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# A study on The Expansion of Public Technology Start-up Programs

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## Abstract

**Purpose:** This paper aims to analyze the startup support programs of global universities and explore ways to revitalize the public technology startup ecosystem at domestic universities. **Research design, data, and methodology:** In this study, we analyzed the entrepreneurial capacity of domestic universities and conducted a literature review to diagnose the capacity of entrepreneurship programs at overseas universities. **Results:** Through this study, we diagnosed the shortcomings of the domestic startup ecosystem utilizing public technology, analyzed the key performance factors of overseas startup programs, and presented policy recommendations to revitalize the domestic startup ecosystem and strengthen the usability of public technology. **Conclusions :** The domestic startup ecosystem aspires to enter the global market, but many limitations exist in terms of startup products and technologies. To strengthen the competitiveness of domestic universities and compete in the global market, a support system must be activated to establish diverse startup support programs.

**Keywords :** Entrepreneurship Program, American University Entrepreneurship Support System, University startup ecosystem

**JEL Classification Code :** L26, L31, M53, I28

## 1. Introduction

The purpose of public research achievements diffusion is to create products and services that customers want by utilizing technologies developed with national research and development funds. These products have various customer values in terms of expanding the use of public technologies, and can be seen as having various linkages in the service process.

The diffusion of startups requires fostering independent entrepreneurs and improving the entrepreneurship system, and from this perspective, it is important to examine public research achievements and the difficulties that entrepreneurs face.

Fundamentally, from the perspective of startup expansion, we must approach an open research achievement base.

In particular, for innovative commercialization of public research results, it is essential to establish various customer

discovery functions and cooperative commercialization plans with related organizations. Startups utilizing public technology must have strategies to secure a startup ecosystem, such as establishing various policies that can lead to establishment or commercialization, diversifying commercialization methods, entering the global market, and investment cooperation. In particular, for universities that utilize open technologies, various startup support programs should be established, and linkages with startup support programs operated overseas are very important.

Accordingly, this study recognizes the need to establish a reasonable support system by discovering excellent public research results and preparing measures that can lead to the spread of startups, and by diagnosing technology startup programs, analyzing problems, and supporting excellent overseas universities. Based on the cases and methods of building entrepreneurship, a policy solution was proposed.

The most reasonable alternative for commercialization

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would be to establish a policy linkage based on public research results and a comprehensive support measure to spread public research results to startups. From the perspective of commercialization of public research results, the role of prospective entrepreneurs is very important.

Up until now, the operation of prospective entrepreneurs has been mainly centered on researchers, but in order to create technology-driven commercialization results, it is judged necessary to discover and foster prospective entrepreneurs linked to the private sector(Yoon, 2020).

In particular, it is important to establish a case-based system for startups, discover excellent prospective entrepreneurs with a wealth of experience in the relevant private sector, and develop programs to establish startups through a cooperative technology support system for researchers. In particular, it is most important to study cases of global programs that systematically spread public research results that are lacking domestically(Yun, 2020).

## 2. Status of Startup Ecosystem Construction

### 2.1. Startup Ecosystem Status

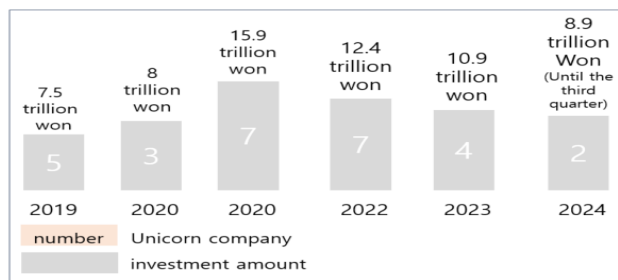
Silicon Valley in the US has a well-established startup infrastructure, so entrepreneurs from all over the world prefer to start their businesses in Silicon Valley. Recently, with the demand for startups rapidly increasing in places such as New York (US), Singapore, and Bengaluru (India), the expansion of the startup ecosystem is expected. Major cities with active startups have various characteristics, and each city has startup competitiveness. The reason why this startup ecosystem has spread is because various startup support systems have been established. The startup ecosystem is a structure in which the public provides support from the initial stage of startup to the post-startup stage, and it refers to a system that supports entrepreneurs to easily solve problems that arise during the startup process.

