NJ SBIR / STTR matching program economic impact

A report developed for NJ Commission on Science, Innovation, and Technology

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Executive Summary

The New Jersey Commission on Science, Innovation and technology has implemented a SBIR/STTR Direct Financial Assistance Matching Grant program as a mechanism to support innovation by NJ-based entrepreneurs that have received federal funding to advance early-stage R&D activities. This report provides an update to a prior economic impact study by analyzing year 1 survey results from two rounds of program funding. The overall assessment is that companies supported by the SBIR/STTR Direct Financial Assistance program have continued to achieve positive economic results increasing employment (38.7%), physical space (25%), IP (100%) and follow-on funding leveraging CSIT’s funding by 14X. This report will be updated with subsequent yearly input and additional future funded cohorts adding to the robustness of the results.

SBIR/STTR Program Background

Small businesses, which account for almost 44 percent of the economic activity in the U.S., are the lifeblood of the U.S. economy. Continuing to be at the forefront of driving innovation and economic growth, they create two-thirds of the net new jobs in the U.S and propel innovation and competitiveness\(^1\). The growth-oriented and technology-driven businesses play a key role in the innovation ecosystem as they often pursue ideas that established organizations fail to spot. Technological start-ups such as Apple, Facebook, Amazon, and Microsoft started as small businesses and grew to be among the largest employers in the U.S in just a few years. Despite the benefits that these businesses bring to the economy, in their early years they often face chronic

undercapitalization resulting in their failure. Studies have found that they mostly fail to get investment from investors due to the lack of assets and credibility in the market, and the uncertainties associated with their projects in the initial development stage. In view of the crucial role small businesses have in the country’s economy and the difficulties they face in the financial market, the federal government provides tools, resources, and services to support their development. Support from the government may play a pivotal role in helping these small innovation intensive businesses thrive and prosper into established firms.

The Small Business Innovation Research (SBIR) program was created in 1982 under the Small Business Innovation Development Act to increase the participation of small businesses in research and development, and to facilitate innovation and technological breakthroughs. Subsequently, Small Business Technology Transfer (STTR) program, a parallel program to SBIR, was created in 1992 under the Small Business Research and Development Enhancement Act. In contrast to the SBIR program, the STTR program requires small businesses to formally collaborate with non-profit research institutions such as universities, federal laboratories, or research centers for R&D. The SBIR/STTR program’s mission is to promote scientific excellence and technological innovation by investing federal research funding in small businesses to address vital American priorities to strengthen the country's economy. In keeping with this mission, the program encourages technical innovation, as well as the engagement of women, underrepresented minorities, and individuals from low-income backgrounds in innovation and entrepreneurship. The goal of any successful SBIR/STTR project is to

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4 https://www.sbir.gov/about
ultimately commercialize the innovation. SBA defines commercialization as the process of developing, producing, and delivering product, processes, technologies, or services for sale to or use by federal government or commercial markets\textsuperscript{5}. It is a highly competitive award-based program that encourages small U.S. businesses to engage in Federal Research and Development initiatives, and production and ultimately work towards commercialization.

Under the act, the federal agencies with an extramural Research and Development budget of over $100 million allocate a part of their budget for financing selected small businesses via the SBIR program, and the federal agencies with an extramural Research and Development budget of over $1 billion set aside a portion of these funds to support STTR program. Currently, eleven federal agencies, including the Department of Agriculture (USDA), Department of Commerce (DOC), Department of Defense (DoD), Department of Education (ED), Department of Energy (DOE), Department of Health & Human Services (HHS), Department of Homeland Security (DHS), Department of Transportation (DOT), Environmental Protection Agency (EPA), National Aeronautics & Space Administration (NASA) and National Science Foundation (NSF), participate in the SBIR program. Among these 11 federal agencies, 5 agencies including the Department of Defense (DoD), Department of Energy (DOE), Department of Health & Human Services (HHS), National Aeronautics & Space Administration (NASA), and National Science Foundation (NSF) participate in the STTR program. The participating agencies designate their own R&D commercialization topics in solicitations, receive and evaluate proposals from eligible small businesses, and make awards on a competitive basis. SBIR/STTR grants are a principal source of early-stage financing for innovative small businesses in the U.S. By funding the R&D

effort of these businesses, supporting agencies enable small businesses to advance their technological innovations with the objective of commercialization.

