
**NUS ENGINEERING FACULTY ANNUAL DINNER
SPEECH BY MR TEO MING KIAN
PS (NATIONAL RESEARCH AND DEVELOPMENT)
REGENT SINGAPORE
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**ACADEMIC ENTREPRENEURSHIP:
THE NEXT LAP FOR THE FACULTY OF ENGINEERING
IN A KNOWLEDGE-BASED ECONOMY**

Professor Seeram Ramakrishna, Dean, NUS Faculty of Engineering

Distinguished Guests

Ladies and Gentlemen

Let me first thank you for inviting me to your annual dinner this evening, especially at this 40th anniversary of the Faculty.

It is a great pleasure for one who tried to be an engineer but could not
- I was trained as an engineer but did not make it to be one.

Secondly, the word “engineering” is linked by the same Latin root to the word “ingenuity”. And the verb “to engineer” means “to be ingenious”. It is therefore a great honour to be amongst ingenious people this evening.

I am also happy to hear that members of the alumni are here too. It is great to see you being involved in fostering deeper relationships between the faculty and the graduates.

Progress and Contributions of the NUS Engineering Faculty

The NUS Faculty of Engineering has come a long way and has contributed greatly to the economic development of Singapore. You trained the specialist manpower needed to grow our manufacturing sector, which remains the largest sector of our economy and makes up more than a quarter of our GDP. Many engineers have also gone to work in other industries.

You are now ranked amongst the world's top 10 technology colleges by the Times Higher Education Supplement. This is no small feat, and is undoubtedly the result of relentless efforts put in by many of you and your predecessors.

Some are being recognised tonight. Let me take this opportunity to congratulate them.

No doubt, the development of the Faculty will continue to keep pace with what is happening around us or changes we are anticipating. These changes may not be incremental and gradual, and could require major transformation. Just like our economy. It has made several major phase shifts - from a labour-intensive one in the 1960s, to skills-intensive in the 1970s, capital-intensive in the 1980s, technology-intensive in the 1990s, and going forward, becoming knowledge-intensive.

Creating significant value and impact from new knowledge through excellent science and advanced technologies is clearly necessary in a knowledge intensive economy. Universities play a defining role in creating such an economy. No thriving and vibrant knowledge-based economy is without great research universities to sustain it.

New knowledge cannot be generated without R&D. And it is not easy to make a phase shift from a primarily teaching university to a research university. It requires a change in mindset. When I was first appointed Chairman of NSTB, my first task was to try to get students interested in R&D. I gave a presentation to an auditorium full of students in the NUS - Engineering Faculty of course. The very first question after my presentation was “Why do you ask us to do R&D? There is no career prospect. I do not want to be a lecturer”. That was how they saw R&D, and lecturers.

That was 15 years ago. NUS has moved on. R&D has become a staple of the university, as much as teaching students. It is a good foundation that the National Research Foundation (NRF) hopes to build on to help move Singapore decisively into a knowledge-based, innovation-driven economy.

The NRF will do this with three thrusts:

Firstly, strengthen research capability.

Secondly, push for knowledge diffusion.

Thirdly, encourage innovation and enterprise.

I. Strengthen research capability

In the two years since it was set up, the NRF has allocated substantial funding to support research capability and capacity development in our universities. These include:

- \$1.55 billion to fund research in the three strategic programs of Environmental and Water Technologies, focusing on clean water and clean energy, Interactive and Digital Media, and Translational and Clinical research in Biomedical Sciences;

- \$250 million to fund bottom-up research ideas on a competitive basis through the Competitive Research Program (CRP) funding scheme;
- \$500 million to co-fund with the Ministry of Education (MOE) the establishment of a number of research centres of excellence in our universities; and
- \$160 million to attract, and support the research of outstanding young researchers through the NRF Research Fellowship program.

In addition, NRF is developing the Campus for Research Excellence and Technological Enterprise (CREATE) to house inter-disciplinary research programs led by faculty from top research universities such as the Massachusetts Institute of Technology (MIT) and the Swiss Federal Institutes of Technology (ETH) in collaboration with local faculty and researchers from our universities and research institutes.

II. Push for Knowledge Diffusion

These substantial investments in research will undoubtedly generate a lot of interesting results and new knowledge. However, pure knowledge generation that is decoupled from the real world and without societal impact would be wasted. Imagine, for example, if electricity had remained a thrilling experiment in the laboratory. The world would be a very different place and we would probably be having a candlelight dinner tonight! Perhaps not so inappropriate, this being the night after Valentine's Day!

Faculty members will have to see themselves as more than a 'lecturer'. This is not just to improve his image so his occupation would not be seen by his students as an uninspiring career prospect. He also has to be more than a 'researcher', generating new knowledge not only to become a better teacher, but to push his research outcome from the laboratory to the marketplace.

