

Symbiosis between University Research and Industry

The development of the SF Bay Area owes much of its success to its surrounding top research universities (US News Ranking): Stanford University (5), UC Berkeley (20), and UCSF School of Medicine (top 5). Studying the potential roles of HK universities is critical in relation to the Greater Bay Area Project because it offers policies for Hong Kong to develop and foster an innovation-based economy.

Comparable to Silicon Valley's ecosystem, Hong Kong consists of 4 top 50 2018 QS world ranking research universities: University of Hong Kong (26), The Hong Kong University of Science and Technology (30), The Chinese University of Hong Kong (46), City University of Hong Kong (49).¹ In relation to the universities in the Guangdong area, *Thus, Hong Kong can serve as the Greater Bay Area region's education, knowledge, and research hub.*

As Mowery noted, Hong Kong's university faculties have failed to transform into "research entrepreneurs" despite continuous research government grants.²

In contrast to Hong Kong's model of public funding university research, "research budgets are allocated through multiple different agencies, with evaluations of grant approval based on blind peer-reviewed boards comprised of scientists and other members who do not necessarily work at the agencies providing funding. Independent advisory boards evaluate the merits of proposals, and awarded on a project basis rather than central bureaucracy allocations of budgets to institutions."³

A. Transforming Faculty into "Research Entrepreneurs"

The most significant point is that the universities, and Silicon Valley's private sector, have become interdependent.

For example, **Stanford Research Park** was built in 1951, and is the world's first technology-focused office park. The park is 2.8 km², and has leased office space/land to Tesla, Hewlett Packard Enterprise (HP), Google, VMware, etc.⁴ The park has successfully:

1. Generated new and constant revenue stream for Stanford university
 - Research and fellowship funding for students

¹ <https://www.topuniversities.com/university-rankings/world-university-rankings/2018>

² David C. Mowery, "University-Industry Collaboration and Technology Transfer in Hong Kong and Knowledge-Based economic growth" in *Innovation Policy and the Limits of Laissez-faire: Hong Kong's Policy in Comparative Perspective*, 10.

³ Kushida, "A Strategic Overview of the Silicon Valley Ecosystem: Towards Effectively "Harnessing" Silicon Valley," *Stanford University*, 44.

<https://static1.squarespace.com/static/54b4afe7e4b096f7dca62bef/t/55ce2e78e4b0989acdb06285/1439575672613/Silicon+Valley+Ecosystem+Overview+2015.pdf>

⁴ <http://stanfordresearchpark.com/about>

- Philanthropic Gifts from corporations, CEOs are often alumni of the school (Philip Knight, a co-founder of Nike, donated \$400 million to Stanford University in 2016)⁵
2. Integrated academia and private-sector industry in one space
 - Ability to commercialize research
 - Tech company workers take part-time courses at Stanford, and in return offer, job opportunities for Stanford grads.
 3. Inspired students to start their own companies. Companies' technology and/or business plans that have developed during a student or researcher's time at Stanford include:
 - LinkedIn
 - Instagram
 - Charles Schwab & Company
 - EBay
 - Google⁶

Stanford University and UC Berkeley has encouraged its faculty to serve as paid consultants to corporations to bridge the gap between academia and industry. Faculty take sabbaticals in Silicon Valley firms, "transferring innovative designs to industry, facilitating the hiring of students by local startups, and licensing intellectual property."⁷ Thus, professors are able keep up to date with industries within their field of research, incentivized to tackle industry issues, and contribute to this feedback loop.

B. Corporate Affiliated Programs

Silicon Valley's top universities have corporate affiliated programs in Business, Earth Sciences, Education, Engineering, Humanities and Sciences, Law, and Medicine.⁸ Corporations have sent and sponsored workers into the universities' labs and academic programs, which have allowed them to recruit and employ talented PhD students into their firms and stimulate innovation.

Such programs have had important outcomes to the development of Silicon Valley. *For the academia side, it has created a "virtuous cycle" of professors engaged in important areas of research, and receive many corporate sponsorships to PhD students, which encourages professors to conduct more research and receive more outside funding.*

⁵ <http://fortune.com/2016/02/24/nike-phil-knight-stanford/>

⁶ Ritihika <https://techcrunch.com/2015/09/04/what-will-stanford-be-without-silicon-valley/>

⁷ Kushida, "A Strategic Overview of the Silicon Valley Ecosystem: Towards Effectively "Harnessing" Silicon Valley," *Stanford University*, 41

<https://static1.squarespace.com/static/54b4afe7e4b096f7dca62bef/t/55ce2e78e4b0989acdb06285/1439575672613/Silicon+Valley+Ecosystem+Overview+2015.pdf>

⁸ Ibid, 43.