Cities with a safe startup ecosystem are creating various elements for startup success. Startup cities with such excellent capabilities and ecosystems are building various advantages. Second, they provide a collaborative space where entrepreneurs can exercise autonomy and creativity while connecting with excellent mentors. Third, they are building a close network between startup investors and accelerators suitable for early investors.

### 2.2. Expansion of public Research Performance Policies

The Korean startup ecosystem has undergone many changes, and the startup ecosystem is also seeking a model for a new leap forward. Therefore, it is a time when various attempts are needed to support the growth of Korean startups,

and in particular, various cooperative support systems are needed to strengthen the competitiveness of startups.



Source : edited by the author

**Figure 1: Status of Domestic Unicorn Companies**

Looking at the data in the graph above, it means that the number of domestic unicorn companies is decreasing. It decreased sharply from 7 in 2021 and 7 in 2022 to 2 in 2024. This is analyzed to be due to a decrease in domestic venture investment. In particular, the reason for this decrease in unicorn companies is interpreted as a decrease in the size of investment.

Domestic venture investment funds have been on a downward trend since 2021, and it seems that companies entering the global market are having difficulty growing. Attracting corporate investment is essential for startups, and only by building a good initial startup model can they grow into startups with a high probability of survival(Yoon, 2020).

The latest startup investment model is a model that discovers and fosters excellent promising startup teams based on collaboration with entrepreneurs and grows into an accelerator that operates a startup program that leads to investment. As the expansion of the startup ecosystem is promoted through recent policies, startup investment is also actively taking place.

### 2.3. Expansion of Startup Support Business

The government's startup support project is currently being led by the Ministry of SMEs and Startups. The budget size of the Ministry of SMEs and Startups is greatly expanding, and in particular, various startup support projects are being expanded to stimulate investment. Startups are being supported in various fields such as corporate R&D cost support, early-stage startup investment fund support, and various startup infrastructure support.

The government's support for startups is effectively supported by the budgets of not only the Ministry of SMEs and Startups but also various ministries. Currently, support is limited to corporate support and the support areas are distributed among ministries, but in the case of various research and development projects, budgets are supported by various ministries.

The budgets are also distributed in various ways depending on the type of company. Small and medium-sized companies and small business owners are supported by the Ministry of SMEs and Startups, and medium-sized companies and above are supported by the Ministry of Trade, Industry and Energy.

However, the startup creation sector has diverse and dispersed government support. In terms of early growth, startup support requires various support systems, but generally, early-stage companies under 3 years old are immature companies that are difficult to view as complete companies, so various support measures are needed.

Various support measures have been prepared for the growth of startups, but the initial growth potential of startups is not actively being built. In particular, various support systems are being established to create commercialization results for research institutes, but it takes a long time for technology to be actually utilized in terms of corporate competitiveness, so support measures that match various technologies and market demands are needed.

### 3. Limitations in Startup Support System Problems with Device Operation

#### 3.1. Lack of Korean-style Public Technology Startup Growth Model

Entrepreneurial growth models for startups have been presented from various perspectives. Korea's startup ecosystem model has been linked to commercialization policies in line with overseas global market trends. However, the domestic start-up model must be constructed with a detailed start-up model linked to Korean-style start-up growth. Since most public technology commercialization policies are based on overseas commercialization models, a Korean model is needed.

In particular, improving expertise from indirect technology commercialization to direct technology commercialization can be seen as a strategic support system for market diversification of public technology. Since the technology commercialization support system is changing from TLO-centered commercialization support to now consumer-centered, it is important to establish a driving force for direct technology commercialization. In order to secure a diverse technology startup ecosystem in the future, it is necessary to think about the value-up of startups and build a competitive growth model(Park et al., 2015).

Until recently, technology holding companies could be operated by universities or research institutes for public technology commercialization, but it is time to expand these technology holding companies in various ways. However, although the support system of a technology holding

company can be used as an advantage in Korea's startup growth model, it can be seen as a limitation in terms of various commercialization developments.

#### 3.2. Lack of Commercialization Information Platform System

Information asymmetry is occurring because information on startup investment status is not systematically established. Investment information support is a platform that helps early-stage start-ups appropriately identify necessary investment sources while also strengthening connections with investment companies. It is important for startups to secure excellent technology and create opportunities for certification, assurance, and commercialization of the technology. From this perspective, it is important to analyze obstacles to commercialization for early-stage start-ups and clearly present the capabilities and support required for start-ups.

