Support System that Foster Human Resources for University Start-ups in Japan

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Abstract: Since the late 1990s, Japan has followed the cloning Silicon Valley model typified by American-style technology, capital, and systems, with a major focus on technology transfer, patent revenues, and the makeup of funding. However, the University of Tokyo, which has formed entrepreneurial clusters, has constructed an ecosystem built on technology agglomeration by educating its undergraduate and graduate students and forming a support network for alumni employed at financial institutions, major corporations, and central government offices. In forming an ecosystem for industry–academia collaboration, it is crucial to understand start-ups, even if not starting a business oneself, and to educate and develop human resources that can function throughout society.

Keywords: university start-ups, technology transfer, cloning Silicon Valley, venture ecosystem

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The author declares there are no competing interests. A part of this article was presented at the ABAS Conference 2021 Winter (Nakano, 2021).

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Introduction

Industry–academia collaboration has taken Silicon Valley as its model for success (Nishimura, 2003). Attempts to replicate this success in the U.S. and throughout the world have also adopted a number of policies that can be termed as “cloning Silicon Valley” (Rosenberg, 2001). Since the late 1990s, Japan has also taken various measures of this sort, but it is considered to be seriously lagging behind the U.S. in both quality and quantity (Kutsuna, 2020).

However, the University of Tokyo, which currently holds the top spot among universities for turning out university start-ups in Japan, does not appear to be pursuing the Silicon Valley model in its original form. This paper gives an overview of the history of university–industry collaboration in Japan and the programs adopted by universities and identifies their differences with the U.S. system. This is where Japanese universities, which face many more restrictions than industry–academia collaboration in the U.S., have tried to groom students to become entrepreneurs.

History of Industry–academia Collaboration in Japan

In Japan, the Ministry of International Trade and Industry (currently, the Ministry of Economy, Trade and Industry) has been implementing industry–academia collaboration programs adopted from U.S. policies since the late 1990s. First, during the third “venture boom” in 1995, it organized venture business laboratories (VBLs) at national universities. VBLs were set up at national universities throughout Japan for the three purposes of (i) promoting R&D programs for future industry’s basic technology, (ii) developing

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1 Kuwashima (2020) discusses the case of Chugai Pharmaceutical and Osaka University as an example of long-term industry–academia collaboration in Japan.
creative human resources filled with an entrepreneurial spirit, and (iii) establishing specialized research and educational facilities. In 1997, the ban on faculty members of national universities holding concurrent positions was lifted. To encourage the transfer of universities’ intellectual property rights, the Act to Facilitate Technology Transfer from Universities to the Private Sector was enacted in 1998, which set up a system of technology licensing organizations (TLOs), and the Act on Special Measures concerning Industrial Revitalization was enacted in 1999 (the so-called Japanese version of the Bayh-Dole Act). In 2000, teachers at national universities were permitted to concurrently hold executive positions in the private sector, and 2001 saw the launch of the “Hiranuma Plan” aiming for 1,000 university start-ups, a goal that was achieved in 2004.

As these relationships with universities became institutionalized, the corporations offered support programs. Stock options programs were launched in 1997, and restrictions on trading unlisted shares were lifted. The Limited Partnership Act for Investment was enacted in 1998, which made it easier to set up venture funds. Measures taken with regard to funding included the 1999 establishment of such new markets as the Tokyo Stock Exchange’s MOTHERS market and NASDAQ JAPAN and the revision of special tax incentives to promote investment in venture businesses (the angel tax system) in

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2 Regulations of five hours per day and eight hours per week were lifted, and teachers at national universities were able to provide private corporations with research guidance under certain conditions.

3 Licensing costs were also critical for Japanese corporations (Nakano, 2020).

4 Liberal arts instructors were allowed to be auditors, and science instructors were allowed to be auditors as well as board members tasked with the commercialization of research findings and board members of TLOs promoting the use of university research findings in the private sector. Then, in 2002, restrictions were lifted on their serving in non-executive positions providing advice on corporate management and legal affairs.
2000. The small business innovation research (SBIR) system (the Japanese version of the SBIR system), based on the Law for Facilitating the Creation of New Business, was created in 1999.

