

Part I: Opportunities and benefits of EU-Asian academic collaboration

2. Opportunities and Benefits of International Academic Collaboration for Doctoral Students: The Singaporean Experience

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This paper describes the challenges of ensuring a high quality graduate education, from the experience of the National University of Singapore. It focuses on international collaboration with academic institutions as well as industries, and shares some insights and examples.

2.1. Global Trends

Two key global trends have had a significant impact on the development of graduate education in recent times: globalisation and the rise of knowledge economies.

In the new flat world of the 21st Century, universities are becoming increasingly self-conscious of their global position. As we move from a uni-polar to a multi-polar world order, the emerging challenges of an increasingly inter-connected world have spawned more instances of international academic collaboration, changing the way doctoral education conceived and delivered. With globalisation, there is a greater need to incorporate an international dimension into our graduate programmes. More than ever before, our PhD graduates are now expected to work in collaborative teams with a diverse composition of talents and expertise. Beyond the lofty purposes of knowledge creation, cross-cultural and cross-disciplinary understanding is now essential if our doctoral graduates are even to find gainful employment.

There has been much talk about the importance of knowledge economies. It is understood that in a knowledge economy, a country's economic performance is determined by the quality and innovation of its labour force, underpinned by effective research and development capability and capacity. In other words, graduate programmes are required to bring the human capital of a country up the value chain. Talent is an important component of this equation. Because talent is crucial, this leads to an increase in competition for talents. The sense today is that the appetite and demand for doctoral programmes is greater than ever before.

The story for Singapore is no different. The transition to a diversified knowledge-based and innovation-driven economy has effected a conscious effort and investment in education and the development of human capital. Amidst the shift in the global strategic landscape, we also have to grapple with a slew of other urgent security, social and environment issues such

as the impact of climate change, population growth, aging population, pandemics, and food and water security. These are issues no single country can address on its own. A global approach is the sensible way forward and leading universities have an important role to play in forging such a global approach, especially in research and education, in addressing these challenges. Ideally, there should be an appropriate proportion of our top students doing doctoral programmes. However, the draw of the industry against a backdrop of less attractive local compensation for graduate students in doctoral programmes has compounded the attraction of talents into doctoral programmes. The increased student mobility and unattractiveness of doctoral education thus result in a high rate of attrition that inherently affects the quality of students and research programmes.

2.2. Support and Intervention by the Government

Against this backdrop, it is therefore not surprising to find the government intervening in doctoral education through increased funding support, and increased intervention in academic and research directions. Half a decade ago, the Singapore government started taking steps to transform its publicly funded universities into research intensive universities. Its strategic review of the University Sector resulted in the devolution of autonomy to the local universities and significant increase in government funding. Key to this development was the formation of the Research, Innovation and Enterprise Council (RIEC) and the National Research Foundation (NRF) to oversee R&D development in Singapore and implement key strategic R&D thrusts by the Prime Minister's Office. Their target is for Singapore to reach 3% of Gross Expenditure on R&D by 2010 (see [1]). What this would translate into is a substantial influx of funding for education and research for the universities in the form of PhD scholarships, research funding from a multitude of sources, and Research Centres of Excellence (RCEs). RCEs are a new initiative by the Singapore government to build research competence within universities. Each RCE is generously funded to the tune of about USD\$100 million over 5 years.

In Singapore, doctoral programmes are largely concentrated in public universities and are almost entirely supported through public funding in the form of PhD scholarships. From the supporting agency's perspective, there is a need for accountability and quality control, and accountability considerations (such as requiring a high proportion of PhD graduates to remain in Singapore) may go counter to a university's desire to build excellence in PhD programmes. The tension between fulfilling national needs and the necessity of educating students for participation in the international academic arena is therefore an important component of this new dynamics.

2.3. Brain Drain versus Brain Circulation

For years, the best and brightest in Asia flocked to the West to pursue advance degrees and better prospects. This loss of intellectual capital from the sixties to the eighties was coined "Brain Drain" and it became a source of worry for the developing nations. What they did not expect is that "Brain Drain" is only a part of the story. The late nineties and early years of the 21st century, however, saw large numbers of these migrants returning to their home country as prospects improve. This other part of the story which is now known as "Brain Circulation" relates to the social contacts and international world view the expatriates gain when

studying and working in a foreign country. With globalisation, talents have become extremely mobile and for countries such as China and India, their experiences and contacts of the returning emigrants proved to be invaluable, propelling the nations' rise on the world stage.

For a small nation like Singapore, a better solution to the brain drain issue would be one of supporting institutional cooperation and mobility through joint doctoral programmes, co-tutelles, etc., with other universities and industry. This is in part an expansion of the concept of brain circulation and, by far, this would be a compelling reason for our universities to adopt such a co-operative approach towards doctoral education.

2.4. Academic Collaboration with Universities

In the era of globalisation and interdependence, academic collaborations between universities, especially for undergraduate programmes, have become a common feature in all global universities. More recently, universities are starting on collaborative doctoral programmes across borders. Just like opening the economy to free trade, international collaboration in research and education strengthens competition and affords tremendous opportunities. It should be viewed more as an opportunity than a threat - a positive sum gain that translates into better-informed citizens and a stronger global capability that benefits all. In addition, academic collaborative efforts are required to address the pressing global security, social and environment issues mentioned earlier. Developing the capacity for cross-cultural understanding and working towards a common solution will make these Herculean global problems more tractable.