**Table 1:** Current Status of Start-up Support Projects

Government department	Business details	Target	Budget (100 million won)
Ministry of SMEs and Startups (Commercialization)	Pre-startup package	Prospective entrepreneur	490
	Startup Package	Start-up companies with less than 3 years of business experience	490
	Startup Leap Package	Companies that have been in business for more than 3 years but less than 7 years	455
	Super Gap Startup 1000+ Projects	Start-up companies within 10 years	593
	Public-private joint venture discovery and development	Start-up company within 7 years	1,133
	Startup Growth Technology Development	Re-establishment of business within 7 years (business)	5,960
	Other business		2,950

Ministry of Science and ICT (Technology Development)	Public technology-based market linkage project, deep science startup project, etc.	Support for laboratory excavation and potential entrepreneurs	313
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Source: edited by the author

In particular, many start-up businesses limited to the deep tech field have been emerging recently, but there is a lack of a diverse linkage system to foster deep tech-based entrepreneurs. In addition to fragmented commercialization support policies, a plan to foster a support system that allows entrepreneurs to grow is needed.

### 3.3. Lack of Public Research Performance and Institutional Improvement Measures

Since there are many institutional laws and regulations that must be resolved in the market for public research results, various institutional improvements must be made first for the commercialization of research results.

In order for startups to quickly establish and commercialize their businesses, I believe that a perspective that contributes to the spread of public research results along with the overhaul of the legal system is necessary. In various systems for starting a business based on public research results, there are processes that need to be resolved through policy, including product certification and approval for verification.

In particular, there are various issues related to commercialization support from research institutes during the commercialization process. Since there is a mutual conflict process regarding the Conflict of Interest Prevention Act and different start-up support systems are operated by each research institute, the legal perspective from a commercialization perspective is important.

The process of commercializing research results has many policy-related issues that need to be resolved, and it is important to quickly collect and resolve opinions institutionally during the process.

### 3.4. Lack of Full Cycle Start-up Support System

Representative projects for public technology commercialization include the Ministry of Science and Technology's 'Research Institute Enterprise' and 'Laboratory Startup' support projects, but it is somewhat difficult to view them as full-cycle startups in the deep tech field and are mainly focused on idea commercialization and R&D. In the full-cycle start-up support system, the existing support

system before and after start-up must be accompanied by various support policies.

In particular, in the pre-startup stage, support is focused on executing business expenses, which is realistically difficult for prospective entrepreneurs, but if a differentiated program is not established, entrepreneurs will face difficulties.

Accordingly, the government should provide various start-up life-cycle programs for public research results and provide a linkage system between start-up businesses accordingly.

Although there are various ways to spread public research results presented to start-up companies, there are many areas that lack linkage with businesses operated before start-up. Accordingly, we believe that a process is needed to build a mutual support system by establishing a connection plan before and after starting a business.

### 3.5. Lack of Public Technology-based Start-up Linkage Projects

Public technology-based start-up linking projects require new expansion through government policy. Start-up projects based on public research results are supported by researchers, but they need to be operated as a single center as an integrated commercialization area.

Existing public research and start-up support projects have been operated mainly by the Ministry of SMEs and Startups, but many of the projects operated by the Ministry of Science and Technology take the form of corporate support.

However, in technology-based start-up support, it is important to secure the demand of entrepreneurs in the process of discovering and nurturing prospective entrepreneurs rather than supporting companies (Lee et al., 2024).

By shifting from the current focus on teacher start-ups to the demand for various private sector-linked start-ups, talent with excellent private sector experience should be provided with many opportunities to enter the commercialization of public research results and start-ups. To achieve this, start-up support is needed through discovering start-up items linked to various private sectors, securing technology, and supporting commercialization.

## 4. Delta-V Program Case Study

The MIT Delta-V Acceleration Program is a startup support program at MIT University in the United States.

The Delta-V program is a three-month entrepreneurship support program for MIT students in the United States. It is characterized by providing rigorous and practical customized

solutions through proven frameworks, workshops, and processes.

