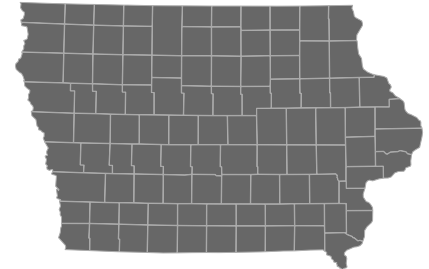




The Economic Value of Iowa State University of Science and Technology

IOWA STATE UNIVERSITY OF SCIENCE AND TECHNOLOGY (ISU) creates value in many ways. The university plays a key role in helping students increase their employability and achieve their individual potential. The university facilitates, through its focus on innovation and entrepreneurship, new research and economic developments and also draws visitors and students to the state, generating new dollars and opportunities for Iowa. ISU Extension and Outreach is actively engaged in providing research-based education and information to improve lives of Iowans in all 99 counties. ISU provides students with the education, experiential training, and skills they need to have fulfilling and prosperous careers. Its student, employee, and ISU-coordinated community volunteers support the state economy through the output and employment generated by state businesses and organizations. Furthermore, ISU is a place for students to meet new people from diverse backgrounds, increase their self-confidence, and promote their overall health and well-being.



IOWA

ISU enhances both the lives of its students and the state economy. The university supports a variety of industries in Iowa, serves state businesses, and benefits society as a whole in Iowa from an expanded economy and improved quality of life. Additionally, the benefits created by ISU extend to the state and local government through increased tax revenues and public sector savings.

ISU enhances both the **lives of its students** and the **state economy**.

This study measures the economic impacts created by ISU on the business community and the benefits the university generates in return for the investments made by its key stakeholder groups—students, taxpayers, and society. The following two analyses are presented:

 **Economic impact analysis**

 **Investment analysis**

All results reflect employee, student, and financial data, provided by the university, for fiscal year (FY) 2021-22. Impacts on the Iowa economy are reported under the economic impact analysis and are measured in terms of added income. The returns on investment to students, taxpayers, and society in Iowa are reported under the investment analysis



ISU promotes economic growth in Iowa through its direct expenditures and the resulting expenditures of visitors, students, and state businesses. The university serves as an employer and buyer of goods and services for its day-to-day, construction, and research operations. Extension and Outreach activities help state and local businesses, farmers, and organizations succeed. Numerous start-up and spin-off companies have formed as a result of programs and knowledge at ISU. The university's reputation and activities attract visitors and students from outside Iowa, whose expenditures benefit state vendors. ISU encourages its students and employees to volunteer in the community, helping businesses and organizations grow. In addition, ISU is a primary source of higher education for Iowa residents and a supplier of trained workers to state industries, enhancing overall productivity in the state workforce.

Operations spending impact



ISU adds economic value to Iowa as an employer of state residents and a large-scale buyer of goods and services. In FY 2021-22, the university employed 12,624 full-time and part-time faculty and staff (including graduate assistants and student employees but excluding research employees), all of whom lived in Iowa. Total payroll at ISU was \$640.5 million¹ (excluding payroll from research employees), much of which was spent in the state for household and living expenses, including groceries, mortgage and rent payments, and dining out. In addition, the university spent \$296.5 million on day-to-day expenses related to facilities, supplies, and professional services (excluding construction and research expenditures).

ISU's day-to-day operations spending added \$751.2 million in income to the state during the analysis year. This figure represents the university's payroll, the multiplier effects generated by the in-state spending of the university and its employees, and a downward adjustment to account for funding that the university received from state sources. The \$751.2 million in added income is equivalent to supporting 13,627 jobs in the state.

Construction spending impact



ISU invests in construction each year to maintain its facilities, create additional capacities, and meet its growing educational demands. While the amount varies from year to year, these quick infusions of income and jobs have a substantial impact on the state economy. In FY 2021-22, ISU's construction spending generated \$38.7 million in added income, which is equivalent to supporting 517 jobs.

¹ Includes royalty payments to inventors related to ISU who still live in Iowa.