While a number of policies modeled on Silicon Valley were implemented during this period, the growth of university start-ups slowed after the Livedoor Incident in 2005, which put an end to the third “venture boom” (Nakano, 2017). According to the report on the Fiscal 2019 Survey on Industrial Technology (Survey on the Implementation of University Start-ups), the cumulative number of university start-ups increased by 1,010 companies during the five-year period from 2000 to 2005, from 420 to 1,430, but growth then slowed so that the number was 1,627 in 2006, 1,755 in 2007, and 1,807 in 2008. In addition, the government program review after the Democratic Party of Japan came into power in 2009 squelched support for university start-ups.

However, in 2012, the year after the Liberal Democratic Party of Japan regained control of the government, the Ministry of Education, Culture, Sports, Science and Technology and the Japan Science and Technology Agency joined together to launch the Program for Creating STart-ups from Advanced Research and Technology (START). This program aims for commercialization in certain markets and for certain purposes by taking human resources units with start-up know-how and combining private sector commercialization know-how with public funding to nurture R&D and businesses from university start-ups’ pre-formation stage. Also, the Enhancing Development of Global Entrepreneur Program (EDGE program) was launched in 2014 to directly appeal to the interests of university students. This evolved into the Exploration and Development of Global Entrepreneurship for NEXT Generation program (EDGE-NEXT program) in 2017, which aims to develop human resources that will tackle the creation of start-ups and new business based on university R&D findings and build a venture ecosystem of concerned
people and institutions. This program selected five university-based consortia. As a result, the cumulative number of university start-ups, which was 1,749 in 2014, reached 2,093 in 2017, and a record high of 2,566 in 2019 (Japan Research Institute, 2020).

**Cloning Silicon Valley Policy**

Many scholars have proposed ideal models for this type of “regional ecosystem.” Etkowitz (2008) proposed a triple helix model based on interaction among universities, business, and government. Universities, the business community, and the government would work together on the regional level to bring together organizations and functions supporting the resultant mutual collaboration and teamwork, thus creating seamless, integrated innovation.

Also, Doutriaux (2008) describes the following three steps in building regional systems within knowledge clusters: (i) pre-conditions, whereby it is a sufficient condition if certain levels of people and technology can be accumulated, (ii) cluster emergence, whereby support organizations are set up as a necessary condition employing this agglomeration of people and technology, and (iii) cluster growth, whereby the sufficient conditions of (i) and the necessary condition of (ii) are combined to spur the growth of such agglomeration. Of these, (i) requires an entrepreneurial university that will function as a central university-level organization promoting a certain accumulation of people and technology. Here, an entrepreneurial university is a university that values innovation, has embarked on industry–academia collaboration, and has a research park, university–industry cooperative research center, TLO, business incubator, or other such facility (Etkowitz, 2002). Along with this, if the region (ii) has a support organization and some successful ventures have come into being, the region will recognize it as an
ecosystem, and if in that region, (iii) technology-based companies start to be created and grow, the incubator companies themselves will constitute the regional culture, so that the region will become known for its formation of new high-tech industries.

Nishizawa (2014) points out that the aforementioned model for industry–academia collaborative support in Japan at the end of the 1990s was a cloning Silicon Valley policy (Rosenberg, 2001), as Silicon Valley had propped up the U.S. in the 1970s when it continued growing while the U.S. economy was experiencing stagflation. The key points were that the reform of the technology transfer system from the enactment of the Bayh-Dole Act and the Stevenson-Wydler Technology Innovation Act of 1980, promoted industry–academia technology transfer from universities and national research institutes; that a risk capital supply system was established and nurtured by shares in high-risk start-ups; and that the introduction of the SBIR system put these programs into effect. Also, the cloning Silicon Valley policy was known for building the regional ecosystems necessary to the formation of high-tech industries.