As of 2021, the amount raised has exceeded \$1 billion and is increasing every year. With the goal of becoming a co-founder, students understand the success potential of ventures, networking, team capital issues, etc. and receive startup support according to the program. Such programs are considered very important programs for fostering a healthy startup ecosystem.

A key characteristic of American universities' entrepreneurship support programs is the ability to launch startups with a variety of products.

This means they can explore new areas, such as climate change, hunger relief, and the global environment, as mandated by the UN. In contrast, Korean universities lack established products. Even with superior technology, they often lack marketability, leading to commercialization.

**Table 2:** Overseas University Entrepreneurship Program

Division	MIT (Delta-V Program)	University of Chicago (Polsky)	Cornell University Ignite Program
Program Overview	Entrepreneurship education, comprehensive startup support program operated by universities	The Polsky Program establishes a strong support system from the perspective of venture investment and nurturing startup teams.	Emphasize entrepreneurship and continuously manage and support the growth of aspiring entrepreneurs.
Competitiveness	Startup support system centered on the I-CORE program	Investment firm networking and idea dissemination	Establishing your own capacity building program

Source: edited by the author

### 4.1. Delta-V Program Operation Status

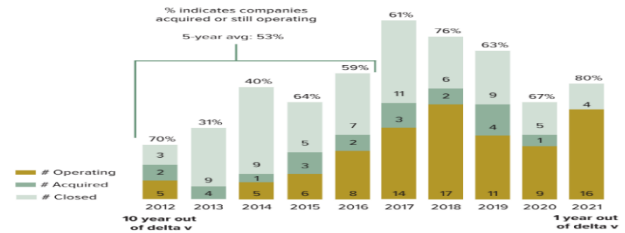
The operational status of the Delta V program can be known through the Delta V survey published in 2024. The survey is the result of 10 cohorts at MIT University and was surveyed on a total of 692 startups. Main survey items include program survival rate, reasons for business closure, female CEO participation, recommendation index, and follow-up financial support status.

Delta-V operates a program within the MIT Martin Trust Center for Entrepreneurship, and operates a cohort of 20 to 25 people every summer. Through mentoring and coaching, progress is announced and feedback is received at a mock board meeting, and industry leaders, experts, investors, entrepreneurs, etc. participate and operate in cooperation.

Each venture is introduced to the MIT community, and companies that graduate with immediate business participation through potential investors and entrepreneurs secure significant funding and advance into business in each field (born with a solid corporate culture).

### 4.2. Delta-V Program Survival Rate

In the Delta V program, 61% of companies participating in the Delta V program are surviving across all cohorts. The average survival time over the past five years (2012-2016) was 53%, which is considered high survival.

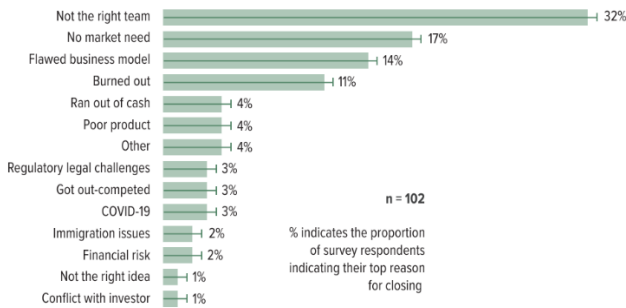


Source : MIT Delta-V Program(2024)

**Figure 2:** Delta V Program Survival Rates

In particular, the reason for not being able to start a business through the Delta V program was the failure to find an appropriate team, which was the biggest reason among respondents (32%). As a result of the survey responses, the following reasons were due to not having an appropriate team (32%), not being able to find market requirements (17%), and a flawed business model (14%).

In general, there are domestic performances announced by the Ministry of SMEs and Startups regarding the survival rate of startups. According to the 2023 corporate survival statistics announced by the Ministry of SMEs and Startups, the 5-year survival rate was announced as 34.7%, and the 3-year survival rate was announced as 49.6%.



Source : MIT Delta-V Program(2024)

**Figure 3:** Reasons for startup failure

The failure of the Delta V program to lead to startups can be interpreted as an aspect of the importance of finding an appropriate team. The most important and difficult part of starting a business is the aspect of discovering and nurturing excellent talent. Technology-based startups have very different growth paths from a marketing and technology perspective(Han, 2016).

