A Bureau of Business Research Report
From the University of Nebraska—Lincoln

The Annual Economic Impact of Businesses Supported by Nebraska Business Innovation Act Programs 2018 Update

Final Report

Prepared for the Invest Nebraska Corporation and
Nebraska Department of Economic Development

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Executive Summary

The Talent and Innovation Initiative was passed by the Nebraska Legislature and signed into law in 2011. The Act included the Nebraska Business Innovation Act (BIA), which is designed to promote successful entrepreneurial firms by providing access to capital in early stages of product development. The BIA provides such support through five primary programs: 1) the Pre-Seed Prototype grant program; 2) matching state support for Small Business Innovation Research (SBIR) grants; 3) the Academic Research and Development program; 4) the Seed/Commercialization program; and the 5) Microenterprise Loan and Technical Assistance Program. This study by the University of Nebraska-Lincoln Bureau of Business Research provides an economic impact assessment of Nebraska businesses that have been supported by BIA programs. This report builds on previous reports completed in 2014 and 2016.

The current analysis finds that Nebraska businesses have attracted considerable investment in relation to support received from BIA programs. Businesses that provided data for the study reported receiving over $22.5 million in funding through BIA programs. Firms reported raising $100.3 million in capital after receiving BIA support. This equals $4.46 in capital for every $1 of state funding, all of which has been raised after the required initial match. These investments take the form of equity, loans, grants, and other sources of capital, and help businesses throughout the product development process. Successful businesses will ultimately be funded through revenue from sales, and some Nebraska businesses have already advanced to the revenue-earning stage. In fact, the study found that participating businesses have already earned $100.6 million in revenue, which is equivalent to $4.47 in revenue for every $1 of state support. These ratios are somewhat smaller than reported in the 2016 report due to updated analytic procedures, but represent the ability of Nebraska businesses to leverage BIA funding and generate revenue. The businesses participating in Nebraska BIA programs have several direct economic impacts on Nebraska. In particular, these businesses have added 630 new jobs in the state with annual wages of $32.6 million since initial participation in BIA programs. These businesses also had a significant total economic impact and tax revenue impact. The report contains several industry-specific breakdowns.

When considering the multiplier impact of Nebraska businesses, the numbers are even more significant. The total annual economic impact was $284.3 million. The economic impact in terms of value-added is $134.9 million. The annual economic impact in terms of employee compensation is $77.1 million spread over 1,436 jobs. The state and local tax impact is estimated to have reached $6.5 million annually; this figure will grow as businesses advance further through the development and commercialization process. Again, the report breaks these impacts down further by industry.

In sum, the analysis provides additional evidence that Nebraska businesses are successfully leveraging BIA funding to generate revenue and to attract follow-on capital. The multiplier effects demonstrate that the businesses receiving BIA support are driving significant economic and employment activity in the State of Nebraska.

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1. Introduction

This report provides an estimate of the economic impact of businesses that have been supported by Nebraska Business Innovation Act (BIA) programs. Under the Act, part of the Nebraska Talent and Innovation Act adopted in 2011, the State of Nebraska provides support to businesses through five broad programs: 1) the Pre-Seed Prototype Grant program; 2) matching state support for federal Small Business Innovation Research (SBIR) grants; 3) the Academic Research and Development program; 4) the Seed/Commercialization program; and the 5) Microenterprise Loan and Technical Assistance Program.

The programs are designed to assist businesses, many of which are in the early stages of developing new products and technologies, in a variety of ways. For example, the programs allow small businesses to better leverage federal dollars received through the SBIR and other programs that invest in small business research and development. The programs also encourage collaborations between small businesses and university personnel in the development of new technologies and services. In these ways, the programs offered through the Act have the potential to spur job creation and economic growth throughout the state.

Business Innovation Act Application and Process

Companies interested in accessing the various BIA programs apply to the Nebraska Department of Economic Development through its online application at neded.fluidreview.com. A representative of the Department will then follow-up with the company on its application. An internal review committee at the Department will then approve or disapprove the application for funding. If the company is seeking funds through the Nebraska Innovation Seed Fund program, the application is then forwarded to Invest Nebraska for due diligence, a determination of whether to move forward in the investment process, negotiation of deal terms and Investment Committee approval.

Invest Nebraska conducts thorough due diligence on each company, utilizing both internal and external resources. After satisfactory due diligence, the Invest Nebraska staff will assess the company's prospects and decide on whether to move the company forward in the investment process. Negotiation of deal terms often times requires a "deal lead" to establish the terms of the investment and identify potential investors in Nebraska as well as outside the state. Invest Nebraska will act as deal lead or follow in the round as needed. Finally, assuming mutually satisfactory deal terms as a result of negotiations, the investment is presented to the Invest Nebraska Investment Committee for approval before being returned to the Nebraska Department of Economic Development for final approval.

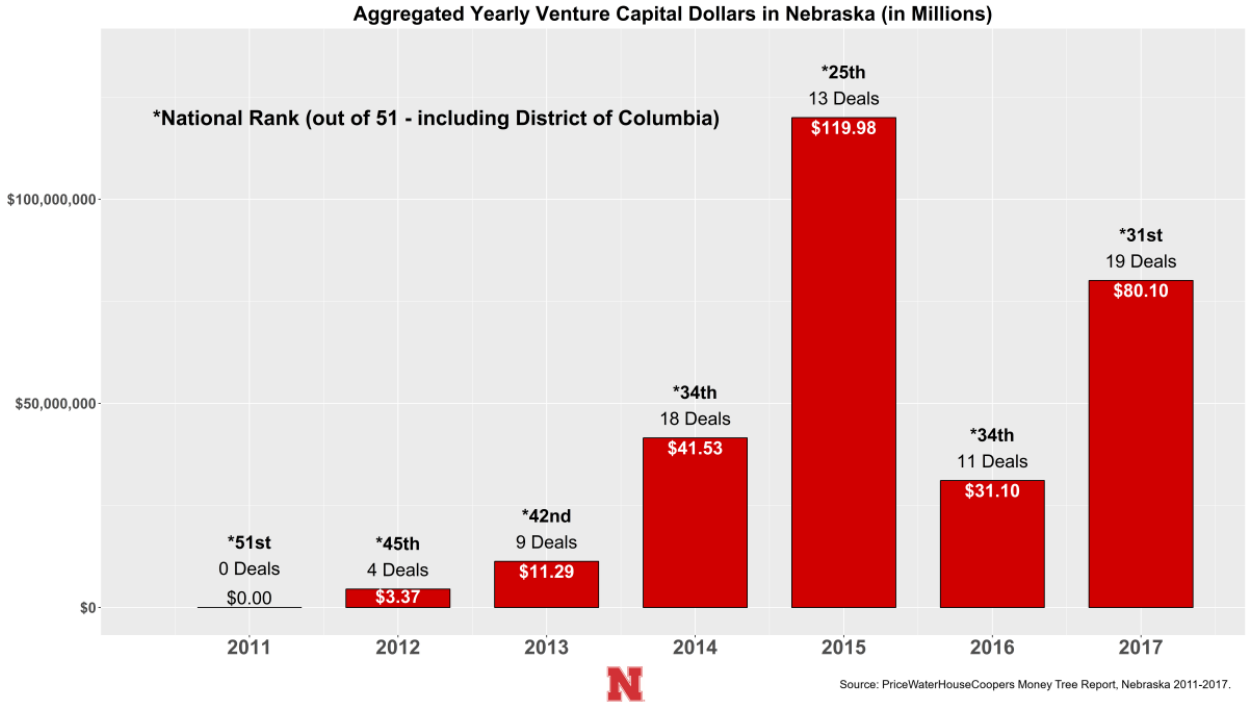
The Board of Directors for Invest Nebraska is comprised of eleven individuals with a variety of public/private experience.

