2017 reported creating 336 jobs, retaining 269 jobs, producing $76.9 million in additional annual sales, and making $89.9 million in capital investments (Table 1). These jobs, investments, and revenues were a direct result of working with AURI.

The assisted businesses anticipated creating or retaining 606 jobs and making capital investments of $139.3 million in the next five years.

Table 1: Direct Effects of Projects with AURI Assistance Between FY 2011-2017

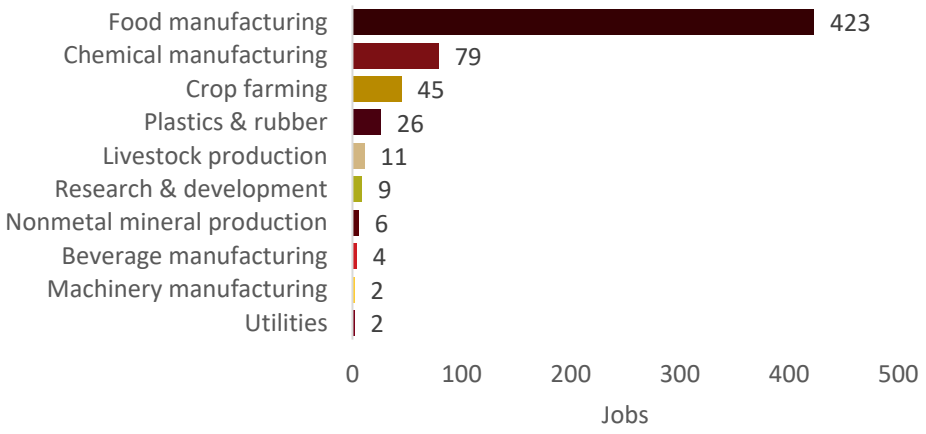
Number of Jobs Created	336
Number of Jobs Retained	269
Future Jobs Created/Retained (next five years)	606
New Capital Investments to Date (millions)	$89.9
Future Capital Investments (millions)	$139.3
New Gross Annual Sales Due to AURI Assistance	$76.9
Total of Commodity Utilized Each Year (tons)	323,900
Dollars Contributed by non-AURI Sources (millions)	$30.1

Source: AURI Client Impact Survey Results; reflects 50% of all client-based projects served over five hours during FY 2011-2017

AURI assists businesses in a variety of industries. Of the 605 jobs created or retained between FY 2011 and 2017, 423 (70 percent) were in the food manufacturing sector (Chart 1).[6]

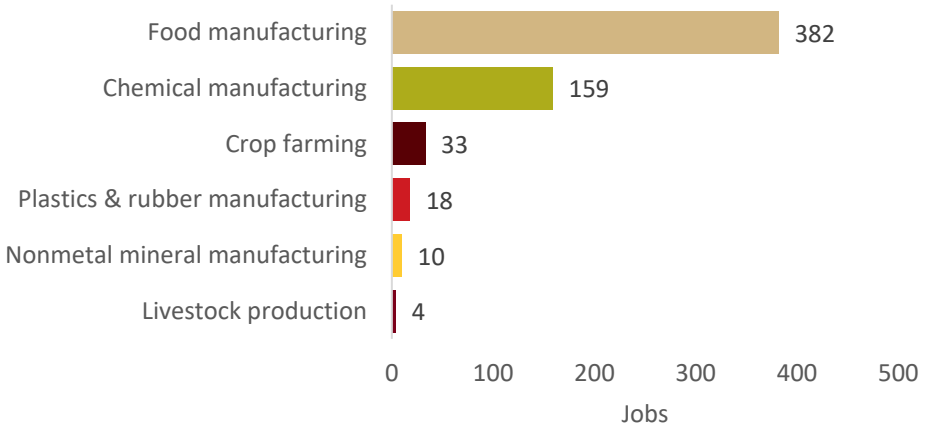
[6] Due to rounding, the total number of jobs in Chart 1 adds to 607.

Chart 1: Direct Jobs Created or Retained by Industry, Annual Operations of AURI-Assisted Businesses: FY 2011-2017



Businesses receiving AURI assistance planned to create or retain 606 jobs in the next five years. The highest number of jobs created will be in food manufacturing and chemical manufacturing (Chart 2).