In Japan, too, the venture start-up support programs of the late 1990s included the organized introduction of regional development and support systems in which start-up development and support was aligned with the conditions particular to each region. These included industry–academia technology transfer policies, such as the passage of the Act to Facilitate Technology Transfer from Universities to the Private Sector and the Act on Special Measures for Industrial Revitalization, which was a Japanese version of Bayh-Dole provisions; the Limited Partnership Act for Investment and the organization and expansion of a venture fund system to establish new markets; and the Japanese version of the SBIR system, which assisted R&D by small and medium-sized enterprises. Furthermore, the Ministry of Economy, Trade and Industry’s industrial cluster
policy and the Ministry of Education, Culture, Sports, Science and Technology’s knowledge cluster creation project were implemented as macro policies (Japan Academic Society for Ventures and Entrepreneurs, 2017). In other words, Japan’s cloning Silicon Valley policy consisted of three pillars: the technology transfer system, venture funds, and the introduction of a Japanese-style SBIR system.

But that being said, the problem is that Japan introduced this while ignoring the differences between the Japanese and U.S. ecosystems. The military industrial complex has always played a key role in the U.S. regional ecosystem. In the 1960s, a large proportion of U.S. university research was being funded by the government, while that funded by business was small, and most funding from corporations was linked to arms either directly or indirectly (Nishimura, 2003). Thus, the government’s cloning Silicon Valley policy was a policy aimed at consolidating the system of development and support among the arms industry, industry–academia collaboration, and venture capital and building a regional ecosystem for the region’s university start-ups (Nishizawa, 2014). In fact, half of the U.S. SBIR system’s spending was for the Department of Defense (Yamaguchi, 2015). Therefore, to create high-tech industries through industry–academia collaboration, the source of funding had to change from arms-related sources to the private sector, and to do this required the states to take the lead in promoting industrial agglomeration (Feller, 1997).

Meanwhile, in Japan the focus was on technology transfer, not on the arms industry, as in the U.S., and the amount of money coming from corporations in the arms industry to support universities was minuscule. So, how did support for university start-ups in Japan come to be? For a specific example of how industry–academia collaboration has been happening, let us look at the University of Tokyo, which currently maintains the top position among universities
for generating university start-ups.\textsuperscript{5}

\textbf{Case: Collaboration in University of Tokyo}

In 2004, the University of Tokyo established a Division of University Corporate Relations, which gives various types of support to entrepreneurs and university start-ups for the commercialization and application of research and academic findings. The University of Tokyo Intellectual Property Policy set forth by the university states,

The University will make active efforts with joint applicants and external TLOs to broadly utilize its intellectual property... (omission) Furthermore, as a means of returning intellectually created results to the community, the University of Tokyo will positively utilize new enterprises founded by Inventions. In order to support such new enterprises, the University will cooperate with technology transfer organizations.

However, the university had long been practicing a traditional style of industry–academia collaboration in joint research and commissioned research projects with private corporations and other external organizations. In fiscal 2000, the University of Tokyo had 852 commissioned research projects amounting to about 10.4 billion yen, which was more than half of the 20.3 billion yen it received that year as grants in aid for scientific research. This declined significantly to about 7.2 billion yen for 707 projects in fiscal 2001, but it still constituted about one-third of the 22.7 billion yen in grants in aid for scientific research that it received that year and was a key part of the University of Tokyo’s total research budget. Joint research with the private sector and others expanded rapidly to 302 projects costing

\textsuperscript{5} See Hasegawa and Sugawara (2017) for more on the characteristics of university start-ups by the University of Tokyo.
1.64 billion yen in fiscal 2001 (Takahashi & Nakano, 2003).

Since the university established the Division of University Corporate Relations in 2004, it has been supporting university start-ups in a three-way collaboration with one of its TLOs, TODAI TLO, Ltd. (formerly, the Center for Advanced Science and Technology Incubation: CASTI), and a venture capital firm, The University of Tokyo Edge Capital Partners Co., Ltd. This three-way collaborative setup offers start-up and management consulting services to researchers and students, organizes and manages incubators that can even be used by bioscience start-ups, and offers educational programs in entrepreneurship and project support. The university also set up UTokyo Innovation Platform Co., Ltd., a public–private sector fund, in 2016 to promote the three initiatives of start-up support, investment business, and support for corporate innovation.

These entities are currently providing both pre- and post-startup support to researchers and students through the following programs.

A) For first- and second-year students (at the Komaba campus), in fiscal 2017, the Division of University Corporate Relations started offering university-wide independent research seminars, which consists of courses on different topics every year to attract interest in monozukuri, programming, and the like.