Richard Baier	President and CEO – Nebraska Bankers Association
Jackie Ostrowicki	Assistant Vice President for University Affairs & Director of Marketing and Strategic Communications – University of Nebraska
Chris Roth	CEO – Reinke Manufacturing
Paul Eurek	Founder and former CEO – Xpanxion
Joseph Young	Executive Vice President – Nebraska Chamber of Commerce and Industry
Dan Curran	Deputy Director – Nebraska Department of Economic Development
Craig Tuttle	Former Managing Director – Prairie Ventures
Tim White	President – WOR, LLC
Mike Flood	Founder and CEO – News Channel Nebraska
Dr. Michael Dixon	President and CEO – UNeMed
Dennis Wiederholt	CFO and Managing Partner – DLR Group

Third Party Validation of the Entrepreneurial Ecosystem in Nebraska

The Nebraska BIA programs exist within the larger context of the entrepreneurial ecosystem within the state. While BIA programs offer generous support to small businesses in the state, venture capital investments occur continuously, as a result of state-run programs and outside of state-run programs. Annual reports by PriceWaterhouseCoopers MoneyTree™ provides definitive information on startup activities and venture capital activities in the U.S. Using this authoritative source of information, it is possible to examine the venture capital activities in Nebraska as well as compare Nebraska to other states. Figure 1 on the following page is derived from a recent PriceWaterhouseCoopers MoneyTree™ report. The graph presents the yearly aggregate amount of venture capital raised within the state from 2011-2017. As the figure indicates, the total amount of venture capital slowly increased from $0 in 2011 to a peak of nearly $120 million in 2015. This amount was driven by 13 individual deals, suggesting that there were several larger deals in Nebraska that year. Nebraska ranked 25th in the nation that year, in the amount of venture capital raised. Since 2015, the venture capital dollars have dropped, though the number of deals has not. This differs somewhat from national trends where funding to venture capital-backed companies has increased, but the numbers of deals have decreased.

Figure 1. Aggregate Yearly Venture Capital Dollars in Nebraska



The Present Study

This study represents the third effort to examine the annual economic impact of the businesses that have been supported through such programs. Two earlier studies completed in 2014 and 2016 demonstrated that the incentives offered through the BIA yielded a number of direct and indirect benefits to the State of Nebraska. In particular, businesses receiving support through the Act to promote product development were successful at attracting investment from a variety of sources, and were able to generate considerable amounts of revenue in relation to the dollars received from the State of Nebraska. Further, companies receiving support created a large number of jobs in the state, with a considerable amount of total compensation and benefits. Economic modeling was used to estimate the indirect impacts that job creation and salaries; estimates showed that jobs and salaries created as a result of state investment generated considerable indirect impacts through additional job creation and through federal, state, and local taxes.

The current analysis shows that BIA programs provided about $22.5 million in support to businesses that provided information for this study. About $55.1 million in initial matching funds were generated by participating businesses as they received state support. Beyond the original matching dollars, Nebraska businesses supplemented state support with $100.3 million in additional capital raised, or 446% percent

of the total amount of state support provided. Of this total, firms raised over $65.9 million in equity capital, about $21.2 million in loans, $11.6 million in grant funding, and $1.6 million in capital from "other" sources. There was over $100.6 million in revenue earned by firms since initial involvement with a Nebraska BIA program. This was 447% of state support indicating $4.47 in revenue earned for each $1 of most recent state support. The $4.47 return on the dollar represented a considerable increase over the $2.32 return on the dollar in the 2014 analysis of Nebraska Business Act programs, but slightly lower than the $7.21 return reported in the 2016 analysis.[1]

Businesses receiving support through the Act and that responded to the 2018 request for data have been successful at attracting investment from a variety of sources, and have been able to generate considerable amounts of revenue in relation to the dollars received from the State of Nebraska. Further, companies receiving support created a large number of jobs in the state, with a considerable amount of total compensation and benefits. Economic modeling was used to estimate the indirect impacts that job creation and salaries had; estimates showed that jobs and salaries created as a result of state investment generated considerable indirect impacts through additional job creation and through federal, state, and local taxes.

2. Methodology

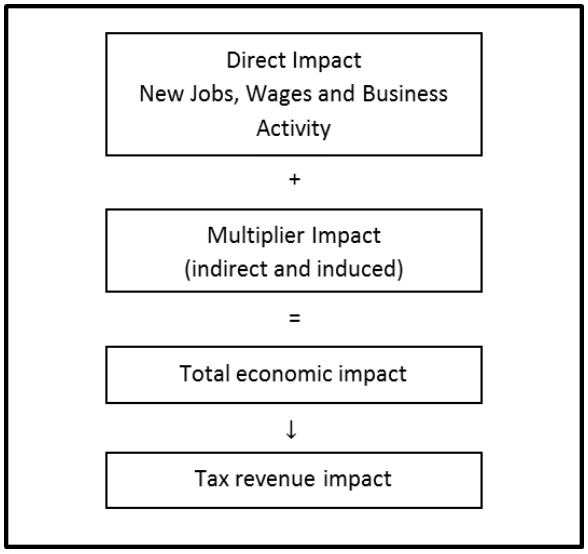
Data for the present report were derived from several sources. First, Nebraska firms that had received assistance through one of the programs offered through the BIA in the past were invited to complete a brief survey. For businesses that did not complete the survey, University of Nebraska Bureau of Business Research (BBR) analysts looked to data collected for the 2014 and 2016 reports, as well as administrative data, to determine whether there was usable data for these businesses. More detail on this process is provided below.

Using information from the surveys and administrative data allowed investigators to compute the direct effects of investment through the Nebraska BIA programs. In particular, it was possible to compute direct economic impact through new jobs, wage, and business activity since receiving an award through the BIA program. This information was then used to estimate the "multiplier" effects which capture the additional economic activity that takes place as companies grow, and as employees support other local businesses. For example, growing firms make additional purchases of supplies and services from other

[1] A key difference between the 2016 report and the current report is the current focus on total BIA dollars received. In 2016, the analysis focused on the most recent BIA award received by businesses.

businesses within the state, supporting sales, wages and employment at these businesses. This is known as the indirect impact. In addition, the new employees of firms spend their paychecks on ordinary household items such as housing (mortgage payment or rent), food, retail items, entertainment, insurance, health care, or transportation. This spending supports other businesses throughout the state and is known as the induced impact. The indirect and induced impacts together form the multiplier impact, which is the additional economic activity in the state which results from the initial direct impact when businesses expand. The total economic impact is the sum of the direct impact and the multiplier impact, as seen in Figure 1 below.

Figure 2. The Economic Impact Process



The multiplier impact is estimated using the IMPLAN model. IMPLAN is a widely used input-output analysis software package and database which provides a detailed picture of the economy for any state and sub-state region in the nation. Specifically, the IMPLAN model can be used to calculate the relationship between the direct economic and multiplier impact. For example, for each job created at a firm involved in a Nebraska BIA program, the IMPLAN model will estimate the additional job or jobs in the Nebraska economy due to the multiplier impact. Direct, multiplier and total economic impacts will be prepared for each of four economic concepts*: output, value-added, proprietor and labor income and employment.*

- *Output* is equivalent to an increase in business activity.

● *Value-added* is analogous to gross domestic product and reflects the increase in labor income, proprietor profits, business taxes paid and capital consumption in the economy.