Past research has shown that the SBIR/STTR program positively contributes to small businesses’ R&D and commercialization activities. A survey study conducted among the companies that received SBIR grants revealed that 60% of the companies attributed their success in the commercialization of their projects to SBIR support while 84% stated that they would not have pursued the technological development without the SBIR grant. Furthermore, SBIR-funded firms also enjoyed greater sales and employment growth and were more likely to attract venture capital investment than their matched counterparts. SBIR-funded companies were also more likely to receive a higher rate of return from their SBIR projects, which provided them a higher incentive to commercialize. Another research studying the commercialization probability of SBIR projects had predicted that the SBIR-funded projects had a 0.46-0.50 probability of commercializing their projects. The SBIR/STTR program also had a significant economic impact on a national scale. An economic assessment of the U.S. Air Force and Navy SBIR/STTR programs found that they generated $92.1 billion in total output, $8.8 billion in total taxes, which was more than the cost of the program, and $31.4 billion in labor income. Another study examining the economic outcome and impact up to 2018 from DOD’s SBIR/STTR programs investment from 1995 to 2007 estimated an impressive 22:1 return on the investment and the

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6. 2019 SBIR AND STTR ANNUAL REPORT
creation of 65,578 jobs on average per year\textsuperscript{12}. In addition to supporting the government's innovation policy and economic growth policy, the SBIR program also enhanced the entrepreneurial ecosystem. A local presence of SBIR can increase a region’s new firm formation rates in high technology industries\textsuperscript{13}.

**SBIR/STTR matching programs**

Realizing the contribution of these innovative small businesses to the economy and the positive impact of early-stage financing, states throughout the U.S. have developed matching programs to supplement the federal SBIR/STTR grants. By providing additional funding opportunities to the small companies, the states can attract new technology-based companies to the state and boost the capability of the funded state-based companies to engage in R&D and commercialization activities. As of June 2021, 26 states had active matching programs for SBIR / STTR companies. They provide funding to the companies working on their projects in either Phase I or Phase II of their SBIR/STTR award\textsuperscript{14}.

Participating states have experienced positive economic growth and increased employment opportunities through SBIR/STTR matching programs. An assessment of the One North Carolina Program, which has already distributed 423 matching awards to 250 businesses throughout the state, revealed several clear benefits of the matching program. The additional funding through the matching program increased the chance for Phase I recipients to receive Phase II awards and increased their probability of realizing sales from the funded projects. Specifically, when the

\textsuperscript{12} DOD SBIR National Economic Impacts, 1995-2018  
\textsuperscript{14} State funds for SBIR companies, July 2021
state increased the funding through matching programs relative to the federal funding by 10 percent, there was a 5.7 percent increase in the project’s chance of receiving a Phase II award and a 2.5 percent increase in their chance of obtaining sales activity. The survey among program participants also revealed that approximately half of the funded projects were continuing R&D work, 83% of projects received additional private-sector investment, and the projects had already received 97 patents and 17 copyrights\textsuperscript{15}.

New Jersey Commission on Science, Innovation, and Technology (CSIT) was re-established in 2018 to oversee the implementation, evaluation, and formulation of the plans and programs for science, innovation, and technology in New Jersey. It provides financial support to NJ small businesses seeking to participate or already in the federal SBIR/STTR program through SBIR/STTR Direct Financial Assistance Program. The main objectives of this program are to increase the success rate of NJ-based SBIR/STTR grant applications, to reduce the financial burden of the awardees, and to increase their success and growth. New Jersey-based enterprises that obtain federal SBIR/STTR funds are eligible for a financial match of $25,000 to $50,000 under the program. In 2020, the New Jersey SBIR/STTR support program provided $400,000 matching grants to New Jersey small businesses that had received SBIR/STTR grants. In the first round of the program, CSIT awarded $25,000 matching grants to eleven businesses that had received a federal Phase I SBIR/STTR award and $50,000 matching grants to each of the two businesses that had successfully completed Phase I and applied for phase II of the federal SBIR/STTR program\textsuperscript{16}. Similarly, in the second round of the program, CSIT awarded $25,000 matching grants to fourteen early-stage companies that had received federal SBIR/STTR Phase I,

\textsuperscript{15}\url{https://ssti.org/blog/recent-research-north-carolina%E2%80%99s-sbirsttr-matching-program-yields-results}
fast-track or direct to Phase II awards, and $50,000 bridge funding grant was provided to each of the two other small businesses that had successfully completed Phase I and had applied for Phase II of SBIR/STTR program. In total, $825,000 was awarded to 29 New Jersey companies during the two funding rounds\(^\text{17}\).