The most difficult part for prospective entrepreneurs is that it is difficult to find an excellent team. Although the startup team must be properly prepared, it is difficult to secure excellent talent during the startup process, and it is also not easy to find capable employees. Students who participated in MIT's Delta-V program are also frustrated at the threshold of startup because it is not easy to find excellent students. Because the product's competitiveness does not appear in the beginning, the process of establishing a strategy to approach customers is important in the beginning. A startup's purchasing competitiveness provides value that increases the productivity of its products(Han, 2016).

In order to spread startups, excellent startup teams should be supported to create teams through various processes and have talents understand the startup process so that many excellent startup models can emerge.

### 4.3. Status of Female CEO Participation

Female CEO participation is at a very high level, with an average of 23% for the first five years and 39% for the second five years. Teams comprised of at least one woman averaged 61% in the first five years and 75% in the second five years, and the overall female participation rate in the cohort was high, averaging 26% in the first five years and 42% in the second five years.

This is evidence that women are actively participating in entrepreneurship, and that the environment for female CEOs to start businesses is excellent, and that women are participating widely as CEOs and team members.

### 4.4. Network Community Status

Regarding the status of building a network community, the proportion of respondents who responded that they were in contact with accelerator colleagues after training was at a high level of 83%. In particular, the Delta V Capstone Program, which is linked to a private accelerator, is well established, and when Delta V is not enough, participant teams are receiving help from appropriate external resources.

100% of participants are participating in the Sandbox Innovation Fund, Venture Mentoring Service (VMS), MIT Fuse and MIT \$100K Competition, DesignX Program, etc. In terms of external connections, 68 of the 181 teams potentially participating in Delta V are external; Approved for private (for-profit) purposes.

Accelerators mainly include Mass Challenge, Y Combinator-led accelerators, and TechStars. The recommendation index of participants in this program was 69 points, indicating a high intention to recommend it to others, and the common feedback from participants was positive feedback, saying, "It changed my life."

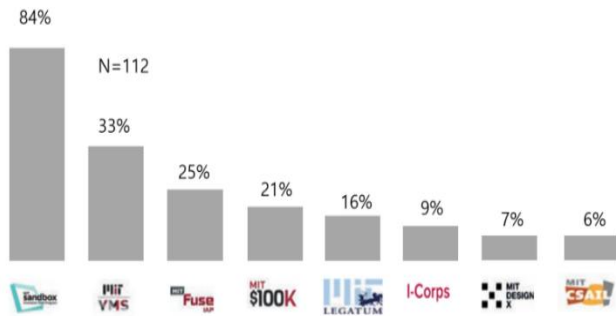


Source : MIT Delta-V Program(2024)

**Figure 4:** Accelerate Program Participation

Based on the network community construction status, the program most frequently utilized by Delta-V participants from 2017 to 2021 was Sandbox, accounting for 84%. (Sandbox Innovation Fund Program)

The Delta V program ends with Demo Day, and many students and entrepreneurs are participating in building a startup program. In particular, if you register your startup item on the sharing platform, you will be connected to startup support through cooperation with many startup accelerators.



Source: MIT Delta-V Program (2024)

Figure 5: Network Collaboration Partner

## 5. Analysis of the University of Chicago Polsky Training Program

The Polsky Entrepreneurship Program, a startup support program at the University of Chicago, supports various accelerating and provides high satisfaction to entrepreneurs. The Polsky Entrepreneurship Support Program provides customized accelerator functions that other universities have by segmenting them, and it can be seen as a very useful program for early-stage startups as it is a startup support system that meets various needs within the university.

### 5.1. Introducing the Chicago Bulls University Entrepreneurship Support Program

The first is supporting the Resurgence Cleantech Accelerator. Supported by the Polsky Center Deep Tech Ventures at the University of Chicago, startups receive business education and advice, facilities, mentoring, and funding opportunities. In particular, it provides \$30,000 in support for startup activities.

Second, it provides access to the Cleantech Innovation Network. Companies accepted into Resurgence will have access to infrastructure, initiatives, and thought leaders in Chicago and the surrounding area. With access to a broad network that includes field-defining expertise from partner institutions such as the University of Chicago, Argonne National Laboratory, Fermi National Accelerator Laboratory, and Marine Biological Laboratory, we are connecting innovators with resources to drive meaningful change in the cleantech ecosystem. Various policy supports should be provided for the commercialization of startup technologies (Kwang et al., 2014).