Research spending impact



As a land grant institution, research is critically important to ISU and an integral part of the university's commitment to improving the lives of Iowans while also contributing to the betterment of the national and world. ISU and its faculty have a proven track record of success in attracting external sponsored funding to leverage the state's investment in the university. During FY 2020-21, the last year with official data, the university spent \$237.4 million to conduct research on behalf of federal and non-federal entities. While not finalized, research expenditures for FY 2021-22 are running ahead of the previous year. Research activities impact the economy by employing people and requiring the purchase of equipment and other supplies and services. Over the last four years, ISU received 645 invention disclosures, filed 182 new patent applications, and produced 174 licenses.

ISU research developments

Fiscal year	Inventions	Patents	Licenses
2018-19	165	46	46
2019-20	176	50	46
2020-21	179	51	47
2021-22*	125	35	35
Total	645	182	174

* FY 2021-22 is preliminary.

Source: ISU.

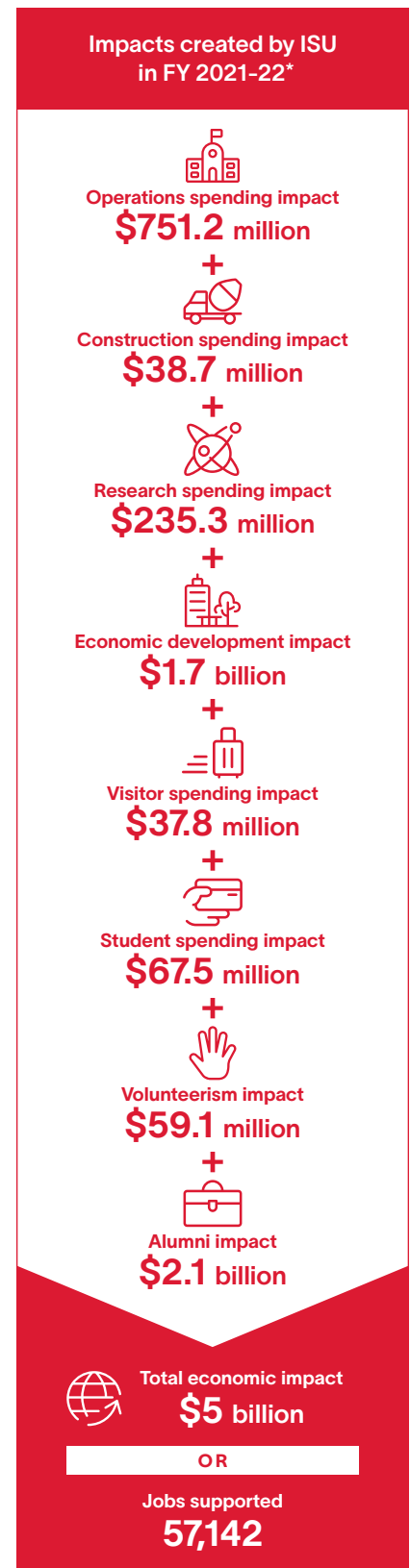
Research at ISU is highly integrated with student education, as well as the delivery of science-based education and information through Extension and Outreach. Research activities impact the economy by employing people and requiring the purchase of equipment and other supplies and services.

Soy-based polymers pave the way for innovation

SoyLei Innovations, a startup firm established by six ISU co-founders and based in the ISU Research Park, is all about commercializing green technologies developed at the university, including a soybean oil-based alternative to a petroleum-based asphalt additive that extends the life of pavements. The research led to development of a \$5.3 million pilot plant and the sale of about 400,000 pounds of biopolymers.

Industry needed a simpler manufacturing process, and the ISU engineers delivered. They found a way to simplify production from three reactors to one, and from 24 hours per batch down to a few hours. It's a process the engineers call Poly100—production in one reactor, with zero volatile organic chemicals and zero waste.

Beyond greener pavements, the researchers are exploring other market opportunities for soy-based polymers such as asphalt shingles and high-performing detergents—putting technology to work to help grow Iowa's economy.



* This table does not include the positive impacts of ISU Extension and Outreach activities.



In FY 2020–21, ISU spent \$116.3 million on payroll to support research activities. This, along with \$175.4 million in other research spending,² created a net total of \$235.3 million in added income for the state economy. This added income is equivalent to supporting 3,822 jobs. Note that at the time of this study, FY 2021–22 research expenditure data were being verified, so FY 2020–21 research expenditure data were used as the reference. Actual FY 2021–22 research awards are equal to or higher than FY 2020–21.