**The economic impact of the matching program in New Jersey**

In 2021 and 2022, CSIT administered a multi-part survey to the companies receiving its first and second rounds of matching grants. The purpose of the survey was to learn from each supported company:

1) the status of their projects funded by the state’s Matching Funds Program.

2) the challenges the companies were facing in carrying out their projects.

3) the impact of the matching grants on the firms’ ability to receive Federal Phase II funding and other additional funding.

4) the project’s economic outcomes.

The surveyed companies were developing new products and services for a wide range of industries from education, and healthcare to communication technologies. Most of them were

carrying out research and development activities to invent new products that could improve the established norms in their respective industries. Among those surveyed, 39.29% of the companies reported that they had already completed tasks they proposed during Phase I applications and a further 7.14% reported that they were near to completing Phase I tasks. For the remaining projects, some of the companies had successfully completed the product development and demonstrated its benefit to the public, while most of them were still involved in research and development activities.

Among the 28 companies surveyed, 10 companies reported that they received Phase II award, 7 companies were still working on their product development and did not apply for the Phase II funding yet, 4 companies had applied for the Phase II funding and were awaiting the decision, and Phase II applications of 7 companies were declined. Out of the 7 applications that were denied, 2 companies are planning to reapply. The bridge funding grants were provided to 4 small businesses, 2 in each round, to assist them in transitioning to Phase II of the SBIR/STTR grants from Phase I. Among those 4 companies, 3 companies reported that they received Phase II award and 1 company was awaiting the result of their Phase II application at the survey time.
Regarding the challenges faced by the companies, most of them identified limited funding as the major difficulty in carrying out the project activities. This challenge was followed by the difficulties imposed by the Covid-19 pandemic. The surveyed companies reported that the Covid-19 pandemic caused delays in project execution as there were supply chain delays, supply chain induced price increment, equipment shortages, covid-19 infection among staff, lab closures, difficulty in recruiting test subjects, and problems in commercializing their technologies. Additional challenges that they faced were as follows:

1) Time management
2) Scientific issues for the product development
3) Problem with the physical facility related to space and safety
4) Difficulty in getting the study about the project published
5) Recruiting personnel experts in the subject area
6) High competition from the large and highly resourceful companies

From the survey, it was learned that the pandemic had more impact on the project activities of the companies in cohort 1 than cohort 2. The 6 companies in cohort 1 mentioned pandemic as one of the major challenges for executing project activities, whereas only 1 company in cohort 2
mentioned facing pandemic related challenge. Majority of companies in cohort 2 mentioned facing funding challenges for executing project activities.

The economic impact of the projects was evaluated based on the following six aspects:

1) **Creation of the employment opportunities**

43% of the companies, 38% in round 1 and 47% in round 2 reported adding new employees after receiving the grant. The companies reported employing about 136 employees at the time of the survey. 38 new employees were hired after they received the funding, among which 29 were full-time employees, 4 were part-time employees and 5 were interns.

On average, each project created about 1.36 jobs. The maximum number of new jobs created by a project was 6 and the minimum was 0. Among the new employees hired, 7.8% were females.
2) **Patent issued**

Technology development and knowledge creation are important for economic growth and development. The number of patents obtained by the companies is an indicator of innovation and new technological development. In total, 28 patents were issued for the projects: 22 U.S patents and 6 international patents. On average, about 1 patent was issued per project. The companies had also filed several other patent applications and were awaiting results. The surveyed companies reported awaiting decision for 23 patents applications among which 21 were US patents and 2 were international patents.

3) **Physical space expansion**

The physical space expansion of the companies is another indicator of economic activity. Among the 28 companies surveyed, 25% of them reported expanding their physical space in NJ. They reported expansion of both their office and lab spaces.
4) **Additional investment attracted**

The new companies often need additional budgets to continue their R&D, production, and commercialization activities. From the survey result, it was found that the projects funded by the matching programs were able to attract additional investments. The projects obtained an additional $12,228,130 investment in total, over 14x the CSIT matching grant amount. The new investments were achieved in the form of grants, loans, and private company investments. Most of the new investments were received as grants (54%), private investments (36%), and loans (10%). 1 of the 28 companies was acquired by another company for its technology. The companies in both round 1 and round 2 cohorts mostly received additional funding in the form of grants, followed by private investment and then loans.