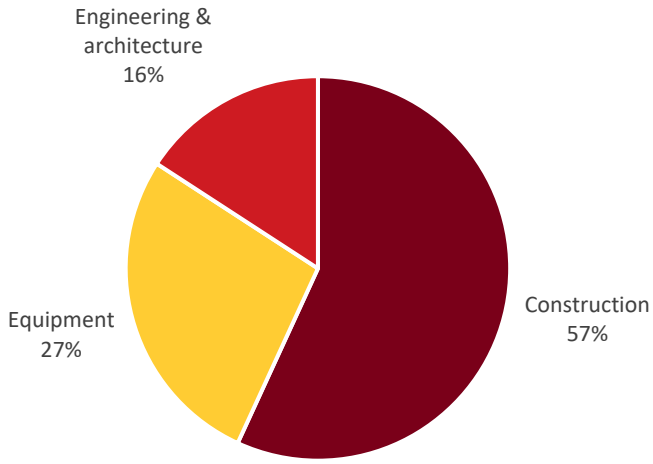
Chart 2: Direct Jobs Created or Retained by Industry, Annual Operations of AURI-Assisted Businesses: Anticipated 2018-2023



Short-Term Capital Investment Direct Effects of AURI-Assisted Projects

Businesses receiving AURI assistance reported investing $89.9 million in capital investments between FY 2011 and 2017. Businesses did not provide information on the type of capital investments. In general, however, capital investments might include adding building space or purchasing new equipment to manufacture a new product. Based on previous, similar studies, Extension divided the investments into three categories: construction, equipment purchases, and engineering and architecture services (Chart 3).

Chart 3: Direct Jobs by Industry, Capital Investments Resulting from AURI Assistance: FY 2011-2017



Indirect and Induced Effects of AURI-Assisted Projects

Input-output models trace the flow of dollars throughout a local economy and capture the indirect and induced, or secondary, effects of an economic activity. To quantify the indirect and induced effects for this analysis, the direct effects were entered into the input-output model, IMPLAN. This analysis uses IMPLAN version 3.0 with SAM multipliers.[7]

Indirect effects are those associated with a change in economic activity due to spending for goods and services. In this case, these are the changes in the local economy occurring because AURI clients increased their purchase of goods and related services due to the assistance they received. As clients make purchases, this creates an increase in purchases across the supply chain. Indirect effects are the summary of these changes across an economy.

Types of Effects

Direct: Spending and employment by businesses receiving AURI assistance

Indirect: Activity generated by the assisted businesses' spending for goods and services (business-to-business spending)

Induced: Activity generated by the assisted businesses' employees' spending (consumer-to-business spending)

Induced effects are those associated with a change in economic activity due to spending by the employees of businesses (labor) and by households. These are economic changes related to spending by people directly employed by AURI clients because of AURI's assistance. It also includes household spending related to indirect effects.

Effects are measured in output, employment, and labor income. In the model, one job is one job regardless if it is full-time, part-time, or seasonal. Appendix one contains a definition of terms used it this report.

[7] www.implan.com

The following discussion of total economic contribution details the indirect and induced effects related to AURI-assisted projects.

Total Economic Contribution of AURI-Assisted Projects

Businesses receiving AURI assistance benefit the economy in two ways. First, there are annual operational contributions. Second, there are short-term construction and capital improvement contributions. Economic contribution is measured in output, employment, and labor income.

> **A Note on Jobs**
>
> In this report, one job is one job, regardless if it is full-time, part-time, or seasonal.

Annual Operational Contributions of AURI-Assisted Projects

The jobs created and retained, along with the new sales generated, are operational contributions. They will occur annually, as long as the businesses create their products. Businesses receiving AURI support directly created $76.9 million of economic activity between FY 2011 and 2017 (Table 2). The businesses themselves generated 605 jobs and paid an estimated $6.5 million in labor income.[8]

After accounting for the indirect and induced effects, the businesses generated a total estimated $141.8 million in economic activity. The businesses supported a total of 935 jobs and an estimated $26.3 million in labor income.