Home sweet 3D home: next generation of affordable housing?

Affordable housing is a challenge for many of Iowa’s rural communities, especially those recovering from natural disasters. Building homes with 3D printers could be part of the solution. ISU researchers are taking the emerging technology into the real world as a way to drastically reduce the time, labor, and costs associated with conventional construction.

To test different 3D printing techniques and materials, ISU researchers partnered with Iowa Central Community College, Brunow Contracting, and CT Creek to build heated prototype sheds in Fort Dodge. Lessons learned from the prototypes will help inform construction of a demonstration house slated to begin in the spring 2023 in Hamburg, Iowa—a town still recovering from 2019 Missouri River flooding.

ISU received a \$1.4 million grant from the Iowa Economic Development Authority for the project. Additional funding totaling \$2.1 million will help ISU and its partners demonstrate the scalability of the project in Iowa.

Value of Extension and Outreach



ISU Extension and Outreach strengthens communities and their local economies by enhancing leadership capacity, broadening engagement, teaching best practices, preparing the future workforce, and providing problem-solving assistance. In FY 2021–22, ISU’s Extension and Outreach helped 256 organizations and assisted 2,756 companies, 16,785 farmers, and 21,151 non-farmers across the state to receive necessary certification. ISU has 100 Extension and Outreach locations across the state.

Certified to do the job, with knowledge delivered by ISU

In FY 2021–22, ISU Extension and Outreach reported more than 800,000 direct educational contacts. Over 42,000 of those contacts were Iowans who earned certificates required by employers, businesses, or regulators by completing ISU-delivered educational programs. One example is food safety certification required by Iowa code. In 2021, 2,033 food service supervisors participated in ServSafe classes delivered by ISU human sciences extension and outreach specialists, with 77% successfully earning the certification that helps ensure food service workers have the knowledge they need to protect the public from foodborne illness.

Every day, ISU Extension and Outreach provides research-based education and engages Iowans to solve today’s problems and prepare for a thriving future.

² Excludes indirect costs because indirect costs are not necessarily spent during the analysis year.



Around 570 employees work off campus delivering Extension and Outreach, with 435 of these employees being paid by the counties rather than on ISU payroll. Due to the specific nature of the majority of these activities, Lightcast does not attempt to measure an impact. Overall, the private and public value Extension and Outreach offers on a daily basis for individuals and state and local communities is significant. It should be acknowledged that the data in this report represent only a small sampling of the organization's overall educational, environmental, and economic development activities.

Economic development impact



ISU creates an exceptional environment that fosters innovation and entrepreneurship, evidenced by the number of ISU start-up and spin-off companies related to the university and companies that have grown in the state with support of ISU. Start-up companies, created specifically to license and commercialize ISU technology or knowledge, have a strong and clearly defined link to ISU. Spin-off companies, created and fostered through university programs or faculty and alumni, have a clear but weaker link to ISU. In addition, companies that benefited from ISU's Small Business Development Center (SBDC) and Center for Industrial Research and Service (CIRAS) are included under spin-off companies.³

Last year, 1,591 businesses from all 99 counties in the state received assistance on projects or attended educational workshops from CIRAS staff or partners. Companies responding to surveys reported \$506 million in total economic impact⁴ (\$350 million in sales gained or retained, \$119 million of new investment, and \$37 million in costs saved or avoided) and over 5,300 jobs created or retained as a result of the assistance they received from CIRAS and its partners.

ISU start-up innovates to advance health therapies

If you're testing and creating cell and protein therapies for cancer, autoimmune diseases, or urinary tract problems, you're going to need a lot of cells to work with. For scientists in this \$150 billion industry, producing those cells is monotonous, time-consuming, and costly.

Enter Skroot Laboratory, Inc., an ISU start-up spun off from faculty research. The company provides wireless process analytical technologies for cell and protein therapy development. The company's efforts remove the need for hundreds of hours of manual work, speeding the process toward new answers for recalcitrant health problems.

Skroot Laboratory won first place in the 2021 John Pappajohn Iowa Entrepreneurial Venture Competition.

"Research is good, but it's even better if it leads to contributions that can do something to better the world," says Nigel Reuel, founder of Skroot and a faculty member in ISU's chemical and biological engineering department.