Third, we support data science and AI accelerators. Transform is supported by Deep Tech Ventures at the Polsky Center for Entrepreneurship and Innovation at the University of Chicago in collaboration with UChicago's

Data Science Institute. The program provides unparalleled support to early-stage data science startups, focusing on solving complex problems over 16 weeks. Through this accelerator, startups have access to business education and technical advice, industry mentors, venture capital connections, and a variety of funding opportunities.

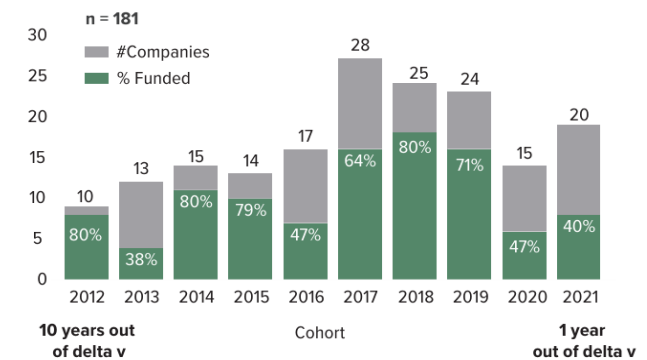
Fourth, we provide an accelerator through the Duality program. Duality is the first accelerator program in the U.S. focused solely on supporting innovative quantum startups. This 12-month program is located in Chicago, a global hub for quantum innovation. Launched in 2021, the Duality Accelerator program focuses on helping quantum-based startups enter the quantum industry, and Duality has helped 11 companies achieve significant success in the past two years since its inception.

### 5.2. Chicago Polsky Investment Support Program

The University of Chicago's startup investment program provides customized services to various startups. The University of Chicago operates an investment support program within the university to enable startups to be discovered, invested in, and supported quickly and easily.

First, we have the UChicago Startup Investment Program, a new initiative where the University of Chicago co-invests with existing venture funds in startups led by UChicago faculty, students, staff, and alumni. The university is setting aside \$25 million from the fund to invest in startups that are raising early-round funding, known as Series A.

There are many cohorts receiving investment support for each of the Existence-V programs. Investment support is interesting because it can only be directly invested if it is linked to the university's entrepreneurship support program.



Source: MIT Delta-V Program (2024)

Figure 6: Funding status by cohort

Second, the Collaboratorium program. This program brings together UChicago students, researchers, technologists, and faculty who want to explore commercial

opportunities and business applications. This program is a great opportunity for Booth students, other graduate students, postdocs, alumni, and faculty to network, and scientists and researchers can network with students about cutting-edge research and technologies. It was said that accelerators are a deciding factor in investment for startups(Choi, 2016).

Third, the Deep Tech Ventures program. Deep Tech Ventures Corporate Collision provides a unique opportunity for companies to discover, connect, and collaborate with the nation's best quantum, data science, AI, and cleantech startups. A panel of experts will discuss how to create an equitable structure that encourages collaboration between companies and startups to drive continuous innovation. Attendees will have the opportunity to learn more about the innovation needs and challenges of Duality, Transform, and Resurgence startups and other participating companies, followed by a networking reception and opportunities to meet with interested startups.

Fourth, Polsky provides startup space. Polsky Exchange, operated by the Polsky Center for Entrepreneurship and Innovation, is a 34,000-square-foot startup incubator with office and meeting space, a Small Business Development Center, and a variety of programs and workshops designed to help entrepreneurs start and grow their ventures.

In particular, as part of UChicago's efforts to support economic development in the community, Polsky Exchange has two buildings in the vibrant 53rd Street corridor in Hyde Park.