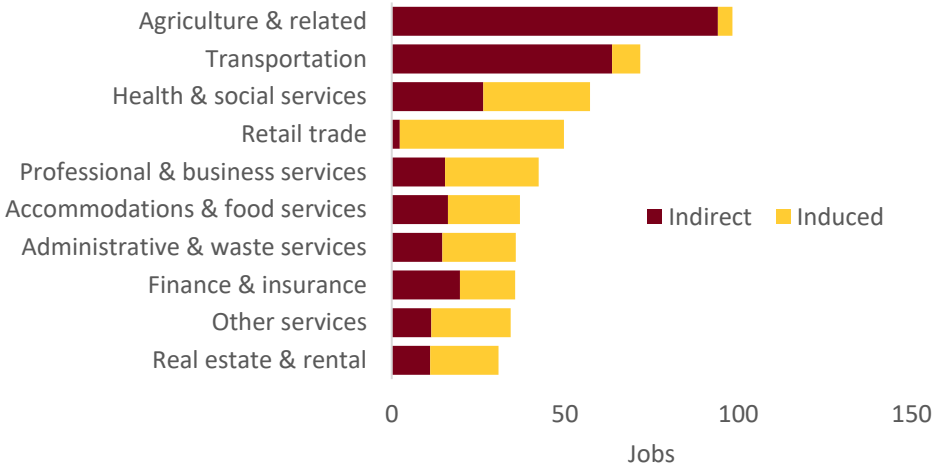
Table 2: Annual Operational Economic Contribution of AURI-Assisted Projects: FY 2011-2017

	Output (millions)	Employment	Labor Income (millions)
Direct	$76.9	605	$6.5
Indirect	$46.4	200	$13.5
Induced	$18.5	130	$6.3
Total	$141.8	935	$26.3

Directly, businesses receiving AURI assistance created and retained 605 jobs. In total, the businesses' activity supported 935 jobs. Thus, 330 jobs were in other industries. The highest indirect and induced effects of annual operations were in the agriculture and related industries (with nearly one-third of the impact), transportation, and health and social services (Chart 4). Combining direct, indirect, and induced effects, AURI's assistance supported 150 jobs in the agricultural production sector.

[8] Direct labor income estimated by the IMPLAN model.

Chart 4: Top Industries Affected (Measured in Jobs), Annual Operations of AURI-Assisted Businesses: FY 2011-2017



Businesses reported plans to create and retain 606 jobs in the next five years (Table 3). This would be a direct result of assistance from AURI. Based on this number of jobs, the businesses themselves will generate an estimated $84.4 million in sales and $8.1 million in labor income during the next five years (direct effect).[9]

Between 2018 and 2023, businesses that received AURI assistance will generate an estimated potential of $157.8 million in economic activity. This includes 966 jobs and $28.2 million in labor income. This number assumes the organizations create and retain businesses according to their reported plans.

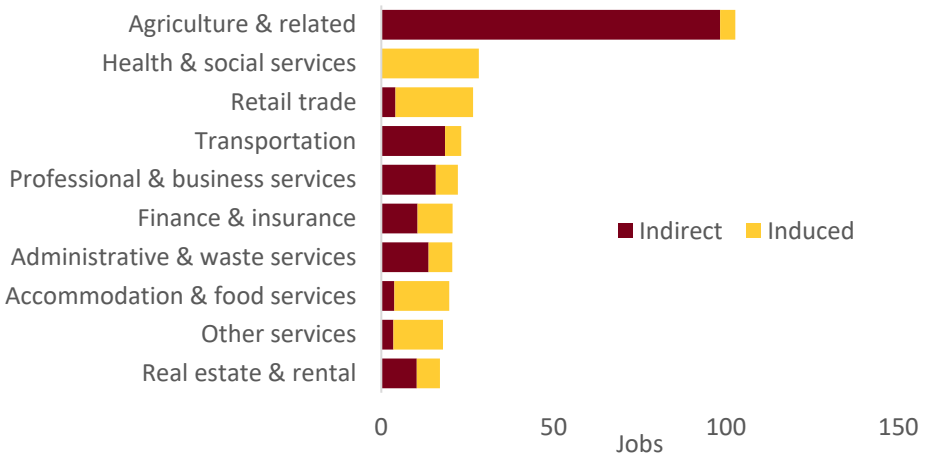
Table 3: Potential Annual Operational Economic Contribution of AURI-Assisted Projects: 2018-2023

	Output (millions)	Employment	Labor Income (millions)
Direct	$84.4	606	$8.1
Indirect	$53.6	220	$13.3
Induced	$19.8	140	$6.8
Total	$157.8	966	$28.2

In total, businesses receiving AURI assistance will potentially support an estimated 966 jobs in the next five years. Of these jobs, 606 of them will be at the businesses themselves. The other 360 jobs will be in industries that support the businesses. The industries with the largest effects include agriculture and related industries, health and social services, and retail trade (Chart 5). Combining direct, indirect, and induced effects, AURI's assistance will support 140 jobs in the agricultural production sector.

[9] Direct output estimated based on reported sales per job for current investments.