³ To maintain an acceptable level of data reliability, this impact is limited to those companies that were created or supported by ISU after FY 2011-12 and are still active in Iowa in FY 2021-22.

⁴ This impact was not calculated by Lightcast and should not be compared with the impact from start-up and spin-off companies calculated by Lightcast.



In FY 2021-22, ISU start-up and spin-off companies added \$1.7 billion in income to the Iowa economy, which is equivalent to supporting 11,178 jobs. Of this added income, \$132.3 million was due to the start-up companies, with the remainder due to spin-off companies. This impact includes the positive effect ISU's Small Business Development Center and businesses assisted through the Center for Industrial Research and Service (CIRAS) have on Iowa.

Visitor spending impact



Tens of thousands of visitors from outside the state were attracted to ISU during the analysis year to attend commencement, sports events, and other activities sponsored by the university. While in the state, visitors spent money for lodging, food, transportation, and other personal expenses. The off-campus expenditures of the university's out-of-state visitors generated a net impact of \$37.8 million in added income for the state economy in FY 2021-22. This \$37.8 million in added income is equivalent to supporting 895 jobs.

Student spending impact



Around 44% of ISU students originated from outside the state in FY 2021-22, and some of these students relocated to Iowa to attend ISU. These students may not have come to the state if the university did not exist. In addition, some in-state students, referred to as retained students, would have left Iowa if not for the existence of ISU. While attending the university, these relocated and retained students spent money on household and living expenses, including groceries, accommodation, transportation, and more. This spending generated \$67.5 million in added income for the state economy in FY 2021-22, which supported 1,319 jobs in Iowa.

Volunteerism impact



ISU encourages its students and employees to volunteer in Iowa, where they can work with businesses and organizations to help meet their goals. ISU also works with community members to coordinate volunteer activities. The work of these student, employee, and ISU-coordinated community volunteers allows businesses and organizations to grow, increasing their output and impacting the economy at large. Using the value per volunteer hour for Iowa as provided by the Independent Sector,⁵ the work of ISU student, employee, and ISU-coordinated community volunteers is equivalent to \$30.5 million in earnings. In terms of actual impact to the Iowa economy, ISU student, employee, and ISU-coordinated community volunteers generated an impact of \$59.1 million in added income for the state in FY 2021-22, equivalent to supporting 2,393 jobs.⁶

⁵ By state value per volunteer hour was provided by Independent Sector (see https://independentsector.org/resource/vovt_details/).

⁶ The impact of volunteerism is grossly undercounted because the number of volunteer hours was self-reported to ISU and only includes a small sample of ISU student, employee, and ISU-coordinated community volunteers.



Included in the hours above are the volunteer hours of ISU Extension and Outreach, which coordinates two large volunteer programs that benefit the state—the 4-H program and the Master Gardener program. Master Gardener volunteers provide value by answering homeowner yard and garden questions, conducting community beautification projects, and growing fresh fruits and vegetables for local food pantries. Iowa 4-H volunteers serve as caring adults who create safe environments and provide meaningful, hands-on learning experiences for youth to develop life skills through club meetings, project learning, service projects, and community showcases. In FY 2021-22, 8,729 Master Gardeners and 4-H adult volunteers recorded 324,914 volunteer hours in Iowa.

Alumni impact



The education and training ISU provides has the greatest impact on the state of Iowa. Since its establishment, students have completed rigorous and robust academic programs at ISU and entered the state workforce with greater knowledge and new skills. Today, thousands of former ISU students are employed in Iowa. As a result of their education from ISU, the students receive higher earnings and increase the productivity of the businesses that employ them. In FY 2021-22, ISU alumni generated \$2.1 billion in added income for the state economy, which is equivalent to supporting 23,391 jobs.