B) For third- and fourth-year students, graduate students, and postdocs, since fiscal 2005, the Division of University Corporate Relations has been running The University of Tokyo Entrepreneur DOJO, which offers lectures and seminars about start-up experiences and methods from entrepreneurs who are alumni. In fiscal 2013, this became a credit course called

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6 The Foundation for the Promotion of Industrial Science is also an approved TLO of the University of Tokyo.
“Entrepreneurship” in the Faculty of Engineering. This was followed by the university’s business plan contest, the Entrepreneur Challenge. Winners are eligible to participate in an exchange program with Peking University or another overseas university. About 3,000 students had taken the course by fiscal 2018 (Kagami, 2018), and alumni include the founder of SCHAFT, which was later acquired by Google (and was subsequently disbanded).

C) Also, in the Todai to Texas project, students chosen for overseas expansion support by the University of Tokyo Entrepreneur DOJO can participate in the trade fair at South by Southwest (SXSW), one of the world’s leading innovation conferences, and take a short visit to Silicon Valley.

D) In 2016, Hongo Tech Garage was set up in the Faculty of Engineering for graduate students and postdocs. The Founders Program is supporting R&D to accelerate development times in technology projects and product development that is concentrated during long vacations and in backing the preparation and development of 3D printers and other such devices.

E) The Found X program was started in 2018 under the auspices of the Division of University Corporate Relations for University of Tokyo alumni, researchers, and students at the pre-seed stage (around the start-up date). Found X offers selected start-ups and individuals the facilities, resources, support programs, and entrepreneurial education programs needed during a start-up’s initial stages, including private rooms, coworking spaces, and conference spaces. In addition, the university supports start-ups following their inception by offering incubation facilities on campus at the University of Tokyo Entrepreneur Plaza and at a building called hub and by offering shared office space and shared laboratories at what is called the Entrepreneur Lab.
Conclusion

This form of support for industry–academia collaboration at the University of Tokyo suggests that the building of an ecosystem for industry–academia collaboration at the University of Tokyo occurred only from the standpoint of simple technological innovation. Even though it was bolstered with a cloning Silicon Valley policy, industry–academia collaboration at the University of Tokyo has not been used much to support R&D at small and medium-sized enterprises or for the university to build industrial clusters ahead of time. Nor has there been any particular government support to encourage the construction of such clusters. But despite these circumstances, the area around the University of Tokyo’s Hongo campus has come to be called “Hongo Valley” due to its concentration of start-ups, and venture capital companies; and coworking spaces have increased where almost none existed 20 years ago. Why has industry–academia collaboration borne fruit to a certain extent?

The University of Tokyo has been implementing many serious programs for its undergraduate and graduate students, as described above. Furthermore, it offers courses such as “Global Venturing I and II” to students and graduate students in the Faculty of Economics and Graduate School of Economics, which do not possess much technology. The vast majority of students at the University of Tokyo go on to work for the government or major corporations. Offering a variety of programs to these students will increase the number of students doing internships at start-ups and the number of students wanting to start businesses while they are still in school. So, entrepreneurs who are University of Tokyo graduates are serving as role models who are changing students’ perceptions about entrepreneurship and especially changing the perceptions of students who will not start-up companies themselves.

Rosenberg (2001) asserts that high-tech is a cultural necessity for
entrepreneurs as well as policy makers and educators, but that its formation is difficult. In other words, one cannot build an ecosystem that creates start-ups using technology, the system, and funding alone. The University of Tokyo is trying to lay the groundwork for an ecosystem by educating undergraduate and graduate students. In other words, University of Tokyo alumni have succeeded in building an ecosystem that goes beyond technological agglomeration by forming support networks for the human resources networks among people working at financial institutions, major corporations that embrace open innovation (Chesbrough, 2003, 2006), and central government agencies.

Twenty-five years after Japan’s introduction of the cloning Silicon Valley model, which is based on American-style technology, funding, and systems, Japan is known only for its technology transfers from academia, its patent revenues, and its funding composition. Still, this suggests that the University of Tokyo, which has been creating start-up clusters, has an understanding of entrepreneurship in the formation of ecosystems in industry–academia collaboration, even though it does not establish start-ups itself, and that it is essential to educate and develop people who can function throughout our society.

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