Chart 5: Top Industries Affected (Measured in Jobs), Annual Operations of AURI-Assisted Businesses: FY 2018-2023



Short-Term Capital Investment Contributions of AURI-Assisted Projects

Capital investments by the businesses will generate short-term economic contributions. These contributions will dissipate once the capital investment project is complete. Businesses receiving AURI assistance between FY 2011 and 2017 invested $89.9 million as a direct result of that assistance. The model estimates that 500 people were directly hired and paid $39.3 million in labor income to complete the projects.

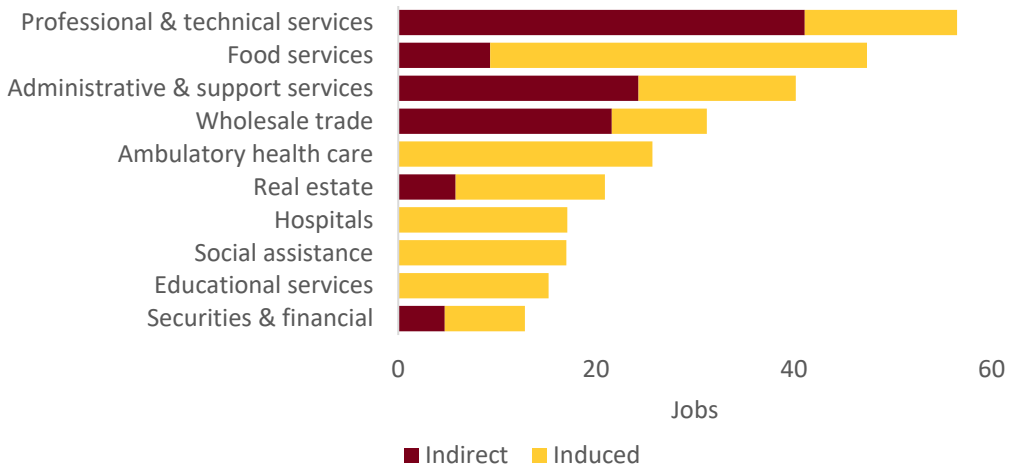
In total, capital investments by these businesses created an estimated $168.8 million in economic activity, including support for 1,010 jobs and $68.0 million in labor income.

Table 4: Short-Term Economic Contribution of Capital Investments Contributions Resulting from AURI Assistance: FY 2011-2017

	Output (millions)	Employment	Labor Income (millions)
Direct	$89.9	500	$39.3
Indirect	$31.0	170	$12.3
Induced	$47.9	340	$16.4
Total	$168.8	1,010	$68.0

Construction, equipment, and engineering and architectural service purchases by businesses receiving AURI assistance directly created 500 jobs. As a result, an estimated 1,010 jobs will be supported with 510 jobs in other industries. The highest number of these jobs were in professional and technical services, food services, and administrative and support services (Chart 6).

Chart 6: Top Industries Affected (Measured in Jobs), Capital Investments Contributions Resulting from AURI Assistance: FY 2011-2017



Businesses planned on capital investments of $139.3 million in the next five years. Directly, the model estimates 780 people will be hired and paid $60.8 million to complete the investment projects.

In total, a potential estimated 1,570 jobs and $261.5 million in economic activity could be created due to AURI's assistance. These impacts will end once the projects are completed. For the contribution to occur, the projects must be carried out as indicated by the businesses.

Table 5: Short-Term Economic Contribution of Potential Capital Investments Contributions Resulting from AURI Assistance: 2018-2023

	Output (millions)	Employment	Labor Income (millions)
Direct	$139.3	780	$60.8
Indirect	$48.0	270	$19.0
Induced	$74.2	520	$25.4
Total	$261.5	1,570	$105.2

Since the ratio of direct investments was the same for both current and future capital investments, the top industries affected will be the same. The magnitude will be different, but the order will not.

AURI-LEVERAGED PROJECTS IN CONTEXT OF THE ECONOMY

Minnesota's strengths in agriculture, forestry, manufacturing, and mining founded its economy. With its rich soils, Minnesota has long been one of the top agricultural states in the U.S. In 2016, based on cash receipts, Minnesota was the fifth largest agricultural producing state (following