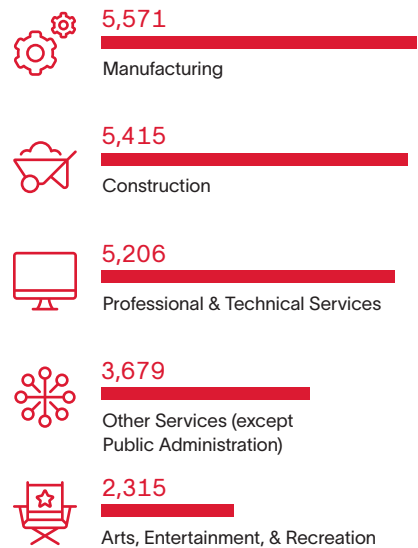
Total impact

ISU added \$5 billion in income to the Iowa economy during FY 2021-22, equal to the sum of the operations, construction, and research spending impacts; the economic development impact; the visitor and student spending impacts; the volunteerism impact; and the alumni impact. This \$5 billion impact does not include the full value of ISU's Extension and Outreach activities, activities which benefit state and local communities and economies by helping thousands of companies and farmers. For context, the \$5 billion impact was equal to approximately 2.4% of the total gross state product (GSP) of Iowa. This contribution that the university provided on its own is larger than the entire Utilities industry in the state.

ISU's total impact can also be expressed in terms of jobs supported. The \$5 billion impact supported 57,142 state jobs, using the jobs-to-sales ratios specific to each industry in the state. This means that one out of every 36 jobs in Iowa is supported by the activities of ISU and its students.

In addition, the \$5 billion, or 57,142 supported jobs, stemmed from different industry sectors. Among non-education industry sectors, ISU's activities and alumni in the Manufacturing industry sector supported 5,571 jobs in FY 2021-22. Without ISU, these impacts would not have been generated in Iowa.

ISU impacts by industry (jobs supported)



One out of every 36 jobs in Iowa is supported by the activities of ISU and its students.





An investment analysis evaluates the costs associated with a proposed venture against its expected benefits. If the benefits outweigh the costs, then the investment is financially worthwhile. The analysis presented here considers ISU as an investment from the perspectives of students, taxpayers, and society in Iowa.

Student perspective



In Fall 2021, ISU served 30,708 students. Expanding to the entire FY 2021-22, ISU served more than 33,000 students. The students paid for tuition, fees, books, and supplies. Some students took out loans and will incur interest on those loans. Additionally, students gave up money they would have otherwise earned had they been working instead of attending college. The total investment made by ISU's students in FY 2021-22 amounted to a present value of \$561.5 million, equal to \$375.7 million in out-of-pocket expenses (including future principal and interest on student loans) and \$185.8 million in forgone time and money.

In return for their investment, ISU's students will receive a stream of higher future earnings that will continue to grow throughout their working lives. For example, the average ISU graduate with a bachelor's degree in FY 2021-22 will see annual earnings that are \$23,600 higher than a person with a high school diploma or equivalent working in Iowa. Over a working lifetime, the benefits of the bachelor's degree over a high school diploma will amount to an undiscounted value of \$1.1 million in higher earnings per graduate. The present value of the cumulative higher future earnings that ISU's FY 2021-22 students will receive over their working careers is \$2.8 billion.

Students see a high rate of return for their investment in ISU



Average annual return for ISU students

14.6%



Stock market 30-year average annual return

10.5%



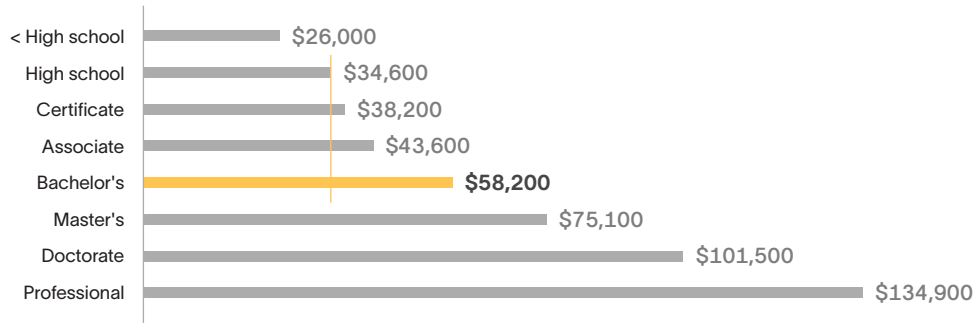
Interest earned on savings account (National Rate Cap)

0.8%

Source: Forbes' S&P 500, 1992-2021. FDIC.gov, 2-2022.



The average bachelor's degree graduate from ISU will see an increase in earnings of **\$23,600** each year compared to a person with a high school diploma or equivalent working in Iowa.



