NJ SBIR matching program economic impact

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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[2]. 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, they often face chronic undercapitalization resulting in their failure[3]. 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[4]. 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

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[2] Releases, P., & Activity, S. (2019). Small Businesses Generate 44 Percent of U.S. Economic Activity. Retrieved 14 December 2021, from https://advocacy.sba.gov/2019/01/30/small-businesses-generate-44-percent-of-u-s-economic-activity/

[3] Servon, L. J., Fairlie, R. W., Rastello, B., & Seely, A. (2010). The five gaps facing small and microbusiness owners: Evidence from New York City. *Economic Development Quarterly*, *24*(2), 126-142.

[4] Gallo, M. E. (2020, May). Small Business Research Programs: SBIR and STTR. LIBRARY OF CONGRESS WASHINGTON DC.

research centers for R&D and put greater emphasis on the commercialization potential of the projects. 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 and 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[5]. It is a highly competitive award-based program that encourages small U.S. businesses to engage in Federal Research/Research and Development(R/R&D) initiatives, 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/STTR program and the federal agencies with an extramural Research and Development budget of over $1 billion set aside a portion of their 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/STTR 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 innovation-intensive 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[6].

[5] About | SBIR.gov. Retrieved 22 December 2021, from https://www.sbir.gov/about
[6] 2019 SBIR AND STTR ANNUAL REPORT

Past research has shown that the SBIR/STTR program positively contributes to small businesses' R&D and commercialization activities. In a survey conducted among the companies that received SBIR/STTR grants, 60% of the companies attributed their success in the commercialization of their projects to SBIR/STTR support while 84% stated that they would not have pursued the technological development without the SBIR/STTR grant[7]. Furthermore, SBIR/STTR-funded firms enjoyed greater sales and employment growth and were more likely to attract venture capital investment than their matched counterparts[8]. SBIR/STTR-funded companies were also more likely to receive a higher rate of return from their SBIR/STTR projects, which provided them a higher incentive to commercialize[9]. Research studying the commercialization probability of SBIR/STTR projects had predicted that the SBIR/STTR-funded projects had a 0.46-0.50 probability of commercializing their projects[10]. 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 it 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[11]. Another study examining the economic outcome and impact up to 2018 of the DOD's SBIR/STTR programs investment from 1995 to 2007 estimated an impressive 22:1 return on the investment and the creation of 65,578 jobs on average per year[12]. In addition to supporting the government's innovation policy and economic growth policy, the SBIR/STTR program also enhanced the entrepreneurship growth policy. A local presence of SBIR/STTR awardees can increase a region's new firm formation rates in high technology industries[13].

SBIR/STTR matching programs

Realizing the contribution of these innovative small businesses in the economy and the positive impact of early-stage financing, states throughout the U.S. have developed matching programs to

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[7] Berger, R. E., Little, C. J., & Saavedra, P. J. (1992). Commercialization activities in the SBIR program (part 1). *The Journal of Technology Transfer*, *17*(4), 27-39.

[8] Lerner, J. (2000). The government as venture capitalist: the long-run impact of the SBIR program. *The Journal of Private Equity*, *3*(2), 55-78.

[9] Audretsch, D. B., Link, A. N., & Scott, J. T. (2019). Public/private technology partnerships: evaluating SBIR-supported research. In *The Social Value of New Technology*. Edward Elgar Publishing.

[10] Link, A. N., & Scott, J. T. (2010). Government as entrepreneur: Evaluating the commercialization success of SBIR projects. *Research Policy*, *39*(5), 589-601.

[11] Gaster, R. (2017). Impacts of the SBIR/STTR Programs: Summary and Analysis. *Small*.

[12] DOD SBIR National Economic Impacts, 1995-2018

[13] Qian, H., & Haynes, K. E. (2014). Beyond innovation: The small business innovation research program as entrepreneurship policy. *The Journal of Technology Transfer*, *39*(4), 524-543.

supplement the federal SBIR/STTR grants. By providing additional funding opportunities to the small companies, the states are able to 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[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 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 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[15].

New Jersey Commission on Science, Innovation, and Technology (CSIT) was reestablished 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 further 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

[14] *State funds for SBIR companies*. (2021). Retrieved from https://www.sbir.gov/sites/default/files/2021_State-Funds-for-SBIR-companies_0826.pdf

[15] Recent Research: North Carolina's SBIR/STTR matching program yields results | SSTI. (2020). Retrieved 20 December 2021, from https://ssti.org/blog/recent-research-north-carolina%E2%80%99s-sbirsttr-matching-program-yields-results

$375,000 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 two businesses that had successfully completed Phase I and applied for phase II of the federal SBIR/STTR program[16].

