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Title	Linkage and collaboration between universities and industries in Singapore.
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Source	<i>SEAMEO RIHED Regional Seminar on Linkage and Collaboration between the Higher Education Institutions and Industries, Da Nang, Vietnam, 16 September 2014</i>

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Lim, K. M. (2014, September). *Linkage and Collaboration between Universities and Industries in Singapore*. Paper presented at SEAMEO RIHED Regional Seminar on Linkage and Collaboration between the Higher Education Institutions and Industries, Da Nang, Vietnam.

## **LINKAGE AND COLLABORATION BETWEEN UNIVERSITIES AND INDUSTRIES**

### **OVERVIEW OF UNIVERSITY LANDSCAPE IN SINGAPORE**

1. Singapore has a vibrant university landscape with both public and private institutions that provide degree programmes across a wide variety of disciplines. Various government agencies, such as the Ministry of Education (MOE), the Ministry of Trade & Industry (MTI), and the Ministry of Manpower (MOM) work closely with these institutions to improve our students' employability and livelihood, and provide the economy with a pool of qualified manpower for economic growth. University-industry links are one crucial aspect to ensure a good match between manpower supply and demand, and that graduates have the skills that industry needs.

2. As Autonomous Universities (AUs) are publicly-funded higher education institutions corporatised with a Board of Trustees, they have the autonomy to decide on their strategies and directions. These are differentiated between the universities according to their unique identities, thus offering more choices to students. The different universities and their areas of specialisation are listed below:

#### *Comprehensive Universities*

- a. National University of Singapore (NUS);
- b. Nanyang Technological University (NTU);

#### *Business and Management Universities*

- c. Singapore Management University (SMU);

#### *Architecture, Engineering, Design & Technology*

- d. Singapore University of Technology and Design (SUTD); and

#### *Practice-Oriented Degrees*

- e. Singapore Institute of Technology (SIT).

### **UNIVERSITY POLICIES AND PROGRAMMES THAT PROMOTE UNIVERSITY-INDUSTRY COLLABORATION**

3. The AUs have developed a wide range of policies and programmes that foster links with relevant industry partners, so as to strengthen existing teaching and

research programmes. These also aim to ensure that graduates are equipped with the skills that the industry needs. Some initiatives are listed below:

### *Internships*

4. To provide graduates with deep knowledge and relevant work experience in their respective areas of study, the AUs have extensive internship programmes with industry players to provide hands-on and on-the-job training as a complement to academic training. NUS, for instance, runs a vacation internship programme for undergraduates to gain experience over the vacation period. This also helps to raise the mutual profile of companies and universities. Apart from the AUs, the polytechnics and Institute of Technical Education (ITE) in Singapore also provide students with internship opportunities, so as to ensure that their higher education is relevant to industry needs.

### *Integrating Innovation in Curriculum*

5. The AUs have dedicated programmes for innovation, as well as courses with innovation-related modules. Some examples include:

- NUS's Design-Centric Programme and Faculty of Engineering Innovation Programme.
- NTU's inclusion of a required entrepreneurship module in its core curriculum, and the Renaissance Engineering Programme with built-in I&E components comprising student internships as well as coursework at its two partner locations, Berkeley and Imperial.
- SMU's Master of Science in Innovation.
- SUTD integrates innovation-related content into most of its programmes and core curricula. It is currently planning an Entrepreneurship Capstone, which is a final-year interdisciplinary project in which students embark on an entrepreneurial venture as their Capstone Project. Courses that comprise the innovation element include "Introduction to Design".

### *Encouraging Entrepreneurial Efforts*

6. The AUs also incorporate an entrepreneurial dimension into their education activities to nurture and encourage future entrepreneurial leaders.

- NUS partners with the ASEAN+3 Silicon Valley Entrepreneurs Network to help promote mutual learning and networking between Silicon Valley and Asian entrepreneurs.
- NTU has an existing incubation and mentoring programme to support development of student start-ups, and is also piloting a "Nanyang

Accelerator Programme” aimed at imparting start-ups and aspiring entrepreneurs with entrepreneurship skills.

- SMU partners with the United Overseas Bank and other local enterprises to facilitate the exchange of knowledge and resources, as well as support the growth and development of local enterprises and learning for undergraduate students.
- SUTD implemented “Start Something@SUTD” a programme developed in consultation with MIT to nurture entrepreneurship through experiential learning.

### *Research and Industry Links*

7. The AUs also play an important role in bridging the needs of industry with the outcome of research. These industrial collaborations form the key component of a research-intensive technological university, and ensure that research activities maintain their societal and industry relevance. The following presents some initiatives from each university to foster closer links between research and industry:

8. NUS. NUS has set up laboratory collaborations on campus with companies like GE water, Keppel, Carl Zeiss; and established strong working relationships through Lean Launchpad@Singapore, an experiential learning programme which aims to foster entrepreneurial interests in researchers by educating them on the fundamentals of technology commercialisation and start-up development. NUS’s TechLaunch also aims to help students develop start-ups based on NUS technologies.