In the same breath, I have a few points to note on this issue:

- Partner universities should go into this only when there is sufficient ground support and interest from faculty for such collaborations. Universities take substantial amounts of time and effort to get the formalities adopted through their academic governance framework. One instance of NUS' experience is that of a joint PhD in Chemical Engineering with a top university in the US – it took us several years to formalise a joint PhD degree, and it was not even done in time for the first batch of joint supervisees.
- Universities should not let formalities over-shadow a possible collaborative relationship. If possible, always allow a collaborative relationship time to build strength before going into details of a dual or joint doctoral programme, or do the formalities in parallel.
- There must be mechanisms to guard against students switching universities, because it would be unhealthy for a partnership between Universities X and Y, should some students registered at University X switch their candidacies to Universities Y, or vice-versa.

2.5. The example of NUS Graduate School of Integrative Sciences and Engineering (NGS)

The NGS is one successful example of the National University of Singapore's (NUS) experience in academic collaboration. Intended as a platform for novel multi-disciplinary doctoral programmes, the NGS anchors several niche doctoral programmes by providing very attractive student support (i.e., stipends, conference support and peripherals) and "accrediting" PhD supervisors. There is also a structured broad-based coursework component underpinning these multi-disciplinary doctoral programmes. One key feature of the NGS doctoral programmes is the extensive collaboration with top universities, under schemes such as the global 2+2 opportunities where a PhD student could spend up to two years overseas at a partner university supplemented by NGS student stipends, and the Global Enterprise for Micro Mechanics & Molecular Medicine.

NGS's partners have included such prominent universities and research institutions as:

1. Australian National University
2. University of California, Berkeley
3. University of Cambridge
4. University of Copenhagen
5. ETH Zurich
6. University of Oxford
7. Peking University
8. University of Tokyo
9. Yale University
10. California Institute of Technology
11. University of California
12. Duke University
13. Georgia Institute of Technology
14. Harvard University
15. Institut Pasteur
16. John Hopkins University
17. Karolinska Institutet
18. Massachusetts Institute of Technology
19. Max-Planck Institute

These programmes have the novelty of allowing students to spend time in two different countries and in research powerhouses. It thus becomes an attraction for NUS to attract top research talents into Singapore.

2.6. Academic Collaboration with Industry

While this may be less frequent, academic collaborations with companies, especially international ones, are particularly novel ways of leveraging on external parties to further

the goals of the research enterprise. I highlight two examples by NUS for ease of reference, and I am sure other universities have seized similar opportunities:

- **EADS-EDB Joint Industry Postgraduate Programme (see [2]):** The European Aeronautical Defence and Space (EADS) and the Singapore Economic Development Board (EDB – the lead government agency in Singapore for planning and executing strategies to enhance Singapore’s economy) recently agreed on the sponsorship of PhD students under the EDB Joint Industry Postgraduate Programme with the Nanyang Technological University (NTU) and NUS. This agreement allows EADS to increase its research partnership with NTU and NUS (i.e., these students are co-supervised by EADS and NUS/NTU) as well as to secure young talents for EADS’ corporate research centre in Singapore. A total of 6 students from NTU and NUS will be supported. Upon graduation, these students will be employed by EADS for three years. EADS is a global leader in aerospace, defence and related services. In 2008, EADS generated revenues of €43.3 billion and employed a workforce of about 118,000. The Group includes Airbus as the leading manufacturer of commercial and also tanker, transport and mission aircraft, Eurocopter as the world's largest helicopter supplier and EADS Astrium, a European leader in space programmes. EADS is therefore a multi-national corporation (MNC) with a strong research base. Leveraging on resources of such MNCs, especially in the doctoral programmes, can bring tremendous benefits.
- **The Logistics Institute – Asia Pacific (TLIAP) at NUS:** Although this is not a doctoral programme, it does contain the gist of a healthy collaboration with industry in the international arena. Here, NUS collaborates with Georgia Institute of Technology (GT) to offer a dual Masters programme in Logistics and Supply Chain Management (NUS) and Industrial Engineering (GT). The programme spans 18 months, with 6 months in both NUS and GT, and 6 months of internship with a foreign MNC in logistics. There is also a mechanism for companies to sponsor some of the top students in this programme, with a caveat to employ them at the end of the programme. This dual master’s programme has also won numerous accolades, including the prestigious Best Educational Programme of the Asia Freight and Supply Chain Awards for 8 years running. Graduates therefore have been readily snatched up by logistics companies all around the world, and are a testimony to the high level of success of this programme.

The two examples above serve to highlight the importance of collaboration with international industry, especially in graduate programmes. Here, we note the internship component which is a beneficial aspect of a graduate’s education.

Concluding Remarks

Graduate education is today perhaps the most dynamic and innovative sector of higher education. In a globalised knowledge economy, talent will be the key to economic success.

Talent will provide the intellectual and innovation capacity to sustain the technological edge and competitive advantage of a country. Indeed, investments and economic growth will follow talent. In this new economic paradigm, international academic collaboration between universities, with industries and strong government support are essential features of a 21st century doctoral education. Internationalisation has become a necessity and not just an optional mode of operation. It is imperative and not a choice.

References

[1] Science and Technology Plan 2010, Singapore

[2] Source: EDB Press Release, 1 Oct 09, <http://www.edb.gov.sg/>