## 6. Overview of Cornell's Ignite Program

### 6.1. Analysis of Cornell University's Entrepreneurship Program

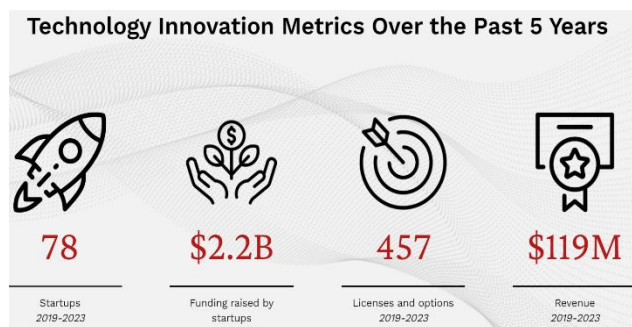
The Cornell Research Lab to Market funding program is managed by the Center for Technology Licensing at Cornell University. The purpose of the program is to accelerate technology commercialization, venture creation and growth support, corporate collaboration, and educate entrepreneurship for students and researchers. The Ignite program is supported at the level of \$3 million per year and is operated with the goal of an innovative pipeline. There are four programs operated under the Ignite program, and they support the success of startups based on clear goals.

First, we operate the Track Startup License program. This program was introduced in July 2018 for Cornell University technology-based startup ventures, and it increases the transparency and speed of the licensing process for Cornell University technology startups. The Track Startup License program is being expanded into two areas. It is expanding

by adding medical devices and life sciences, and additionally supports software and copyright materials from Ithaca, Geneva, and Cornell Tech campuses. In this respect, the Track Startup License program is evaluated as having the goal of increasing the quality and quantity of startups based on Cornell University technology and promoting technology commercialization.

Second, we operate incubation, acceleration, and education programs. Cornell's incubator and accelerator-related programs play a key role in supporting the overall technology startups of Cornell. We support various incubation and acceleration programs that are suitable for entrepreneurs, such as market development and management expertise acquisition support so that Cornell's excellent technologies can lead to commercialization.

Third, we operate the Center for Life Science Ventures. The Center for Life Science Ventures was established in 2008 as a startup incubator to support young Cornell life science companies. The center's programs focus on accelerating research and development of client companies' technologies and products and validating and strengthening client companies' business plans.



Source: Refer to homepage

Figure 7: Cornell University Investment Support

## 7. Policy Alternative

### 7.1. Establishment of a Start-up Support Project Linked to the Private Sector

In order to commercialize public technology, the research institute's knowledge must be expanded to companies and the private sector through open innovation. However, public technology is a field that developers know the most about, and it is an area that private researchers, prospective entrepreneurs, and experts cannot easily enter.

Accordingly, there is a need to reorganize businesses into areas with expertise in the field so that those with private sector experience can connect with technology as

prospective entrepreneurs. In particular, the marketability of public research results is very important, and since it takes time for technological capabilities to be immediately produced in the market after startup, a long-term operation plan is very important from this perspective.

In the case of private sector experts, innovative support is needed through various commercialization support based on expertise in market development planning and commercialization linkage. Recently, the inflow of private startups into the market is accelerating in terms of commercialization centered on cutting-edge science and technology. Since the commercialization of excellent research results is a field that private experts know a lot about, it provides a path for private startup experts to enter the market. It is important.

If these new support projects linked to the private sector are created and provided as government-supported projects, various expertise can be secured based on public technology, and it is expected to become a growth engine in various early-stage markets based on the commercialization network of owned technologies.

### 7.2. Expansion of Matching between Consumers and Public Research Results

Technology transfer for public research results is supported mainly by small and medium-sized enterprises, and technology transfer is carried out mainly by companies linked to government-supported projects.

Accordingly public technology requires an open enterprise platform in which many people participate, and for companies receiving technology transfer, information on excellent technologies and information from researchers is essential.

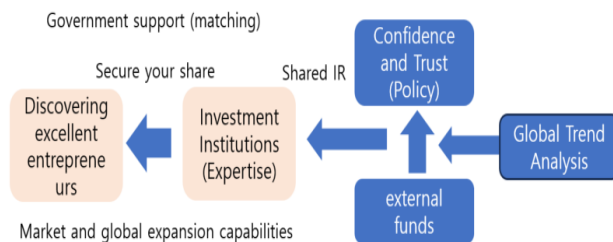


Figure 8: Startup support operation model

I believe that various strategies are needed to introduce excellent technologies and spread the demand that companies match. Accordingly, the key is to have the ability to select excellent technologies, as well as to identify the demand for technologies needed by companies and establish related technology transfer strategies.

The process of discovering excellent public technologies is very important, and a strategy to expand the technology

matching platform is necessary from the perspective of expanding information on excellent researchers and companies (Byeon et al., 2022). Matching excellent researchers with excellent technology is the most necessary strategy for disseminating public research results, and strategic support is needed for dissemination.