● *Employee compensation*, which includes proprietor and labor income*,* corresponds closely with personal income estimates maintained annually for state and local units of government by the U.S. Department of Commerce, Bureau of Economic Analysis.

● *Employment* is a critical measure to consider, and includes both full and part-time positions.

These economic impacts also imply tax impacts for the Nebraska economy. In particular, businesses receiving investments pay direct taxes to state and local government and to the Federal government. There are also additional tax revenue impacts beyond these direct payments. Employees receiving the newly created jobs pay income taxes on this income and sales taxes on their spending. Wages also support mortgage and rent payments, and therefore, local property taxes. At the same time business patronized by these employees pay property taxes. These additional state and local tax payments also must be included in any tax revenue estimates. For example, estimates of wages can be used to calculate estimates income taxes using the effective, or average, tax rate paid on income in the state. This effective income tax rate is 2.7 percent. Wages also lead to sales tax, depending on the percentage of income which is spent on taxable sales. In Nebraska, approximately 35 percent of income is spent on taxable sales. This formula can be applied to the total wage impact and multiplied by 7 percent to yield an estimate of state and local sales tax impact. Income also yields taxable property. There is approximately $1.47 of taxable property in Nebraska for each $1 of annual income. This rate can be applied to the total employee compensation impact and a weighted average state property tax rate of 2 percent to yield an estimate of the property tax impact.

Sources of Data

Data on business activity for firms participating in Nebraska BIA programs were gathered from both a business survey and administrative records. The survey was delivered to companies in May, 2018. Personnel from the Nebraska Department of Economic Development were responsible for the delivery of the survey. One attempt to follow up with firms receiving assistance was made in mid-May, 2018. The questionnaire asked participants to state the total amount of spending in 2016 and 2017, list the number of employees added since receiving assistance, the average salary of new hires, the amount of capital raised, and how that capital had been spent. In total, 225 businesses were invited to participate in the questionnaire; 78 businesses provided responses. For the remaining 147 businesses that did not

complete the survey, personnel from the Invest Nebraska Corporation followed up with businesses with which they had engaged. Thirteen businesses responded to the request from Invest Nebraska. BBR analysts also looked to data collected for the 2014 and 2016 reports to determine whether there was usable data for these businesses. The results showed that there were 59 businesses that had either responded to the 2014 or 2016 surveys, or that had provided administrative data to the Invest Nebraska Corporation. Combining these different data sources, this resulted in a total of 150 businesses for which analysts had data.

While some firms received investments from multiple Nebraska BIA programs, firms were sent only a single survey form. For example, firms might receive $50,000 in funding for an initial Prototype program grant and as development proceeds also receive a Commercialization program investment. Similarly, firms may receive an initial $5,000 grant for the SBIR 0 program, in order to develop a SBIR I grant application for a Federal agency, and may later receive a SBIR 1 or SBIR 2 grant from the Federal government, and a matching grant from the State of Nebraska. The present analysis summed the total amount of investment made in a company through the Nebraska BIA program.

Participants in the Seed Fund/Commercialization program or respondents to the survey provide data about their business including key measures of growth. In particular, businesses reported growth in full- and part-time employment since their initial award from the Nebraska BIA program and the average wages and benefits (i.e., employee compensation) of any new jobs. Data on job growth and average wages and benefits were used to estimate the growth of businesses involved in the program. Reported wage and benefit data were used to estimate the cumulative growth in employee compensation since first award. Estimates of value-added and output in each participating firm were estimated based on employee compensation, using industry averages.

Growth in employment, employee compensation, value-added and output is the measure of the direct economic impact of each participating business. Direct annual economic impacts were summed across businesses to yield the total economic impact from businesses participating in Nebraska BIA programs. This focus on growth as a measure of economic impact was appropriate for multiple reasons. First of all, some businesses were established businesses with employees when applying to the program. The program helped these businesses to develop a new product or process and expand employment. The expansion of employment is the appropriate measure of impact for these firms. In many other cases, participating businesses were at a very early stage of development when applying for a grant with a

Nebraska BIA program. For these firms, growth in employment is essentially equivalent to current employment.

The point is that the focus on business growth better reflects the amount of business activity associated with Nebraska BIA programs. The approach is superior to simply counting all employment, employee compensation and sales of firms which received funding, given that some firms already had significant levels of employment when first applying to a program.

Businesses responding to the survey also provided other key information. Most importantly survey respondents provided information about additional funds obtained in the period since applying to a Nebraska BIA Program. In particular, survey respondents indicated: 1) how much additional funding that has been received from equity investments, loans, grants and other sources, and 2) how much revenue, if any, has been earned by selling products and services. All of this information allows for an analysis of the return in additional investment and revenue for each dollar invested by the State of Nebraska through the SBIR, Prototype, Academic Research and Development, and Commercialization programs. Administrative records were used to account for the total amount of support provided through the BIA program, as well as the total amount of the initial match.

3. Economic Impact Estimates

Early stage investments of the type supported by the Nebraska BIA programs take time to develop. Projects often do not immediately yield wage and salary employment or revenue. Further, prototype projects may need sufficient development to establish a proof of concept before being able to attract further investment. This implies that at any point in time the portfolio of funded projects will include both new projects which have not yet yielded employment or revenue, as well as completed projects which are already at the employment and revenue stage.

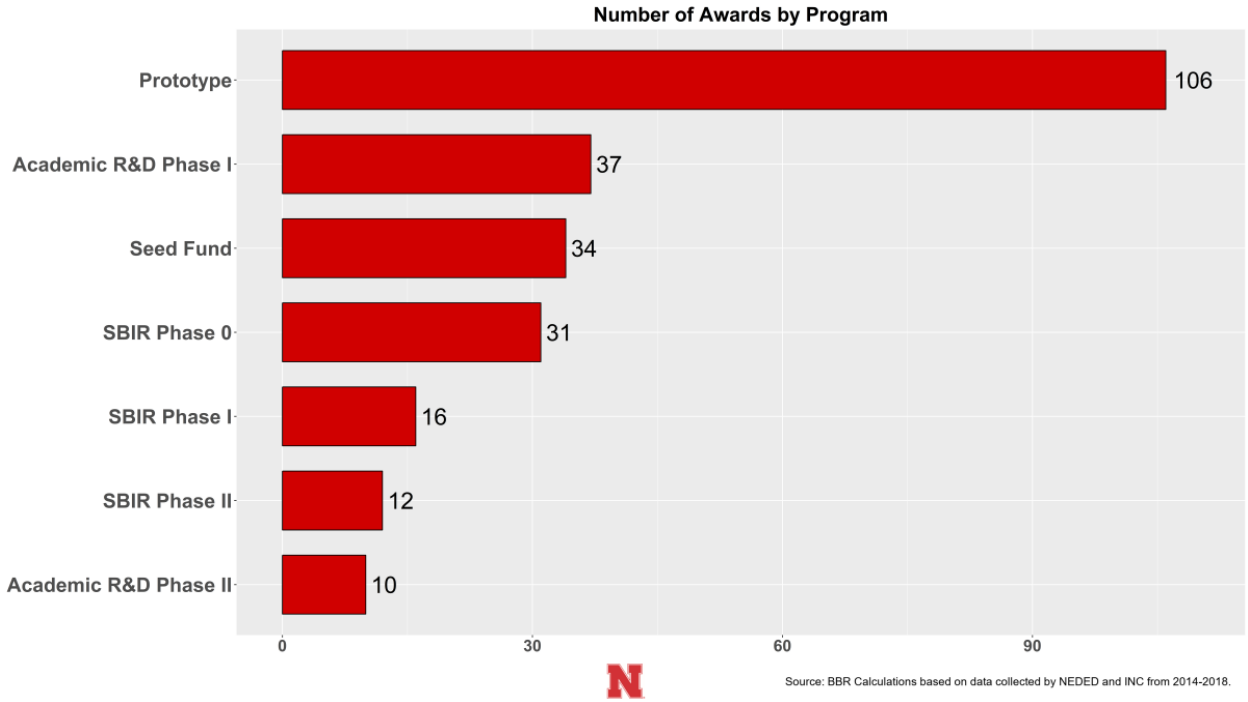
This section of the report examines the portfolio of funded projects using both survey and administrative data on businesses in the commercialization program and survey data on other businesses. As discussed, the Nebraska BIA provides a suite of programs for businesses in the early stages of development including pre-seed funding as well as seed funding. For example, pre-seed funding includes the Prototype program in which firms may be involved in the development of a prototype of a new product or service requiring a proof of concept. There is also a SBIR Phase 0 grant where businesses receive funding to develop an SBIR Phase 1 proposal for submission to a Federal agency. Businesses which participate in these programs move on to later stage of development, when