Source: Lightcast employment data.

The students' benefit-cost ratio is 5.1. In other words, for every dollar students invest in ISU in the form of out-of-pocket expenses and forgone time and money, they will receive a cumulative value of \$5.10 in higher future earnings. Annually, the students' investment in ISU has an average annual internal rate of return of 14.6%, which is impressive compared to the U.S. stock market's 30-year average rate of return of 10.5%.

Taxpayer perspective



ISU generates more in tax revenue than it receives. These benefits to taxpayers consist primarily of taxes that the state and local government will collect from the added revenue created in the state. As ISU students will earn more, they will make higher tax payments throughout their working lives. Students' employers will also make higher tax payments as they increase their output and purchases of goods and services. By the end of the FY 2021-22 students' working lives, the state and local government will have collected a present value of \$484.2 million in added taxes.

Benefits to taxpayers will also consist of savings generated by the improved lifestyles of ISU students and the corresponding reduced government services. Education is statistically correlated with a variety of lifestyle changes. The education that ISU students receive will generate savings in three main categories: 1) healthcare, 2) justice system, and 3) income assistance. Improved health will lower students' demand for national health care services. In addition, costs related to the justice system will decrease. ISU students will be more employable, so their reduced demand for income assistance such as welfare and unemployment benefits will benefit taxpayers. For a list of study references, contact the university for a copy of the main report. Altogether, the present value of the benefits associated with an education from ISU will generate \$79.7 million in savings to state and local taxpayers.

For every dollar of public money invested in ISU, taxpayers will receive a cumulative value of **\$1.90** over the course of the students' working lives.

Total taxpayer benefits amount to \$563.9 million, the present value sum of the added taxes and public sector savings. Taxpayer costs are \$298.4 million, equal to the amount of state government funding ISU received in FY 2021-22. These benefits and costs yield a benefit-cost ratio of 1.9. This means that for every dollar of public money invested

in ISU in FY 2021-22, taxpayers will receive a cumulative present value of \$1.90 over the course of the students' working lives. The average annual internal rate of return for taxpayers is 3.3%, which compares favorably to other long-term investments in the public and private sectors.

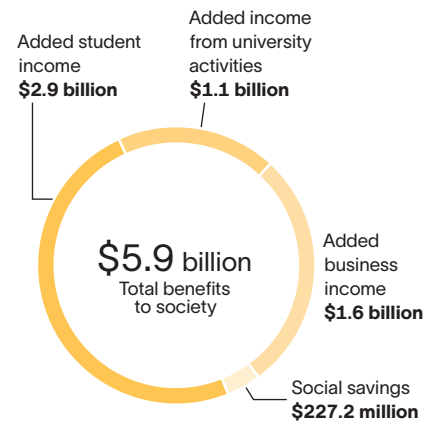
Social perspective



Society as a whole in Iowa benefits from the presence of ISU in many ways through education, research, and Extension and Outreach. Iowa is a more attractive place to live, work, and play because of Extension and Outreach programs focused on improving quality of life in every Iowa county. Society benefits in two major ways in terms of investment analysis. Primarily, society benefits from an increased economic base in the state. This is attributed to the added income from students' increased lifetime earnings (added student income), added income from the university's activities, and increased business output (added business income), which raise economic prosperity in Iowa.

Benefits to society also consist of the savings generated by the improved lifestyles of ISU students. As discussed in the previous section, education is statistically correlated with a variety of lifestyle changes that generate social savings. Note that these costs are avoided by the consumers but are distinct from the costs avoided by the taxpayers outlined above. Healthcare savings include avoided medical costs associated with smoking, alcohol dependence, obesity, drug abuse, and depression. Savings related to the justice system include reduced security expenditures and insurance administration, lower victim costs, and reduced expenditures by the criminal justice system. Income assistance savings include reduced welfare and unemployment claims. All Iowans benefit when young people are prepared for college and careers and are ready to become Iowa's future workforce and successful, contributing members of society. Society also benefits when families and communities become more resilient and are better able to handle any challenges they may face. For a list of study references, contact the university for a copy of the main report.