On the private industry side, it allows small technology firms to recruit top talents while continuing to educate and train workers to meet the demands of the fast-paced technology world.

Examples:

Stanford's Honors Cooperative Program (HCP) allows Silicon Valley's workers to pursue graduate degrees on a part-time basis in the Schools of Medicine, Engineering, Education or Humanities and Social Sciences.⁹

Stanford's Industrial Affiliate Programs serves as an avenue to connect the industry to contribute with Stanford departments and programs of interest. Companies pay a membership fee, and gain access to research programs, participating faculty, and students. Corporate members typically attend annual meetings, receive copies of reports and publications, and have opportunities to recruit students.¹⁰

Public-Private Venture

Energy Biosciences Institute (EBI): a UC Berkeley, Lawrence Berkeley National Lab, University of Illinois Urbana-Champaign and global energy company BP partnership dedicated to developing new sources of energy and reducing the impact of energy consumption. BP signed a \$500 million, 10-year contract with the three universities.¹¹

C. Licensing Program

Stanford's Office of Technology Licensing was founded by Niels Reimers in 1970 with the mission of transferring "ideas from the Stanford laboratories to industry where they can be developed into useful products."¹² It has served as the driving force for the development of Silicon Valley's biotechnology industry, and model for universities around the world.

Inventions from Stanford's OTL include: Google; Recombinant DNA cloning technology, FM sound synthesis

Structure

"OTL receives invention disclosures from Stanford faculty, staff and students. We evaluate these disclosures for their commercial possibilities, and when possible license them to industry. If the inventions are successfully licensed, cash royalties collected by OTL provide funding to the inventors' departments and schools, as well as personal shares for the inventors themselves. We typically begin the licensing process by reviewing an invention with the inventors to learn about potential applications. We then develop a licensing strategy, consider the technical and market risks, and decide whether to patent the invention. Together with the inventors, we try to

⁹ <https://gradadmissions.stanford.edu/programs/hcp>

¹⁰ <https://industrialaffiliates.stanford.edu/>

¹¹ <http://www.ebiweb.org/>

¹² http://otl.stanford.edu/about/about_what.html?headerbar=0

find companies that might be interested in the invention and seek a product champion within a company before negotiating a licensing agreement.”¹³

Table 1: Potential benefits and challenges of Hong Kong universities engaging in technology licensing

Benefits	Potential Challenges
<ul style="list-style-type: none"> • “Long-term relationships with industry that ensure that faculty and research are defining cutting edge new technological trajectories”¹⁴ • Faculty competitiveness for the next round of federally funded research • Serves as alternative income source for universities when federal funded research is limited • Creates new jobs • Generates wealth • Formulates solutions to address societal problems 	<ul style="list-style-type: none"> • HK faculty members will be required to take on more responsibility of detailing and helping in the development of the invention to commercial viability, an increased workload on top of academia and teaching schedule • Establishing a quality control mechanism/board/committee to evaluate ideas/products • HK universities will be required to balance between not publishing faculty research to increase licensing feasibility vs. ensuring the research is credible before it is licensed to industry by being accepted and published in a peer-reviewed journal • Brain drain: HK faculty may be incentivized to shift to do research (and work) for the private sector than contribute to the field of academia.

D. Policy Implications

Hong Kong’s Innovation and Technology Fund currently has a University-Industry Collaboration Programme (UICP), but only offers joint research grants and support local companies to take on graduate students from local universities to assist in proprietary R&D work. This has not been effective in transforming Hong Kong into a knowledge based economy because Hong Kong’s faculty are paid on a 12-months basis and have no incentive to pursue external research or collaborate with the private sector.

¹³ Ibid.

¹⁴ Ibid

Hong Kong should foster an entrepreneurial environment and ensure that local university faculty members, students, and researchers are at the forefront of innovative technology in the Greater Bay Area region. To strengthen university-industry ties, Hong Kong universities could encourage faculty members' participation in the industry as consultants, introduce corporate affiliated programs and strengthen their licensing programs by making their technology transfer offices more proactive players.