appropriate, and the Nebraska BIA continues to help with funding through the Academic Research and Development program, matching grants for businesses which earn a Federal SBIR Phase 1 and 2 grant, and through the Commercialization program. By counting the cumulative total of awards received by each business, it is possible to account for the support received through BIA programs as companies move through the development of products. In total, 246 awards from BIA programs have been given to the 150 businesses who provided data for this analysis.

Business Innovation Act Awards by Program

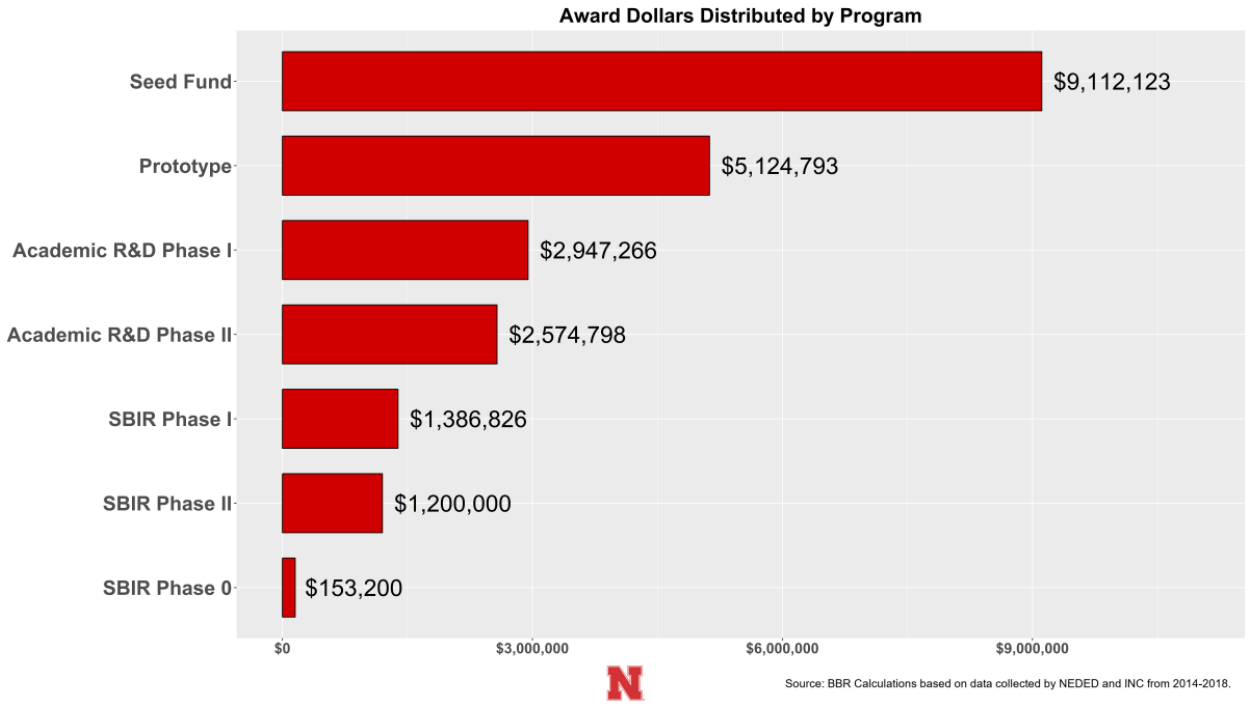
Figure 1 indicates that responding businesses were most commonly awarded the Prototype grant, with 106 awards being made. The Prototype grant fosters the development of a prototype for an innovative product or service. Businesses which develop such products often moved into a later stage of development and commercialization, sometimes utilizing additional services from Nebraska BIA programs. Among remaining businesses, 59 awards were given for either an SBIR 0, 1, or 2 grant. There were also 47 awards given through the Academic Research and Development Phase 1 and Academic Research and Development Phase 2 program. There were 34 Commercialization/Seed Fund awards given to participating businesses.

Figure 3. Frequency of Awards to Responding Businesses by BIA Program



To highlight the funding awarded through each program, Figure 3 presents the total amount of awards given to participating businesses. A total of $22.5 million in funding has been provided to businesses in this study. As Figure 3 indicates, over $9.1 million has been provided through the Seed Fund/Commercialization program. This figure represents over 40% of the total funding that has been awarded through the various BIA programs. An additional $5.1 million (about 23% of the total) has been provided through the Prototype program, $5.6 million (25%) has been awarded through the Academic R&D Phase I and II programs, and about $2.8 million (12%) has been awarded through the various SBIR programs.