This would be an excellent manifestation of the impact the knowledge he created has on the society.

When we met Nobel laureate Steven Chu, Director of Lawrence Berkeley Labs recently, he made it absolutely clear that good science and effective diffusion are different sides of the same coin. He gave various examples, citing the Nobel laureates whose research led to great impact on the society and enhanced the way we live. He would know, since he is a Nobel Laureate himself and 11 researchers from Lawrence Berkeley Lab have been awarded the Nobel Prize. And the Lab has spun off many companies as well.

In most research universities, there is a deliberate process and set up for knowledge diffusion. The new knowledge could be licensed out to existing companies or commercialised through the formation of new start up companies. To do this effectively, it is necessary for the universities to go beyond teaching and research to embrace innovation and enterprise.

III. Encourage Innovation and Enterprise

In innovative regions such as Silicon Valley in the US and Haifa in Israel, we see successful academic entrepreneurship. What is academic entrepreneurship, you may ask. Broadly defined, it is the active involvement of academics, researchers, students and the institution as a whole in commercially relevant activities manifested by academia-industry research collaborations, venture activities, start-up founding, etc. Academic entrepreneurship embodies close academia-industry linkages and promotes use-inspired research, i.e., research that has a use or application in mind, starting often with basic science.

In Israel, for example, IBM's R&D lab is housed within the University of Haifa and HP has its R&D lab in Technion. These corporate R&D labs draw on the expertise of the faculty of the host universities and tap on their pool of talented students who are well honed with the culture and spirit of enterprise. The Hebrew University had spun out more than 60 companies and licensed more than 400 technologies that generated nearly US\$1 billion of worldwide sales annually.

We know well what is happening in Silicon Valley. Start-ups spin out not just from private universities like Stanford, but also publicly funded universities like Berkeley. The close relationship the universities have with industry does not compromise the quality of their research. On the contrary, Prof Chu, told us it increases the professors' sense of fulfilment when they see their research results translated into real applications and products that make a big impact on society. Students, too, benefit from being able to apply what they learn in classes and labs in tangible and "real" projects.

NUS Engineering Faculty Academic Entrepreneurship

I believe NUS is ready for academic entrepreneurship. The Government is investing significant amounts of funding in R&D. In keeping with the status as one of the leading universities in the world now, NUS will have to turn these into a bigger pipeline of impactful, breakthrough science and technologies. This is what is being done not just in established entrepreneurial centres like Silicon Valley and Israel, but also emerging ones like China and India.

The Engineering Faculty, in particular is in an excellent position to lead in this effort. Engineers are supposed to be ingenious. Indeed, the steam engine, electricity, railroads and airplanes were invented by engineers.

They have revolutionised and transformed the world, bringing about higher standards of living.

A National Framework for Innovation and Enterprise

You will be well supported on this exciting journey towards innovation and enterprise. NRF is now formulating a comprehensive framework with initiatives to encourage innovative and enterprising faculty and students to bring their ideas from research to market. This framework will be put to the Research, Innovation and Enterprise Council chaired by the Prime Minister for discussion and approval in March.

The Government is unwavering in pushing innovation and enterprise. Budget 2008 that was just delivered by the Finance Minister a few hours ago provides the clearest signal with the strategic intent and the slew of new tax incentives and existing ones enhanced. They include:

- Enhanced deduction of R&D expenses: 150% of expenditure on R&D done in Singapore can be deducted against taxable income, up from 100% previously.
- R&D Tax Allowances: Up to \$150,000 of R&D Allowances from a company's taxable income could be used to defray expenditure on R&D it does in Singapore in subsequent years.
- R&D Incentive for Start-up Enterprises (RISE): For start ups that have yet to make any profits, the losses can be exchanged for cash so long as they do at least \$150,000 of on-going R&D in Singapore.
- Employee Equity remuneration exemption: Employees of start ups in their first 3 years of incorporation will be exempted from personal income tax on 75% of up to \$10m gains that they derive from stock options and share awards.

These tax changes are formulated to encourage pervasive R&D, innovation and entrepreneurship amongst academic and research institutions, the public sector as well as enterprises, big and small. They and the R&D investments demonstrate the commitment and resolve to step up our drive on R&D and innovation on all fronts, and move Singapore into a top quality, knowledge intensive economy based on innovation and enterprise.

Conclusion

Our universities, polytechnics and research institutions are crucial players that can help bring Singapore to this next phase of development into a vibrant knowledge intensive economy.

And I think you are well placed to lead this charge within NUS, even more so now that your Dean is also being appointed as VP (Research Strategy).

Thank you.