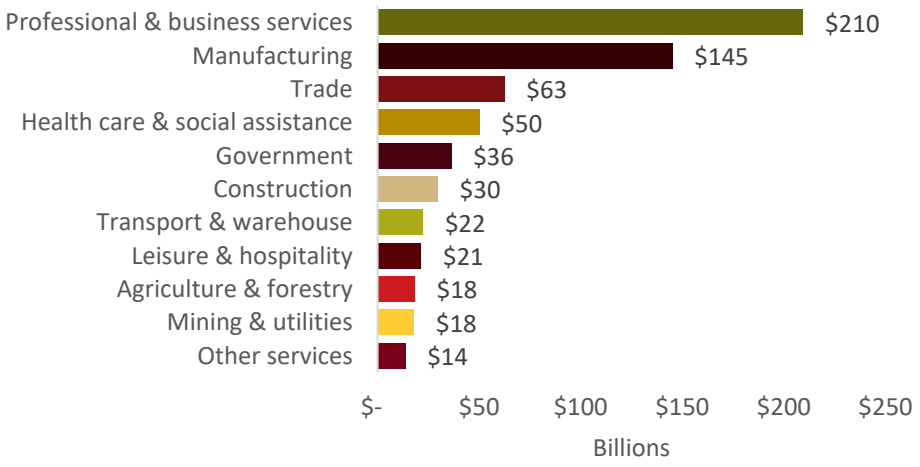
California, Iowa, Nebraska, and Texas).[10] Minnesota's manufacturing industry reflects the state's agricultural strengths. Minnesota is home to major milk, cheese, meat, breakfast cereal, poultry, and agricultural implement manufacturers, among others.

Research by Extension shows agriculture remains important, especially in the western regions of the state. In 6 of 13 regions examined, agriculture was one of the top three industries in either output production or job creation.[11] Agbioscience, which encompasses both agriculture and related manufacturing, created $23.4 billion of output in 2013 and supported 64,000 jobs.[12]

From FY 2011-2017, AURI-assisted projects contributed an estimated $310.6 million to the economy. This includes operational and capital investment contributions.

In 2016, businesses and enterprises in Minnesota generated $627 billion of output. Thus, AURI project assistance contributes about 0.05 percent of output to Minnesota's economy. The professional and business services industry generated 33 percent of the state's output (Chart 7). Manufacturing and trade were the other top generators of output. AURI-supported companies primarily fall within the manufacturing and agriculture industries. However, AURI also supports jobs in the professional and business services industry, as this industry includes research and development and scientific research.

Chart 7: Output by Industry, Minnesota, 2016



From FY 2011-2017, AURI-assisted projects contributed an estimated 1,945 jobs to the economy. This includes operational and capital investment contributions.

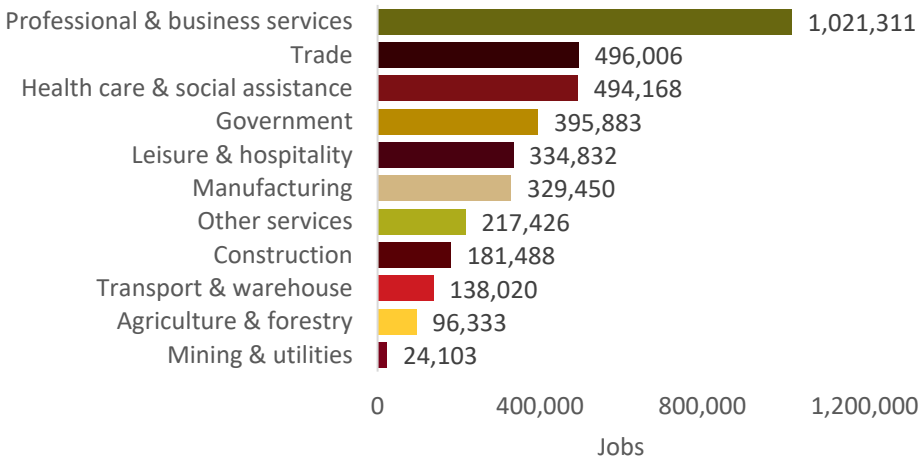
In 2016, businesses and enterprises in Minnesota created 3.7 million jobs. Thus, AURI-assisted projects supported approximately 0.05 percent of the jobs in the state. The professional and business services industry was responsible for 1.0 million of the state's total jobs. Other major industry employers include trade and health care and social assistance (Chart 8).

[10] Retrieved from https://www.ers.usda.gov/faqs/.

[11] To learn more, visit http://www.extension.umn.edu/community/news/getting-to-know-greater-Minnesota/

[12] Read the report here http://www.extension.umn.edu/community/economic-impact-analysis/reports/docs/2015-Economic-Contribution-of-Agbioscience-in-Greater-Minnesota.pdf

Chart 8: Jobs by Industry, Minnesota, 2016



NOTES ON THE ANALYSIS

It is important to note this analysis only includes businesses that responded to the survey. Additionally, the underlying production function was adjusted for chemical manufacturing to reflect a biofuels plant.[13] And while the report examines estimates shared via interviews, there is always potential for businesses to overreport or underreport results. Finally, this analysis examines plans for the future, and as such, it is possible businesses are either overly optimistic or too conservative in their estimates.