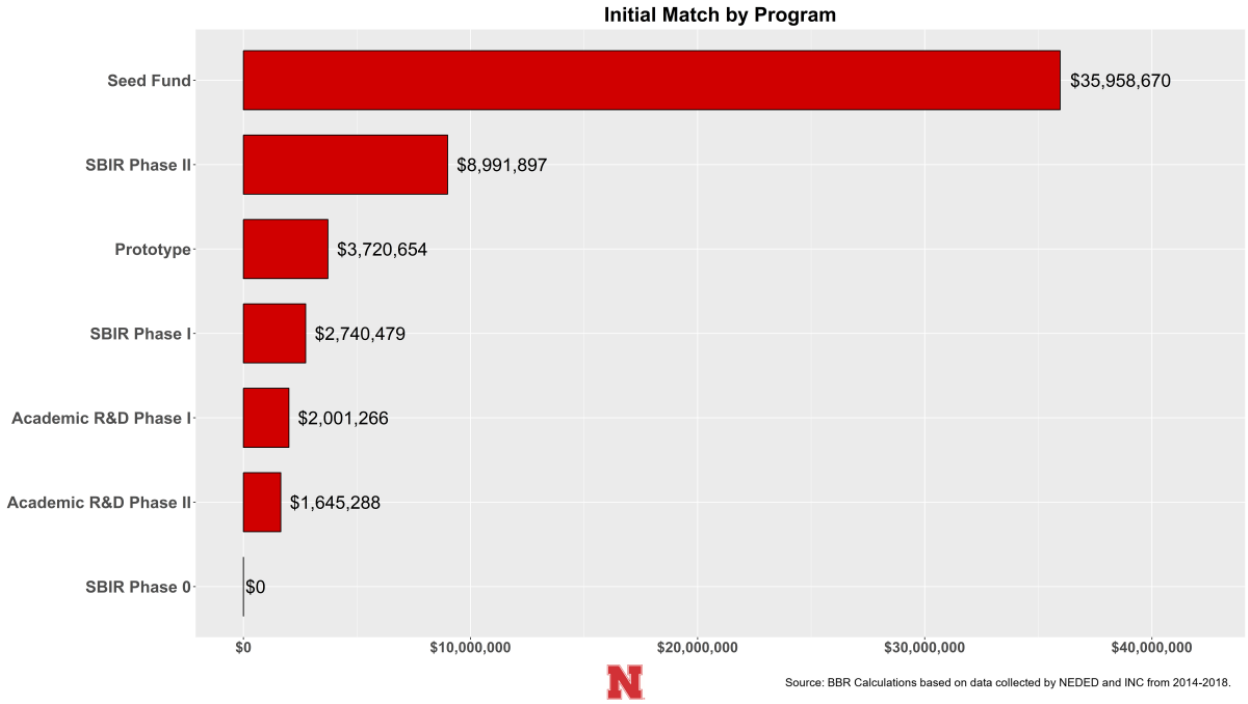
Figure 4. BIA Award Totals by Program



As noted above, each of the BIA programs—with the exception of the SBIR Phase 0 program—requires awardees to match dollars awarded. Match requirements vary across programs, as well as whether the award was received in support of value-added agriculture. These matched dollars represent a co-investment in the business or product by business owners, or other funders. Thus, the matching dollars represent an important source of funding in support of the business. In sum, responding businesses raised $55.1 million in matching funds at time of award. Figure 4 illustrates the co-investments made by businesses across the various award programs. As the figure shows, recipients of Seed Fund awards raised significantly more dollars at time of award than did the recipients of other types of awards. In particular, Seed Fund recipients raised $36.0 million at time of award, SBIR awardees raised $10.7 in

matching funds, Prototype and Academic R&D grant recipients raised $3.7 each million in matching funds.

Figure 5. BIA Matching Dollar Amounts by Program

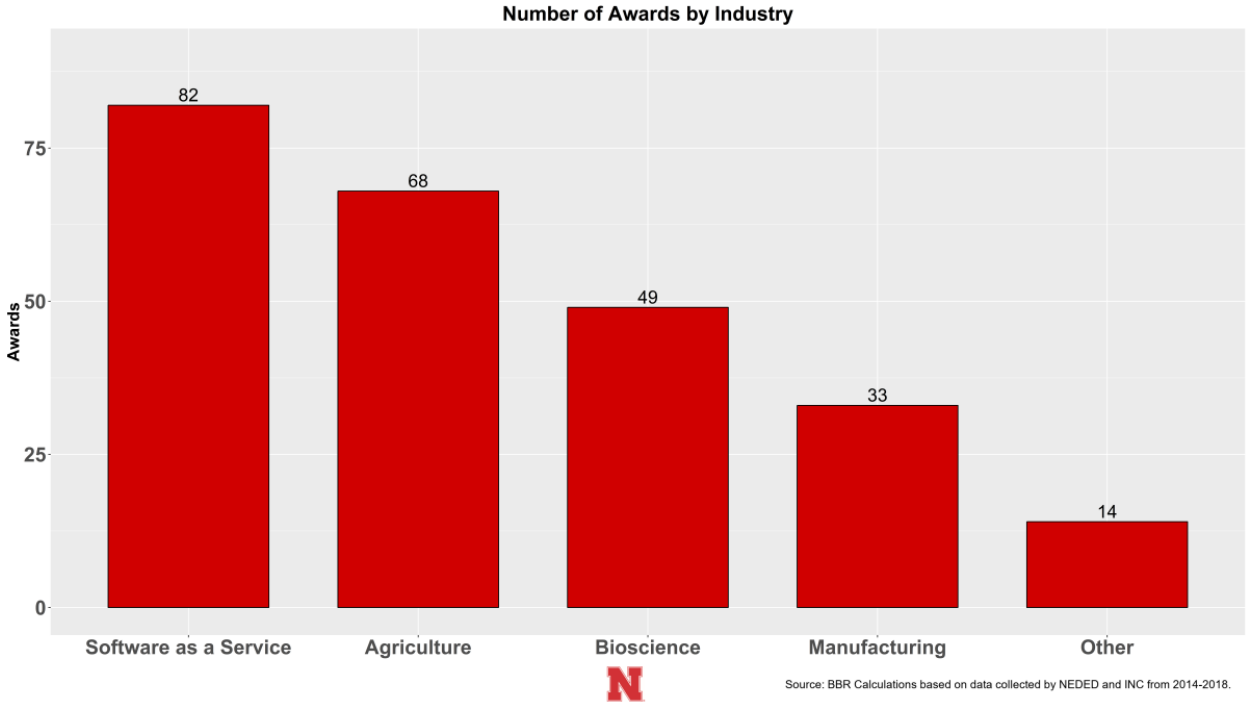


Business Innovation Act Awards by Industry

In addition to examining BIA awards in relation to the various programs offered through the BIA, it is useful to examine how the BIA programs are utilized across industries in Nebraska. To execute this part of the study, participating businesses were classified into five broad categories: Agriculture, Bioscience, Manufacturing, Software as a Service, and Other. These categories allow analysts to examine number of awards, total amount of awards, capital raised, employees added, and salary paid across these five industries.

The first step of this analysis is to present the frequency of BIA awards for each industry. Recall that there were 246 awards given to participating businesses. Figure 5 below illustrates that the greatest number of these awards (n=82) were provided to businesses offering Software as a Service. Firms conducting Agriculture-related business received 68 awards, Bioscience firms received 49 awards, and Manufacturing firms received 33 awards.

Figure 6. Number of BIA Awards by Industry



As noted above, the total amount of funding provided to participating businesses was $22.5 million. To provide greater depth in understanding how BIA award dollars are allocated to Nebraska firms, analysts examined the total amount of award dollars given to businesses that fall into the five broad categories. Figure 6 shows that firms offering Software as a Service received $6.5 million, or about 29% of the total amount of funding provided by BIA to responding businesses. Despite receiving fewer awards, Bioscience firms received nearly as much funding as Software as a Service businesses, with about $6.3 million in funding. Agricultural firms also received a substantial amount of funding with about $5.8 million in awards through BIA programs. Manufacturing firms and businesses classified as "Other" received considerably less support.

Computing an average award amount across the various industries shows that Bioscience firms received the largest average award at $262,589. Agricultural firms received an average of $192,515 per award; "Other" businesses received an average of $187,381 per award; firms providing Software as a Service received an average of $110,023 per award; and Manufacturing firms received an average of $71,878 per award. The wide variation in average award amount likely means that firms across different industries are pursuing different types of awards through the BIA program. Related, it is likely that the average award amount is driven by the fact that some businesses in some industries are at a more

advanced stage of product development, where the BIA and Seed Fund programs offer larger amounts of support.