Social benefits in Iowa from ISU



Social benefits of Extension and Outreach

ISU Extension and Outreach provides research-based education and engages Iowans in solving today's problems and preparing for a thriving future. 4-H Youth Development programs reached more than 123,000 Iowa youth in FY 2021-22, preparing these young people to actively pursue careers and education beyond high school and build skills. Annually, about 91% of 4-H seniors report they intend to pursue trades or postsecondary education within 12 months of high school graduation. During FY 2020-21, 6,697 unique individuals successfully completed one or more Essentials to Child Care modules to help address the child care shortage.

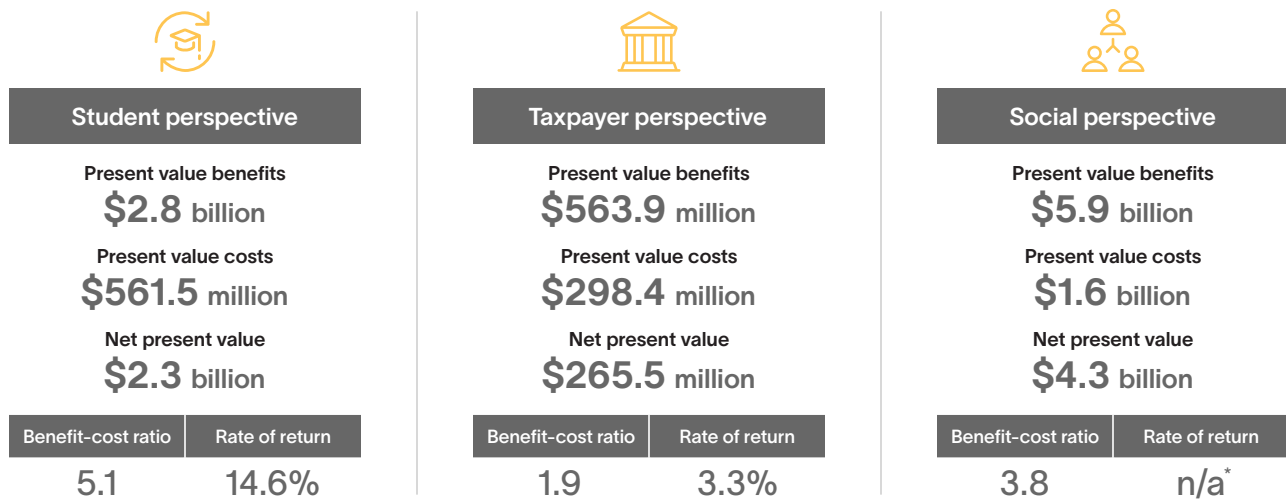
Altogether, the social benefits of ISU equal a present value of \$5.9 billion. These benefits include \$2.9 billion in added student income, \$1.6 billion in added business income, \$1.1 billion in added income from university activities, as well as \$227.2 million

in social savings related to health, crime, and income assistance in Iowa. People in Iowa invested a present value total of \$1.6 billion in ISU in FY 2021-22. The cost includes all the university and student costs.

