

Chapter 9

Universities as Engines of Economic Growth—Entrepreneurship in Academia: A Singapore Experience

Lily Chan

Abstract In the past few decades, universities have come to be expected to directly and positively influence economic growth, a radical departure from the previous understanding of the university as primarily an education provider. How universities approach this new “knowledge economy” will vary by geography and culture, among other factors. This essay will bring to light Singapore’s experience, with focus on the creation of the National University of Singapore’s NUS Enterprise, a university-level cluster that aims to provide an entrepreneurial complement to the school’s teaching and research functions.

1 The University as an Engine for Economic Growth

The fundamental understanding of a university’s relationship to the economy has largely and radically changed within the last half century. Historically, although universities were considered a valuable source for technological innovation and scientific breakthroughs, the commercial benefit derived from their research was largely seen as secondary to the university’s primary value as an education provider.

Current thinking has shifted as financial crises have, in part, caused countries to more directly promote the idea that innovation can be used to fuel economic growth. This view has been summarized by Wong et al., who write, “As argued by Etzkowitz et al. (2000) and Etzkowitz (2003) [1, 2], universities around the world are increasingly shifting from their traditional primary role as education providers and scientific knowledge creators to a more complex “entrepreneurial” university model that

L. Chan (✉)

NUS Enterprise, 21 Heng Mui Keng Terrace, Level 5, Singapore 119613, Singapore
e-mail: etpchani@nus.edu.sg

incorporates the additional role of commercialization of knowledge and active contribution to the development of private enterprises in the local and regional economy [3].”

With these developments, the view that the university is now a critical provider of not only talent, but knowledge and innovation has become embedded within the beliefs of politicians and university administrators around the world. As a result, there is increasing pressure on higher education providers to become more enterprising. Universities are now increasingly tasked not only to cultivate an entrepreneurial workforce that can adapt to the demands of a complex and competitive economy, but to also directly drive economic growth through technology transfer and the production of intellectual capital that can be licensed, patented or spun-off into companies. Thus, the promotion of entrepreneurship and innovation has been frequently incorporated as the “third pillar” of a university.

2 The Singapore Experience

Singapore itself has not been immune to the changing understanding of a university’s role, although the country’s unique cultural and geographical positions present their own challenges. Compared with the often-cited success stories of Silicon Valley and MIT, Singapore’s pursuit of entrepreneurship has been relatively late, with impetus arising in part from the recent Asian financial crisis and the general drift toward the “knowledge economy.”

Having built its post-independence success on its manufacturing and export industries, Singapore has, beginning in the 1990s, increased its focus on the commercialization of R&D and the development of intellectual capital [4].¹ Economic growth for the country has come to be seen as sustained by the skills, innovation and productivity of its people. This is a view reinforced by the fact that Singapore has no natural resources of its own.

Thus, for a country generally known for its risk-averse population and stringent educational system, the push for a more entrepreneurial society has largely been driven from the top down through government initiatives and incentives.

In 2005, the National Research Foundation’s (NRF) Research, Innovation & Enterprise Council (RIEC) was formed with the mission of advising the Singapore Cabinet on national research and innovation policies, while also “encouraging new initiatives in knowledge creation in science and technology... [5].” This council has essentially helped deepen the government’s commitment to fund R&D work done by both industry and higher education, thus encouraging the realization of the commercial value of research and the integration of public and private sectors to produce innovative solutions.

¹ This reflects an updated finding since 2008.

At the university level, NRF has been instrumental in promoting higher education's focus on entrepreneurship and innovation, particularly through its US\$360 million "National Framework for Innovation & Enterprise." Although the initiative lays out support for everything from "creating enterprise support structures" through "innovation policy studies," its relevance to universities is particularly encompassed by its establishment of university enterprise boards and the setting up of university innovation funds (UIF).

Intended to supplement universities' existing funding for innovation and enterprise activities, UIF have provided support to university programmes in four specific categories: entrepreneurial education, platforms for start-up formation, catalysts, and events.

3 The NUS Experience: NUS Enterprise

Even prior to the UIF grant, the National University of Singapore (NUS) was actively pursuing an innovation and enterprise strategy. Indeed, in 2002, NUS Enterprise (ETP) was established in its current form to provide an entrepreneurial dimension to the university. Its three main goals include (1) embedding entrepreneurial learning as an integral part of NUS' education; (2) translating NUS' research into innovation and commercialisation impacts; and (3) serving as Asia's think tank for enterprise and innovation.

In the 10 years since its founding, ETP has developed innovative programs and services to meet the needs of aspiring entrepreneurs at all stages, be it from the inception of an idea or the establishment of a start-up, to the commercialization of new technologies. This is done through four key thrusts, largely similar to those later outlined by the UIF: experiential education, industry engagement and partnerships, entrepreneurship support and entrepreneurship/innovation research and thought leadership.

3.1 Experiential Education

NUS students learn firsthand about the challenges of entrepreneurship through the elite NUS Overseas Colleges (NOC) and innovative Local Enterprise Achiever Development (iLEAD) programs. NOC students with the academic ability and entrepreneurial drive are immersed as interns in entrepreneurial hubs around the world. At the same time they study entrepreneurship-related courses at highly prestigious partner universities, such as Stanford or the University of Pennsylvania. iLEAD represents the local version of the program, exposing students to the entrepreneurial challenges through internships at Singaporean start-ups. NOC and iLEAD programmes now exist in eight locations: Silicon Valley, BioValley, Shanghai, Stockholm, India, Beijing, Israel and Singapore.