Figure 7. BIA Award Dollars Distributed by Industry

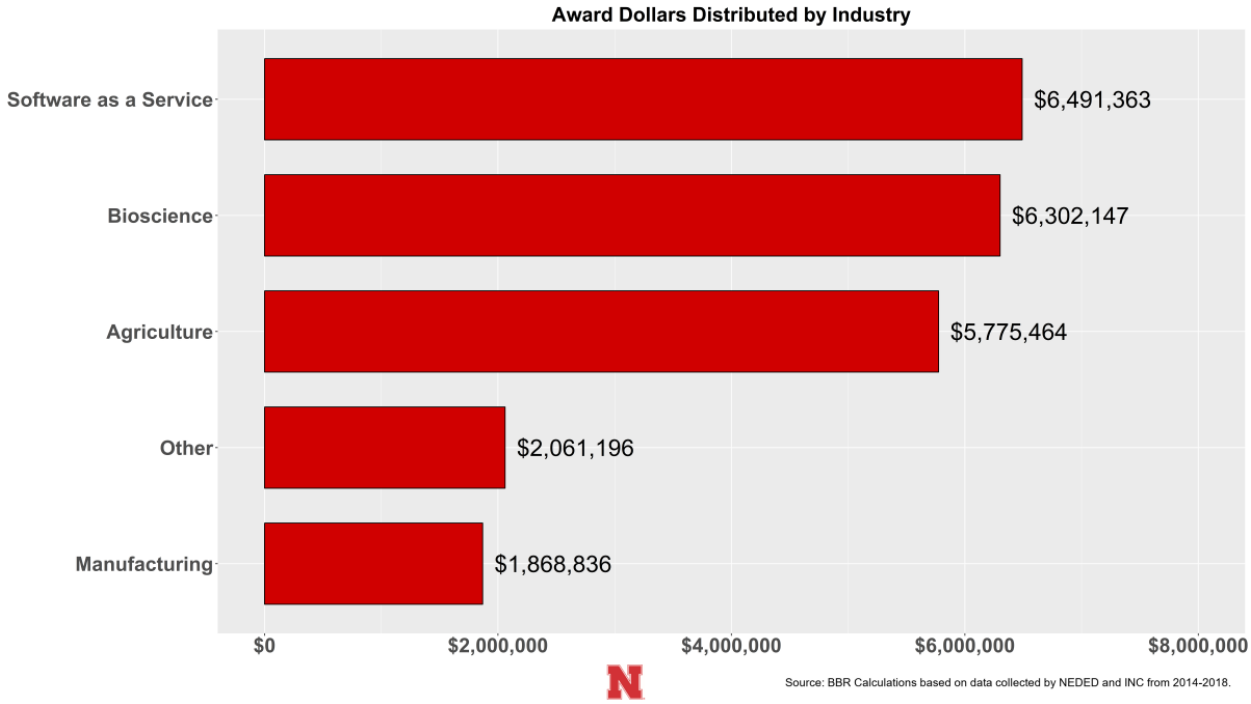
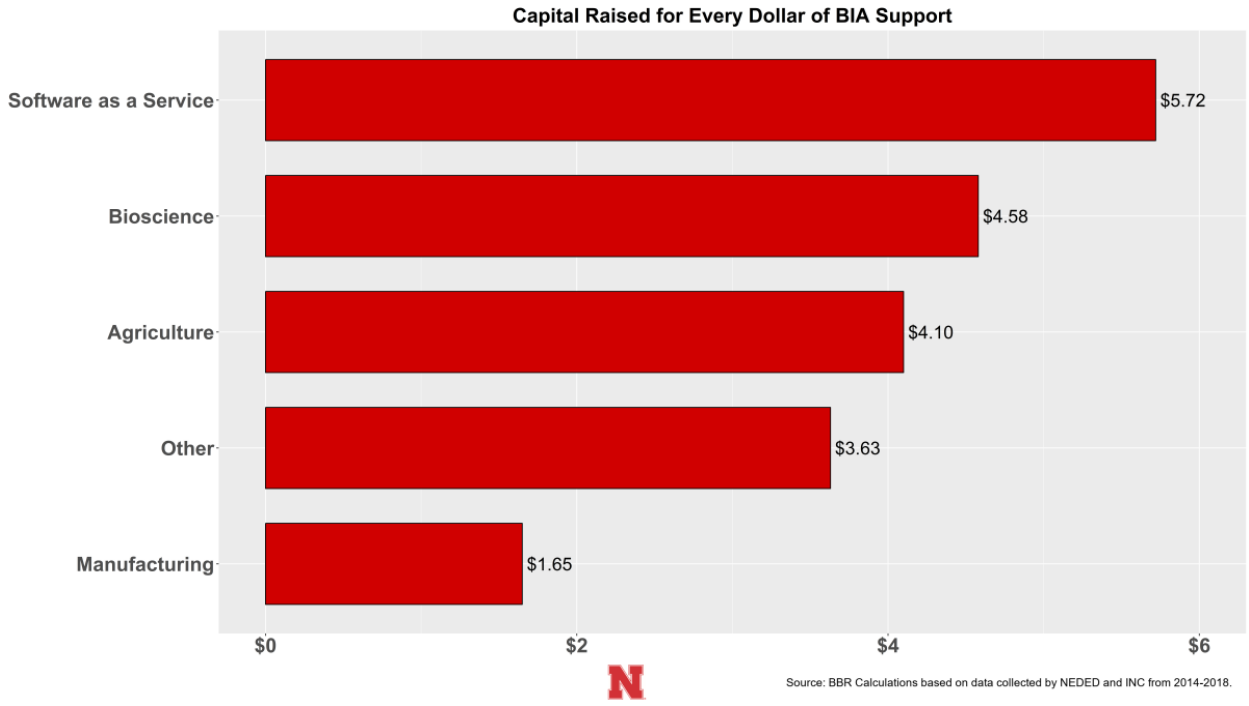


Table 1 below presents the total amount of capital raised by businesses across the five industries. numbers. As the table indicates, the total amount of capital raised is $100.3 million. Firms offering Software as a Service raised $37.2 million dollars in revenue after receiving the first BIA award. Bioscience firms raised $28.9 million and Agricultural businesses raised $23.7 million. Businesses classified as "Other" and Manufacturing firms raised much smaller levels of capital, which would be expected given the relatively lower levels of funding received through BIA programs.

Table 1. Capital Raised by Industry	
Industry	**Capital Raised Since First BIA Award (in millions)**
Software as a Service	$37.2
Bioscience	$28.9
Agriculture	$23.7
Other	$7.5
Manufacturing	$3.1
Total	$100.3
Source: BBR calculations based on data collected by NEDED and INC from 2014-2018.	

The previous two analyses look at the absolute dollars of awards and the absolute dollars of capital raised by businesses across five industries. In order to see the extent to which businesses are leveraging BIA award dollars to raise additional capital, analysts examined the ratio of capital raised to the total award amounts. Here, higher percentages indicate that businesses are raising more capital after receiving support through a BIA program. In total, Nebraska firms raised $4.47 of capital for every dollar of funding received through a BIA program. Figure 7 below presents the results of this analysis by industry. As the figure shows, businesses in the Software as a Service industry have raised about $5.72 of capital for every dollar received through a BIA program. Bioscience firms have raised about $4.58 for each dollar of BIA support, and Agricultural businesses have raised about $4.10 for every dollar of BIA support.