### 7.3. Expand Differentiated Technology Commercialization Marketing

The recent expansion of marketing tools and changes in the customer service market are accelerating. Due to innovation in logistics systems and the expansion of artificial intelligence, cutting-edge science and technology are directly and indirectly affecting products and services. Meanwhile, unlike in the past, customers want to receive a variety of services through online marketing. Accordingly, differentiated technology commercialization marketing is necessary, and such marketing acts as a major factor in securing companies in demand. Diversification of investment portfolios is very important in securing startup competitiveness (Ko et al., 2016).

In particular, marketing through technology briefing sessions linked to small and medium-sized businesses based on large business partners has recently emerged as an important issue. With the spread of online service marketing, commercialization is now differentiated through online marketing methods, so there is a need to develop marketing services accordingly. For technology startups, investment in R&D is essential and has important implications for future growth (Choi, 2023).

In the past, technology commercialization has led briefing sessions with a view to discovering and promoting promising technologies. Not only are there a lack of differentiated points for each organization, but there is also a lack of diversity and one-sided explanations, which results in a lack of understanding of the companies' detailed technologies.

A differentiated marketing strategy should be developed for the technology briefing session and various service models should be presented. I think it is very important to develop a technology commercialization method that deviates from the current marketing method and a strategy to expand capabilities.

### 7.4. Strengthening Cooperation and Role of Government Support Policies

The current domestic operating support system has a gap between government ministries. There is no cooperative coordination tower between ministries, and the scope of continuous existence support is interpreted as a support structure divided into investigators and members. The US

startup support system is a one-stop support system that provides a wide range of opportunities for bio-integration and various choices along the way. Accelerators and venture capitalists differ in their approach to the value of their investments(Choi, 2016).



**Figure 9:** Inter-university cooperation model

Each government department in Korea has different startup systems and businesses, and in the process, there is duplication or limited support for startups with high potential for success. In particular, there is a lack of a system that supports startups from start to finish in one place, and the lack of a control tower in government departments also needs to be improved in reality.

There is a need for a system to analyze how effective the state-led startup support policy is and how effective the US startup policy is. In particular, as US universities are rapidly commercializing startups, there is a need for systematic, dedicated support to analyze various programs applicable to the domestic startup ecosystem and foster startups with high potential for success at an early stage.

Various startups entering the U.S. or global markets are already quickly establishing their own areas through networking with investors, but the reality is that there are not enough opportunities to obtain necessary financial support or growth momentum. There should be more opportunities to directly see how startups are surviving and growing in the U.S.

## 8. Conclusion

The key to commercializing public technology at universities is to determine how much value can be created through products or services using technologies in demand in the market. This requires a distinct approach from conventional commercialization. University entrepreneurship programs utilizing public technology require diverse support for value expansion and capacity development, and building networks for global market entry is seen as a crucial starting point.

This study conducted various strategic reviews to differentiate public research outcomes and create products and services that are easily accessible to customers. This process requires diverse efforts to disseminate public research outcomes.

In order to create innovative results in terms of science and technology commercialization, efforts to create various results must be supported.

In this study, we reviewed the current status of the startup ecosystem and examined the preparation of various startup support responses to expand the startup ecosystem. In addition, problems were identified in terms of implementing various policies for the expansion of public technology commercialization, and solutions were also presented. This study has the following implications. First, policy research must be actively conducted to disseminate public research results, and public technology commercialization policies tailored to consumers must be expanded. Since the public technology commercialization model has been limited to overseas commercialization models, there is an urgent need to develop a technology commercialization model that fits the startup ecosystem in Korea.

Second, it's crucial to secure the marketability of the product itself through active networking between researchers and companies. While public technology itself has high product and service creation value, it's crucial to identify products with high immediate commercialization potential. Third, it is important to systematically remove barriers to market entry for public technology commercialization. There are many obstacles to commercialization of public technology due to various licensing and legal restrictions. Efforts are needed to address this level through entrepreneurship policy, and it is important to make efforts to open the market for items with a high potential for commercialization through various institutional supplements.

In conclusion, this study revealed that it is crucial for startups to establish a follow-up support system by establishing various institutional mechanisms for public technology commercialization, and to secure diverse growth engines based on these mechanisms.

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