3.2 Industry Engagements and Partnerships

INTRO, the predecessor to the current Industrial Liaison Office (ILO), was established in 1992 to handle technology transfer and promote research collaboration between NUS, industry and other partners. In 2002, the office was incorporated into NUS Enterprise. Today, ILO is a key element in the university's drive for industry engagement and partnerships, also managing NUS intellectual property, commercialising NUS intellectual assets, and facilitating the translation of new discoveries and inventions. ILO pursues various models of commercialisation, focusing on selected sub-sectors and portfolio licensing. The office, while also employing "technology scouts," experts who have worked in industry, to serve as the link between industry needs and university research capabilities.

An example of NUS's new commercialisation strategy includes the partnerships formed with accelerators and incubators, including Clearbridge. The Singapore incubator is now licensing many of NUS's technologies and, in the short span of 2 years, has incubated three medical startups from these.

3.3 Entrepreneurship Support

The pipelines provided by NUS entrepreneurial talent (NOC) and technologies (ILO) can also find support through the NUS Entrepreneurship Centre, initiated to help nurture entrepreneurs by providing the resources necessary for their start-up companies to succeed. Events, talks and business clinics are organized by NEC, while dedicated mentors provide advice and guidance on everything from funding to business planning. Physical space for start-up companies is provided through the NUS Enterprise Incubators.

NEC is instrumental in helping start-up companies reach the next stage and introducing entrepreneurs to a network of industry players. As an example, NUS Enterprise helped launch the Accelerator Workshop Series in April 2012 with the Media Development Authority (MDA), a matchmaking initiative that aims to catalyze the adoption of home-grown technology by bringing together start-up products and services with industry demands. In the first AWS call that took place, over 60 industry-start-up meetings were coordinated, with many project discussions still ongoing.

3.4 Entrepreneurship/Innovation Research and Thought Leadership

NUS Enterprise also conducts cutting-edge research on key issues of technology entrepreneurship. This includes academic entrepreneurship; innovation and intel-

lectual property creation in the Asia Pacific; and trends, challenges, processes and success factors for start-up enterprises.

4 Results

Out of NUS Enterprise's initiatives, an impact is being felt on the local entrepreneurship scene. Proactive engagement with industry has helped move several university technologies toward the marketplace, establishing NUS as a major source for innovation in the region. Additionally, 95 active start-up companies have been founded by NOC and iLEAD graduates, each carrying forward the value derived from the immersive experience into new ventures. These start-ups have created numerous employment opportunities and attracted investment into Singapore, drawing increased interest to entrepreneurship as a viable career option for students and staff. Indeed, within a 1 km radius of NUS Enterprise, there exist more than 140 startups and 20 associated incubators/accelerators. That these facets reside so closely to the NUS campus is no coincidence; the environment established by NUS Enterprise has not only helped emerging entrepreneurs find their footing, but has also raised the potential for Singapore to become a major hub for enterprise and innovation.

5 Notes for the Region

It is important to note that the work at NUS Enterprise and in Singapore is far from complete; programmes and initiatives put in place 10 years ago are constantly being updated to adapt to new challenges in the environment. As with any innovation cluster, "success" is influenced by many factors, including the coordination of and policies by the government and university administrators, the availability of public funding and private venture capital, and the culture of a community. Thus, while universities are under increasing pressure to perform to the standards set by Stanford and the Technion it is imperative to realize that those innovation environments took decades of consistent effort to reach their level of impact.

Moreover, universities within Asia and its emerging economies are operating within a different cultural and political environment than that of California or Israel. Asia encompasses many different cultures and many different economic environments, so how this "entrepreneurial university" model is architected for success should and very likely will vary from country to country. Consequently, Asian universities must adapt the best practices of others, or forge their own, in setting their own paths for innovation and enterprise.

Acknowledgments I would like to acknowledge Katherine Chinn for her assistance in the preparation of this manuscript.

Open Access This article is distributed under the terms of the Creative Commons Attribution Noncommercial License which permits any noncommercial use, distribution, and reproduction in any medium, provided the original author(s) and source are credited.

References

1. Etzkowitz H, Webster A, Gebhardt C, Regina B, Terra C (2000) The future of the university and the university of the future: evolution of ivory tower to entrepreneurial paradigm. *Research Policy* 29(2):313–330
2. Etzkowitz H (2003) Innovations in innovation: the Triple Helix of university-industry-government relations. *Social Science Information* 42(3):293–337
3. Wong PK, Ho YP, Singh A (2011) Towards a ‘global knowledge enterprise’: the entrepreneurial university model of the National University of Singapore. In: Wong PK, Ho YP, Singh A (eds) *Academic entrepreneurship in Asia: the rise and impact of universities in national innovation systems*. Edward Elgar, Cheltenham, pp 165–198
4. Wong PK, Singh A (2008) The national system of innovation in Singapore. In: Edquist C et al (eds) *Small economy innovation systems: comparing globalization, change and policy in Europe and Asia*. Edward Elgar, Cheltenham, Chapter 3
5. National Research Foundation (2012) Council and boards: research, innovation and enterprise council (RIEC). <http://www.nrf.gov.sg/nrf/councilboard.aspx?id=160>. Accessed Sept 2012