Figure 8. Ratio of Capital Raised to BIA Funding Support

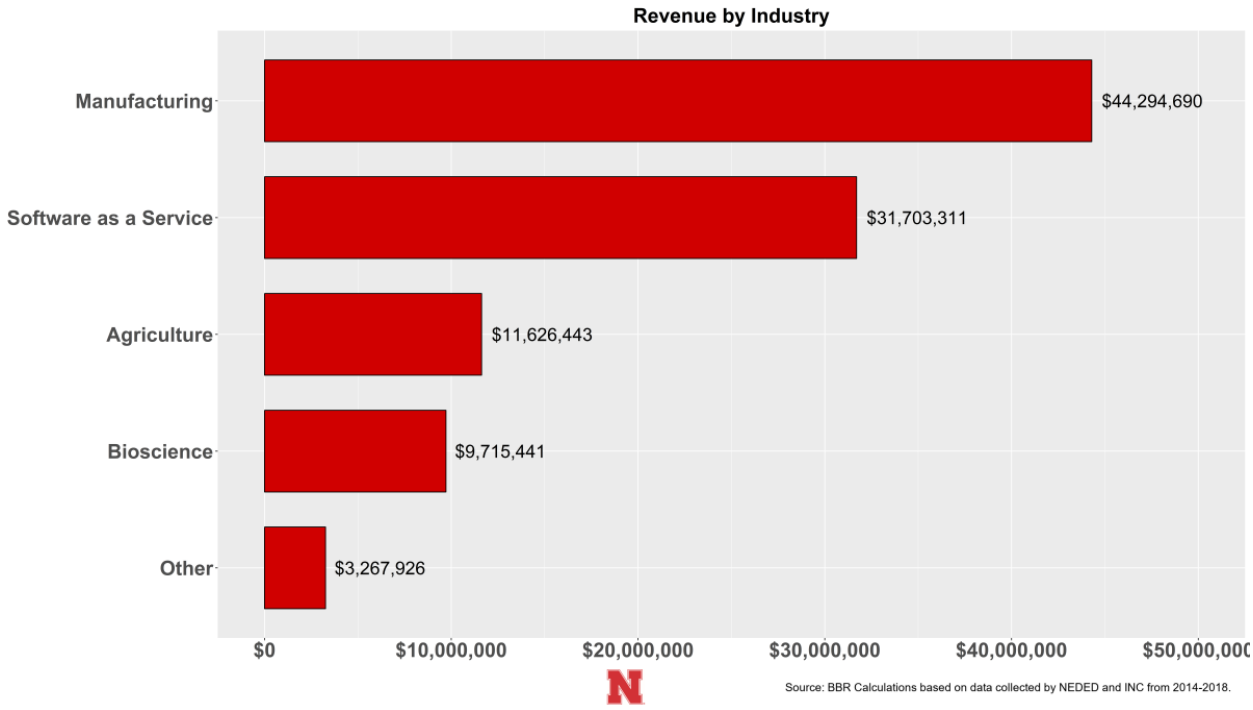


Revenue by Industry

Businesses receiving BIA awards have reported generating substantial amounts of revenue. In fact, businesses have reported generating $100.6 million in revenue since receiving the first award through a BIA program. In relation to the funding received through BIA programs, businesses have generated about $4.47 for every $1 of support received through the BIA. To better see how revenue generated differs across industries, Figure 8 below presents the total amount of revenue generated by industry. As

the figure shows, Manufacturing firms reported the highest levels of revenue with $44.3 million in revenue. This figure is largely driven by a small number of manufacturers that have reported high levels of productivity since receiving an initial BIA award. The figure demonstrates that firms specializing in software have also generated significant revenue, with over $31.7 million in revenue reported.

Figure 9. Revenue Generated by Industry



Direct Employment and Wages

Much of the BIA support, matching funds, and subsequent capital raised goes to support employment of personnel at participating businesses. Businesses that responded to surveys were asked to report the number of employees hired and the average salary of new employees since BIA funding was received. The data show reveal that Nebraska businesses that received BIA support added 630 new direct jobs subsequent to receiving the award. Further, these jobs were associated with $32.6 million in total annual salary.

Looking at the data by industry, businesses providing Software as a Service added the most employees with 250. This industry also had the highest annual salary paid with $12.6 million in salary paid annually. Notably businesses in the manufacturing industry reported the second highest number of employees added with 143, and $7.2 million in annual salary paid to those employees. Recall that of the five industries examined, manufacturers received the smallest amount of BIA support, and also reported the

lowest total of capital raised. This discrepancy lies in the fact that two manufacturers, in particular, reported hiring a large number of employees since time of award, with correspondingly large payrolls for those employees.

Table 2. New Employment and Annual Salary of Responding Businesses		
Industry	**Employees Added**	**Total Annual Salary Paid (in millions)**
Software as a Service	250	$12.6
Manufacturing	143	$7.2
Bioscience	108	$6.6
Agriculture	97	$4.0
Other	32	$2.3
Total	630	$32.6
Source: BBR calculations based on data collected by NEDED and INC from 2014-2018.		

Multiplier Impacts

As noted in the methodology section, these direct economic impacts also will yield multiplier impacts in the Nebraska economy. For example, as businesses make purchases of equipment and supplies and as owners and workers at businesses spend their income on all the elements of household spending. The magnitude of these multiplier impacts are estimated utilizing the IMPLAN model. The IMPLAN model is the most widely used model for calculating economic multipliers and can be used to calculate economic multipliers for hundreds of industries in states, counties, or combinations of states and counties. The IMPLAN model was used to calculate economic multipliers for the Nebraska economy for the industry of each business participating in a Nebraska BIA program.

Multiplier impacts show the additional economic activity for each unit of direct economic activity. For example, a job multiplier would show the additional jobs created in the economy for each 1 job created at a business participating in a Nebraska BIA program. Multiplier impacts, once calculated, are added to direct economic impacts in order to estimate the total economic impact. Tax impacts in turn are estimated based on the economic impact. Purchases associated with business expansion lead to taxable sales while the income of employees leads to taxable income. An estimate of tax revenue impacts therefore can be completed once the economic impact has been calculated. Table 4 shows the total annual economic impact of businesses participating in Nebraska BIA programs in terms of output, value-added, employee compensation and employment. The table also shows the estimated tax revenue impact for federal taxes, as well as state and local income, sales and property taxes, in aggregate. The annual economic impact is $284.3 million while the economic impact in terms of value-added is $134.9

million. Note that the value-added impact is a component of the output impact, implying that the two numbers should not be added together. The annual economic impact in terms of employee compensation is $77.1 million. In relation to the total direct salary of $32.6 million, this figure shows that there is a significant multiplier impact in the State of Nebraska. This employee compensation is a component of the value-added impact. There is an employment impact of 1,436 jobs. This suggests wages per job of $53,677 including both the direct and multiplier employment. The state and local tax impact is $6.5 million annually. Also included in Table 3 are the economic impact numbers from 2016. As the numbers indicate, the total output, value-added, employee compensation, total employment, and state and local tax contributions all increased from 2016 to 2018.

Table 3. Annual Economic Impact Due to Growth

Impact Concept	2018 Total Annual Economic Impact	2016 Total Annual Economic Impact
Output (in millions)	$284.3	$188.5
Value-Added (in millions)	$134.9	$97.2
Employee Compensation (in millions)	$77.1	$52.1
Employment	1,436 jobs	967 jobs
Federal Taxes (in millions)	$4.1	$3.1
State and Local Taxes (in millions)	$6.5	$4.5

Source: BBR calculations based on data collected by NEDED and INC from 2014-2018.

To further understand the impact of businesses participating in BIA programs, analysts examined the total economic impact by industry. Table 4 presents the results. This analysis shows that Software businesses had the highest levels of economic output, employee compensation, and employment. Bioscience and Manufacturing firms also has substantial economic and employment activity.

Table 4. Annual Economic Impact Due to Growth by Industry

	Output (in millions)	Value-Added (in millions)	Employee Compensation (in millions)	Employment	Federal Taxes (in millions)	State and Local Taxes (in millions)
Software as a Service	$117.7	$54.4	$33.5	640	$1.8	$2.8
Bioscience	$68.7	$34.7	$15.8	258	$0.8	$1.3
Manufacturing	$48.4	$21.4	$12.9	262	$0.7	$1.1
Agriculture	$34.7	$15.7	$10.0	201	$0.5	$0.8
Other	$14.8	$8.7	$4.8	75	$0.3	$0.4
Total	$284.3	$134.9	$77.1	1,436	$4.1	$6.5

Source: BBR calculations based on data collected by NEDED and INC from 2014-2018.