9. NTU. NTU has set up Research Institutes for translational research, such as Nanyang Environment and Water Research Institute (NEWRI) and Energy Research Institute @ NTU (ERI@N) to forge links and draw industry partners and public bodies both locally and overseas. NTU has been successful in attracting technologically sophisticated MNCs to the campus, including industry leaders such as Rolls-Royce, BMW Group, Lockheed Martin, Johnson Matthey and ST Engineering.

10. SMU. The DHL-SMU Green Transformation Lab (GTL) aims to accelerate the evolution of sustainable logistics across the Asia-Pacific region and develop interdisciplinary solutions by bringing in technology know-how and innovative solutions to real-world challenges in logistics and supply chains.

11. SUTD. SUTD runs a number of research centres and labs for research and industry collaborations such as the SUTD-MIT International Design Centre, and the Lee Kuan Yew Centre for Innovative Cities. In addition, SUTD and Jurong Town Corporation Cooperation for the Industrial Infrastructure and Innovation Centre aims to carry out research, development and demonstration projects to support

Singapore's dynamic industrial landscape.

12. SIT. SIT is active in the consortium for joint research, especially for new platform technology. SIT is leading and working with the five polytechnics and the InfoComm Development Authority of Singapore (IDA) for the sponsored Free App Development for Small and Medium Enterprises (SME AppStore). SIT also engages industry leaders through each phase in the programme development life cycle. Industry Advisory Committees are formed for each programme and the committee provides inputs on curriculum development to meet industry needs. An Enterprise and Innovation Hub is currently being established with the aim of promoting close industry ties between SIT and the Industry.

### ROLE OF GOVERNMENT AND INDUSTRY IN DESIGNING AND IMPLEMENTING OF UNIVERSITY-INDUSTRY COLLABORATION

13. The Singapore Government also contributes to the design and implementation of university-industry collaborations. This is a multi-agency effort to create an environment that is conducive to fostering stronger university-industry ties. In addition to MOE, MTI works closely with industry to understand their needs and concerns; while MOM also plays a supporting role in striving to develop a productive workforce and progressive workplaces. These Ministries work in close consultation with each other to develop schemes that will improve the quality and quantity of collaborations. Some examples of such schemes are listed below:

#### *Strengthening Links between Research and Industry*

14. To further boost research, the Research, Innovation and Enterprise 2015 (RIE2015) plan was developed by the Singapore Government. The AUs will contribute to Singapore's key R&D strategies and support the Singapore Government's long-term vision to be a research-intensive, innovative and entrepreneurial economy. As one of the key strategies for RIE2015 is to attract and develop scientific talent to meet the needs of industry and public sector research institutions, funds have been allocated to scholarships and fellowships for talent training both locally and overseas. In addition, with increased focus on economic outcomes of R&D, the Industry Alignment Fund has been set up to encourage public researchers to work more closely with industry. Other schemes include:

- a. Corp Lab@University. The Corp Lab@University scheme, launched in March 2013 by the National Research Foundation (NRF), supports the establishment of key laboratories by industries in our universities. The scheme aims to attract foreign and Singapore companies to collaborate with our AUs on industry-relevant research. It seeks to enhance collaborative partnerships between universities and industries, and enable faculty, researchers, PhD and Master's students to work alongside

companies on programmes that have direct relevance for the industry. This will support the effective translation of laboratory work for the marketplace and ensure that universities achieve impact by developing cutting-edge solutions for problems faced by industry. The \$75 million Rolls-Royce@NTU Corp Lab was established in July 2013, and the Keppel-NUS Corp Lab followed in November 2013.

- b. Technology Transfer Office Fund. MOE's Autonomous Universities Technology Transfer Office Fund (AU TTO Fund) aims to nurture a culture of innovation and enterprise at the AUs. With this fund, the TTO at the AUs are tasked to facilitate strategic engagement with industry, and foster close interaction with faculties and research centres.

#### *Provision of Industry Scholarships*

15. The Singapore-Industry Scholarship (SGIS), which is offered by MOE, Economic Development Board (EDB), and other government agencies, aims to develop a strong core of Singaporeans to anchor strategic sectors critical to Singapore's economic and social development. This forms a special partnership between the Singapore Government and Singapore enterprises. Awarded scholars can pursue their undergraduate degrees at any local AU.

16. The Industrial Postgraduate Programme (IPP) is an initiative by EDB to develop a pool of postgraduate manpower with the essential and critical R&D skill-sets for roles in the industry. IPP trainees undergo training in a corporate R&D environment through EDB's partnership with companies and locally-based universities.

#### CONCLUSION

17. In Singapore, the government, universities, and industry players work closely together to harness the synergies from close collaborations between academia and industry. This serves the goals of increasing the generation of applicable knowledge and skills, improving graduate outcomes in employment, increasing productivity in the workforce, and supporting economic growth.

Prepared by: Ministry of Education, Singapore

Date: Sept 2014