Economic impact of the matching program in New Jersey

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

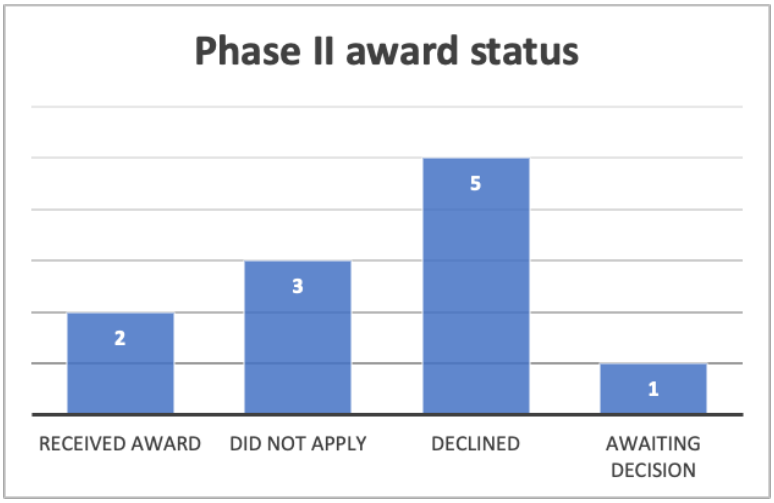
1) the current status of their projects funded by the state's Matching Funds Program;
2) the challenges the companies were facing in carrying out their projects;
3) the impact of the matching grants on the firms' ability to receive Federal Phase II funding and other additional funding;
4) the project's economic outcomes;

The surveyed companies were developing new products and services for a wide range of industries from education, 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. While some of them had successfully completed the product development and demonstrated its benefit to the public, the majority of them were still involved in research and development activities.

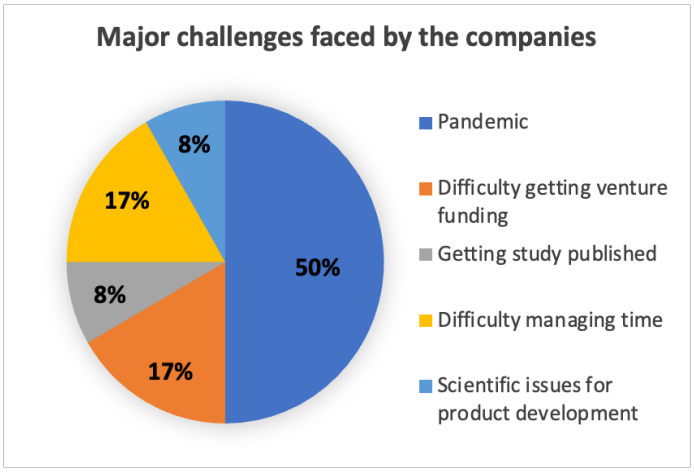
Among the 11 companies that received matching funds in their Phase I award time, 2 companies were able to receive Phase II award by the survey time, 1 company had applied for the Phase II funding and was awaiting the decision, 3 companies were still working in their product

[16] Commission on Science, Innovation and Technology Announces Recipients of New Jersey SBIR/STTR Funding Support - NJEDA. (2020). Retrieved 20 December 2021, from https://www.njeda.com/commission-on-science-innovation-and-technology-announces-recipients-of-new-jersey-sbir-sttr-funding-support/

development and had not applied for the Phase II funding, and 5 of the applications were declined. Among the 5 applications that were denied, 1 company had been planning to reapply.



Some of the major challenges that the companies faced in carrying out their projects were:

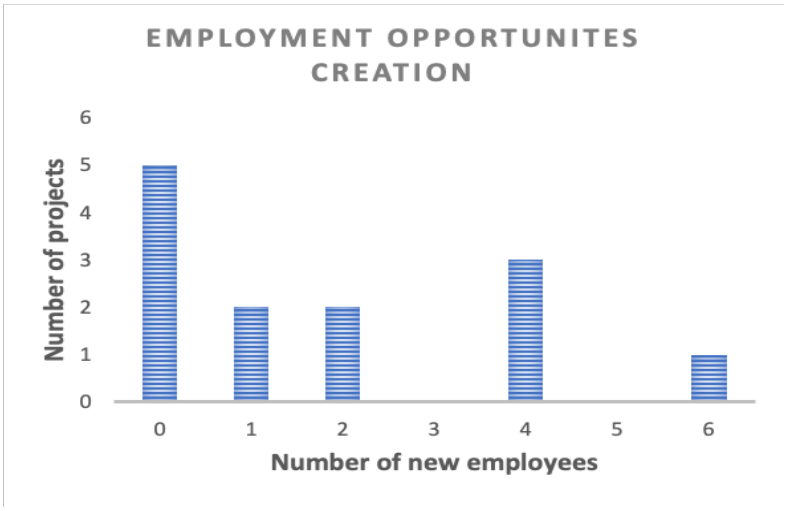


1) Delay in project execution due to the Covid-19 pandemic as it caused supply chain delays, covid-19 infection among staff, lab closures, difficulty in recruiting test subjects, and other problems in commercializing the technology.
2) Difficulty in finding venture funding
3) Difficulty in managing time between technology development and commercialization
4) Scientific issues for the product development
5) Difficulty in getting the study published about the project