4. Conclusion

This study provides an economic impact assessment of Nebraska businesses which have participated in Nebraska BIA programs. Specifically, the study summarizes the additional investments and revenues that businesses have attracted and earned after receiving funding from a Nebraska BIA program. The study also examines employment growth at businesses which received funding from Nebraska BIA programs, as well as the annual wages and benefits associated with these new jobs. The growth of these businesses and the resulting increase in direct annual economic activity is the basis for estimating economic impact. Multiplier impacts also are estimated and added to direct impacts to yield an estimate of the total annual economic impact.

One finding is that participating businesses received $4.46 in additional investments through equity and other sources for each $1 of initial support from a Nebraska BIA program. Supported businesses also have earned $4.47 in revenue from sales for each $1 of such state support. Revenue from sales will continue to grow as more businesses complete the development and commercialization process. Businesses in the Commercialization program and businesses which responded to the survey have added 630 jobs since their initial involvement in a Nebraska BIA program. These jobs had annual wages and benefits of $32.6 million. These are direct economic impacts.

These businesses also had a significant total economic impact and tax revenue impact. The total annual economic impact was $284.3 million. The economic impact in terms of value-added is $134.9 million. Note that the value-added impact is a component of the output impact, implying that the two numbers should not be added together. The annual economic impact in terms of employee compensation is $77.1 million. The state and local tax impact is $6.5 million annually.

The employment impact of these businesses is 1,436 jobs. These results suggest wages per job of $53,677 including both the direct and multiplier employment. This finding implies that the innovative, growing businesses supported by Nebraska BIA programs provide high wage employment.

Appendix 1: About the Bureau of Business and Principal Investigator

The Bureau of Business Research

The UNL Bureau of Business Research is a leading source for analysis and information on the Nebraska economy. The Bureau conducts both contract and sponsored research on the economy of Nebraska and its communities including: 1) economic and fiscal benefit analysis; 2) models of the structure and comparative advantage of the current economy; 3) economic, fiscal, and demographic outlooks, and 4) assessments of how economic policy affects industry, labor markets, infrastructure, and the standard of living. The Bureau also competes for research funding from federal government agencies and private foundations from around the nation and contributes to the academic mission of the University of Nebraska-Lincoln through scholarly publication and the education of students.

Dr. Eric Thompson – Principal Investigator

Dr. Eric Thompson is the principal investigator on this project. Dr. Thompson is the Director of the Bureau of Business Research and an Associate Professor of Economics at the University of Nebraska-Lincoln. Dr. Thompson has conducted a broad group of economic impact studies including impact studies of Nebraska agriculture, Sandhill Cranes migration, the Nebraska child care industry, the Omaha Zoo, the Nebraska horseracing industry, Husker Harvest Days, and the UNL Athletic Department. Dr. Thompson also works on demographic projections, and analyses of economic development programs for Nebraska and cities in Nebraska. He also has conducted numerous economic impact studies for the Lincoln Department of Economic Development, the Omaha Chamber of Commerce, the Nebraska Department of Economic Development, various Nebraska industries, and Nebraska tourism attractions. Dr. Thompson's research has received support from the United States Department of Labor, the Robert Wood Johnson Foundation, the Center for Economic Analysis, the Nebraska Health and Human Services System, as well as Lincoln, Omaha, and Nebraska organizations and agencies. In his previous employment, Dr. Thompson served as the Director of the Center for Business and Economic Research and a Research Associate Professor of Economics at the University of Kentucky. Dr. Thompson received his Ph.D. in agricultural economics from the University of Wisconsin-Madison in 1992. His research fields include regional economics, economic forecasting, and state and local economic development. His research has been published in *Regional Science and Urban Economics,* the *Journal of Regional Science,* the *American Journal of Agricultural Economics,* the *Journal of Cultural Economics,* and the *Economic Review of the Federal Reserve Bank of Cleveland.*

Dr. Mitchel Herian – Senior Research Associate

Dr. Mitchel Herian serves as Senior Research Associate through the Bureau of Business Research. Dr. Herian also serves as a faculty fellow at the University of Nebraska Public Policy Center, and an adjunct professor in the Political Science department at UNL. Dr. Herian has conducted applied research for agencies such as the U.S. Army, the U.S. Air Force, the National Aeronautics and Space Administration (NASA), the Nebraska Supreme Court, the Nebraska Department of Education, and the Kansas Department of Corrections. His research has received support from agencies including the National Science Foundation and the National Institute of Justice. Dr. Herian's research has been published in a variety of peer reviewed journals including the *Journal of Public Administration Research and Theory*, *American Review of Public Administration*, *Policy Studies Journal*, *State and Local Government Review*, and *Ecology & Society*.

Appendix 2: Nebraska Business Innovation Act Programs

SBIR/STTR Program

The federal Small Business Innovation Research (SBIR) program and the federal Small Business Technology Transfer (STTR) program provides funding competitions in two phases that are relevant to the Nebraska SBIR/STTR Program. Phase 1- to conduct feasibility research; and Phase 2-to expand and develop Phase 1 results into commercially viable innovations. The federal SBIR program is administered by 11 federal agencies. Applicants for the federal funding programs compete by submitting proposals in response to solicitations issued by the participating federal agencies. The Nebraska SBIR/STTR Program establishes a financial assistance program to individuals and businesses with a principal place of business in Nebraska to support applications to the Federal SBIR Program solicitations.

Phase 0 Program – Provides funding up to $5,000 to assist small businesses for the purposes of planning for an application under the federal programs.

Phase 1 Program – Nebraska small businesses that receive a federal notification of award for a Phase 1 federal SBIR/STTR grant will receive a state grant of 65% of the federal grant up to a maximum of $100,000.

Phase 2 Program – Nebraska small businesses that receive a federal notification of award for a Phase 2 federal SBIR/STTR grant will receive a state grant of 65% of the federal grant up to a maximum of $100,000.

Nebraska Prototype Program

The Prototype Grant Program provides financial assistance to individuals and businesses operating in Nebraska to support proof of concept activities. The program helps businesses develop new technologies and leverage innovation to enhance quality job opportunities within the State. The grant is up to $150,000 and must be matched with private capital in an amount equal or greater than 50% of the award. If the project is a value-added agriculture project the match is 25%. Matching funds must come from non-state sources government.

Nebraska Innovation Commercialization/Seed Fund Program

The Nebraska Commercialization/Seed Fund Program provides financial capital to businesses in Nebraska for the purposes of commercializing a prototype of a product or process. The investment (equity or convertible debt held by Invest Nebraska) can be up to $500,000 and must be matched 1:1 by non-state government sources. If the project is a value-added agriculture project the match is 25% of the investment amount.

Academic Research & Development Program

Academic R & D involves **applied** research, new product development, or new uses of intellectual property. The academic research and development being performed on behalf of the business must be directed toward: the commercialization of new products, the modification of existing products that lead to substantially improved marketability, or to the improvement of existing processes that will provide new sources of revenue to a Nebraska business. The business must use faculty or facilities of a public or private college or university in Nebraska.

First Phase – The grant amount is up to $100,000 and must be matched 1:1 by the business with non-state government sources.

Second Phase – The grant amount is up to $400,000 and must be matched 1:1 by the business with non-state government sources.

Microenterprise Loan and Technical Assistance Program

Microenterprise Loan and Technical Assistance Program – provides funding to microloan delivery organizations for technical assistance and loan assistance.