[13] Followed methodology laid out in Input-Outrageous: the Economic Impacts of Modern Biofuels Production. Retrieved from http://www2.econ.iastate.edu/research/webpapers/paper_12644.pdf.

APPENDIX: DEFINITIONS AND TERMS

Special models, called input-output models, exist to conduct economic impact analysis. There are several input-output models available. IMPLAN (IMpact Analysis for PLANning, Minnesota IMPLAN Group) is one such model. Many economists use IMPLAN for economic impact analysis because it can measure output and employment impacts, is available on a county-by-county basis, and is flexible for the user. IMPLAN has some limitations and qualifications, but it is one of the best tools available for input-output modeling. Understanding the IMPLAN tool, its capabilities, and its limitations helps ensure the best results.

One of the most critical aspects of understanding economic impact analysis is the distinction between the local and non-local economy. The local economy is identified as part of the model-building process. Either the group requesting the study or the analyst defines the local area. Typically, the study area (the local economy) is a county or a group of counties that share economic linkages. This analysis uses Minnesota as the study area.

To properly read the results of an IMPLAN analysis, a few definitions are essential. These terms and their definitions are provided below.

Output

Output is measured in dollars and is equivalent to total sales. It includes significant double counting. Think of cheese production, for example. The value of the milk is counted when the dairy producer sells to the cheese company. The milk value is then counted a second time when the cheese is sold. If the cheese is added as an ingredient in another item (say pizza), the value of the milk is also counted when that item is sold. The value of the milk is built into the price of each of these items, and then the sale of each item is added to reach total sales (or output).

Employment

Employment includes full- and part-time workers and is measured in annual average jobs, not full-time equivalents (FTEs). IMPLAN includes total wage and salaried employees, as well as the self-employed, in employment estimates. Because employment is measured in jobs and not in dollar values, it tends to be a very stable metric.

Labor Income

Labor income measures the value added to the product by the labor component. So, in the cheese example, when the dairy farmer sells to the cheese producer, a certain percentage of the sale is for the dairy farmer's labor. Then, when the cheese producer markets it cheese, it includes some markup in the price for its labor costs. Finally, the pizza manufacturer adds a mark-up for its labor. These individual value increments for labor can be measured, which amounts to labor income. Labor income does *not* include double counting.

Direct Impact

Direct impact is equivalent to the initial activity in the economy. In this study, it is the additional spending and employment in the economy generated due to the assistance of AURI. Here, it includes both annual operational effects and short-term construction and capital improvement effects.

Indirect Impact

The indirect impact is the summation of changes in the local economy that occurs due to **spending for inputs** (goods and services) by the industry or industries directly impacted. For instance, if employment at a cheese processing plant increases by 100 jobs, this implies a corresponding increase in sales from the plant. As the plant increases sales, it must also purchase more inputs, such as electricity and equipment. As the plant increases the purchase of these items, its suppliers must also increase production, and so forth. As these ripples move through the economy, they can be captured and measured. Ripples related to the purchase of goods and services are indirect impacts. In this study, indirect impacts are those associated with spending by clients of AURI directly resulting from AURI's assistance.

Induced Impact

The induced impact is the summation of changes in the local economy that occurs due to **spending by labor**. For instance, if employment at a cheese processing plant increases by 100 jobs, the new employees will have more money to spend on housing, groceries, and going out to dinner. As they spend their new income, more activity occurs in the local economy. Induced impacts also include spending by labor generated by indirect impacts. So, if AURI's client purchases services from a local tax preparer, spending of the tax preparer's wages would also create induced impacts. Primarily, in this study, the induced impacts are the economic changes related to spending by employees of companies benefiting from AURI's project assistance.

Total Impact

The total impact is the summation of the direct, indirect, and induced impacts.

Input-Output, Supply and Demand, and Size of Market

Regional input-output models have limitations. If input-output models are used to examine the impact of an industry so large that its expansion or contraction results in major supply and demand shifts, causing the prices of inputs and labor to change, they can overstate the impacts. It is not likely clients receiving assistance from AURI have an impact on national input prices. Hence, the IMPLAN model should reliably estimate the impacts.