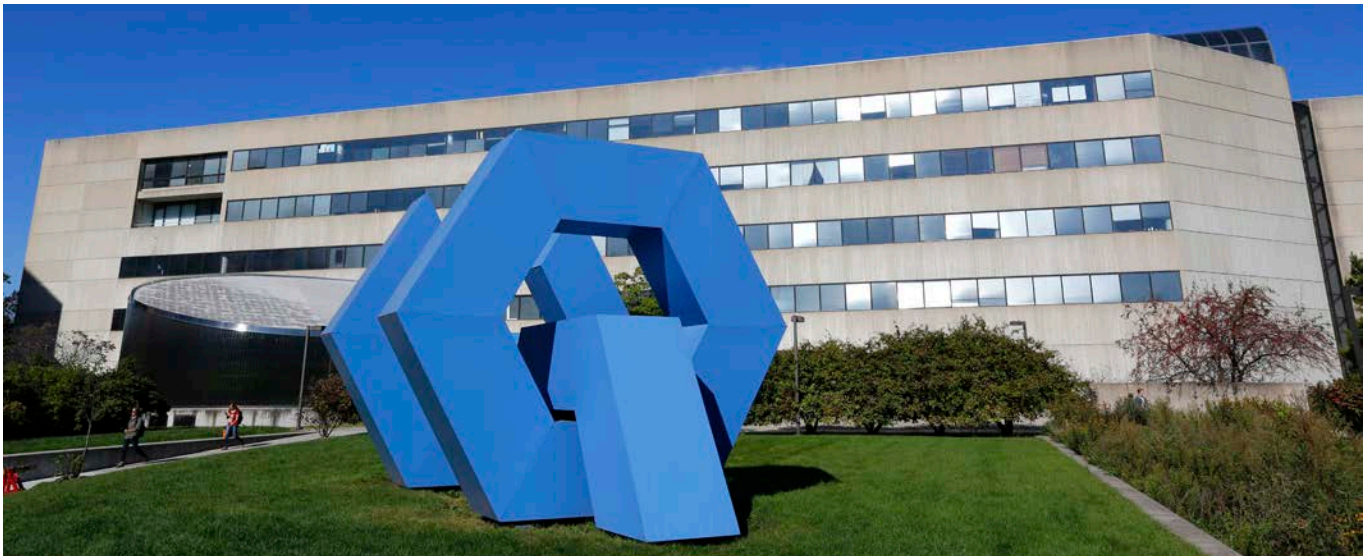
The benefit-cost ratio for society is 3.8, equal to the \$5.9 billion in benefits divided by the \$1.6 billion in costs. In other words, for every dollar invested in ISU, people in Iowa will receive a cumulative value of \$3.80 in benefits. The benefits of this investment will occur for as long as ISU's FY 2021-22 students remain employed in the state workforce.

Summary of investment analysis results

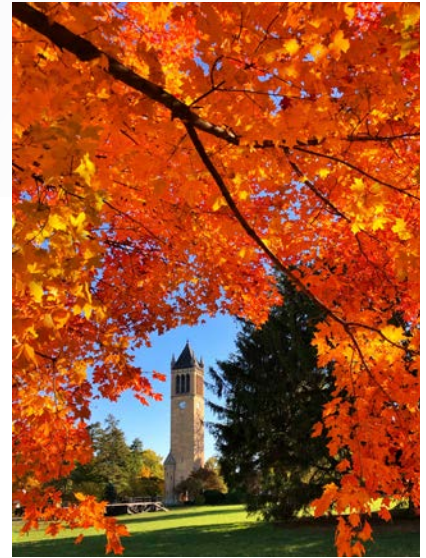
The results of the analysis demonstrate that ISU is a strong investment for all three major stakeholder groups—students, taxpayers, and society. As shown, students receive a great return for their investments in an education from ISU. At the same time, taxpayers' investment in ISU returns more to government budgets than it costs and creates a wide range of social benefits throughout Iowa.



* The rate of return is not reported for the social perspective because the beneficiaries are not necessarily the same as the original investors.



Conclusion



The results of this study demonstrate that ISU creates value from multiple perspectives. The university benefits state businesses by increasing consumer spending in the state and supplying a steady flow of qualified, trained workers to the workforce. ISU enriches the lives of students by raising their lifetime earnings and helping them achieve their individual potential. The university benefits state and local taxpayers through increased tax receipts and a reduced demand for government-supported social services. Finally, ISU benefits society as a whole in Iowa by creating a more prosperous economy, making Iowa a more attractive place to live, work, and play by improving quality of life and generating a variety of savings through the improved lifestyles of students.

About the study

Data and assumptions used in the study are based on several sources, including the FY 2021-22 academic and financial reports from ISU, industry and employment data from the U.S. Bureau of Labor Statistics and U.S. Census Bureau, outputs of Lightcast's Multi-Regional Social Accounting Matrix model, and a variety of studies and surveys relating education to social behavior. The study applies a conservative methodology and follows standard practice using only the most recognized indicators of economic impact and investment effectiveness. For a full description of the data and approach used in the study, please contact the university for a copy of the main report.

The results of this study demonstrate that ISU creates value from **multiple perspectives.**



Lightcast provides colleges and universities with labor market data that help create better outcomes for students, businesses, and communities. Our data, which cover more than 99% of the U.S. workforce, are compiled from a wide variety of government sources, job postings, and online profiles and résumés. Hundreds of institutions use Lightcast to align programs with regional needs, drive enrollment, connect students with in-demand careers, track their alumni's employment outcomes, and demonstrate their institution's economic impact on their region. Visit lightcast.io/solutions/education to learn more or connect with us.