We further evaluated the economic impact of the projects on five aspects:

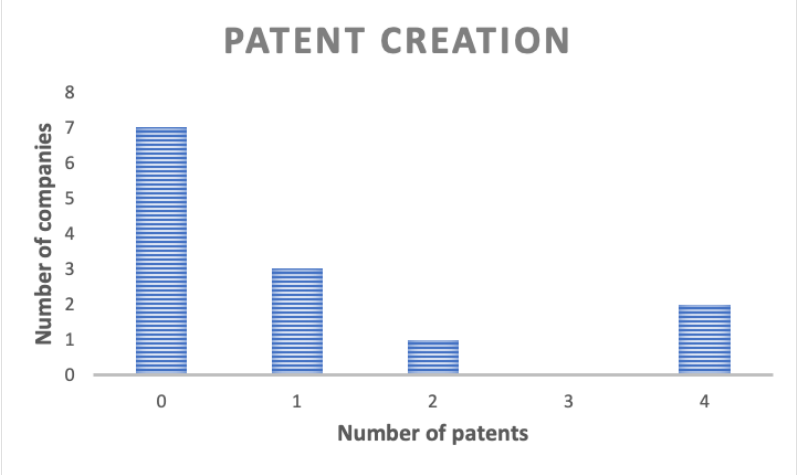
1) **Employment opportunities created**

Sixty percent of the projects gave new employment opportunities. Twenty-four new positions were created of which 18 were full-time employees, 2 were part-time employees and 4 were interns. On average, each project created about 1.84 jobs. The maximum number of new jobs created by a project was 6 and the minimum was 0. Among the new employees hired, 15% were females.



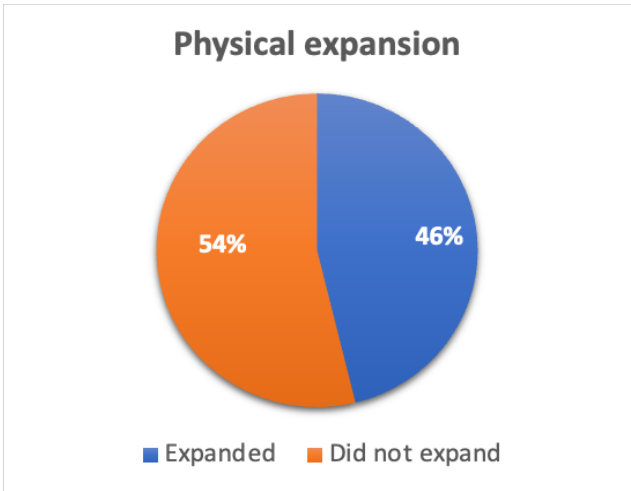
2) **Patent issued**

Technology development and knowledge creation are important for economic growth and development. The number of patents obtained by the companies indicates innovation and new technological development. In total, 13 patents were issued for the projects: 11 U.S patents and 2 international patents. On average, about 1 patent was issued per project. The projects had also filed several other patent applications and were awaiting results.



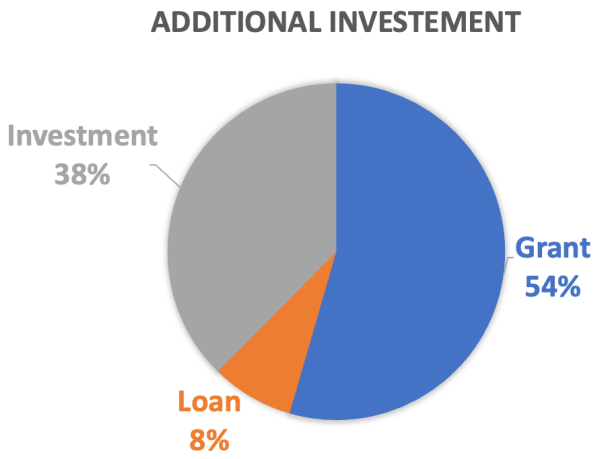
3) **Physical space expansion**

The physical space expansion of the companies denotes the expansion in economic activity. Among the 13 companies surveyed, 6 (46%) 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 more budget to continue their R&D, production, and commercialization activities. From the survey result, it was found that the projects funded by the SBIR/STTR matching programs were able to attract additional investments. The projects obtained an additional $6,646,378 investment in total, over 16x the CSIT matching amount and more than doubling their SBIR/STTR awards. The new investments were achieved in the form of grants, loans, and private company investments. The majority of new investments were received as grants (56%), private companies funding (38%), and as loans (6%). 1 of the 13 companies was acquired by another company for its technology.



5) **Commercialization status**

Most of the companies surveyed were still working on their product development. 2 of the 13 companies had launched their product in the market and 3 companies reported the formation of strategic relationship/partnership with other partner companies to start commercialization of their products.

Conclusion

At this stage, the data are limited and preliminary. We believe that adding data from the second cohort of CSIT matching SBIR/STTR award companies will add robustness to these results. Also following the awarded companies over more years will likely generate more significant results.