5) **Commercialization status**

Most of the companies surveyed were still working on their product development. 5 of the 28 companies had launched their product in the market and further 9 companies reported the formation of strategic relationships/partnerships with other companies to start commercialization of their products in near future. Among the 5 companies that launched
their products in the market, 4 companies reported sales revenue. The total sales revenue obtained by those 4 companies until the survey time was about 1.8 million dollars.

6) Knowledge sharing

In addition to the economic activities mentioned above, the funded projects were also actively sharing their knowledge with others by participating in cohort programs, presenting their work at conferences, and publishing journal articles. Even though it is difficult to quantify the economic impact of these activities, they might indirectly help other similar companies in problem solving and growth over time.

Comparisons between company performance in cohort 1 and cohort 2

The companies funded in cohort 1 mentioned pandemic as a major challenge for carrying out their project activities, while most companies in cohort 2 mentioned facing funding challenges. In both cohorts, most of the companies were still working in research and product development and had not been able to commercialize the final products yet. Only 2 companies in cohort 1 had started the commercialization process of their products compared to 3 in cohort 2. Those 3 companies in cohort 2 had collected the total sales revenue of about $1.01 million, whereas only 1 company in cohort 1 had obtained sales revenue, which was about $780 thousands.
The companies in cohort 1 and cohort 2 were able to attract additional funding of $6,646,378 and $5,581,752 respectively. In both cohorts, majority of new funding was obtained in the form of grants followed by investments and then loans. The companies in cohort 1 had added about 1.25 new employees per project, whereas the companies in cohort 2 had added about 0.93 new employees per project. In nutshell, the companies in both cohorts had similar economic performance without wide differences.

**Conclusion**

The results discussed in this report are based on the answers provided by the companies receiving CSIT matching fund in the first and second cohorts. We believe that adding data from the companies in future cohorts will add robustness to these results. With the addition of new data from other cohorts in future, the new assessments can also be done to understand the economic impact of the funding on different type of company such as technology, health, life sciences, clean tech etc. and the companies with different demographics of founders.
While most of the surveyed companies are still in the research and development phases of product development, the companies who already completed product development are in the early stage of commercialization activities. Greater economic impact of the funding is likely to be realized over time.
Company Name:
SBIR/STTR Title:
Effective Date of CSIT grant award:

1. In one or two sentences, describe the status of development activity for your Phase I/Phase II SBIR/STTR research.

2. In one or two sentences, outline major challenges, if any, your company or research project is currently facing?

3. Please provide an update on the current status of your IP (invention disclosures, provisional patents filed, full patents filed, patents issued, both in the US and internationally).

4. Since receipt of the CSIT grant, has your company been able to secure any additional investment or funding including grants, angel investments, venture capital or loans? Please provide details on the dollar amount, type of funding and the funding terms.

5. Describe the current commercialization status of your technology or research; include details on number of license agreements signed, strategic relationships formed, any Sales of your technology (revenue level) and current number of customers.

6. For Phase I grant recipients, after completion of Phase I research, did you apply for a federal Phase II SBIR/STTR award? Was your application accepted or declined? If declined, please provide reason for declination.

7. For Phase II grant recipients awaiting Federal feedback on Phase II award, did you receive the Phase II award? If declined, please provide reason for declination.
8. Since receipt of the CSIT grant, has your company expanded physical presence in NJ? If so, include details of physical spaces in NJ (include address of physical space in NJ, when did you acquire physical presence in NJ? Purpose of physical space - lab space, headquarters)

9. Since receipt of the CSIT grant, how many new employees (full and part time) have you added? How many existing employees have been retained? In NJ and outside of NJ? Employees included W-2, 1099 and interns. Please provide demographic data for employees including gender and ethnicity.

10. Since receipt of CSIT grant, have you participated in any cohort programs? – I-Corps, accelerators etc. If so, please indicate which program and the dates of the program.

11. If applicable, please provide any relevant press releases, articles or video links as it pertains to the project for which SBIR funding was received.