Subra Suresh â?? President, Nanyang Technological University (NTU), Singapore

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Professor Subra Suresh, president of Nanyang Technological University (NTU) and former director of the US National Science Foundation, explains how the university has managed to consistently be among the top academic institutions in the world despite having only three decades of existence, and outlines Singaporeâ??s strengths as an innovation, trade, and financial hub.

NTU is consistently ranked among the top universities in Asia and the world. What are your priorities as president of the institution?

NTU is a relatively young institution, founded in 1991. This year we are celebrating our 30th anniversary but in that short period of time the university has achieved what many others do in centuries; it is quite remarkable.

Our achievements mirror the momentum of Singapore itself as a country; it got its independence in 1965 and went from a third world to a first world country in just a few decades.

Before being appointed president nearly four years ago, I was very familiar with NTU because for most of my career at MIT in Boston, I actively led and forged strategic cooperation between MIT and

Singapore.

The reasons behind NTUâ??s ascent in the global university rankings stem from several factors. First, Singapore is a meticulously organized country; the government excels at planning for the long-term Education has been a long-term priority. Second, it has provided consistent support for high-quality education and research to strengthen Singaporeâ??s core capabilities in developing world-class universities. Third, education is highly valued here with a focus on excelling in science and technology. Indeed, Singapore became a first-world country through the deployment of cutting-edge scientific and technological innovation and added value not just through low-cost manufacturing. Today, Singapore is ranked as Asiaâ??s most innovative economy. In addition, Singapore has advanced tremendously in internationalization and has today become a global hub for trade, commerce, and finance and a gateway to Asia.

NTU has kept pace with Singaporeâ??s rapid growth. As a publicly funded university, it remains committed to ensuring that the country remains a vital hub for world-class education. NTU is home to a critical mass of talent and infrastructure in the key areas shaping the 4th Industrial Revolution.

With respect to our mandate and priorities, they have been detailed in the NTU 2025 strategic plan. It lays out our ambitions and goals for the next five years for education, research, and innovation along with a roadmap to achieve them.

Taking education as an example, in the 4^{th} Industrial revolution, the meaning of an educated person has changed. A young university graduate will have to continuously change jobs and professions, which means knowing not just one discipline and one skill but being multi-disciplinary and multi-skilled. It is about being able to learn continuously. NTU is finely tuned to these shifts in the future workplace.

To this end, this year, we have launched new degrees, core curricular offerings, experiential learning, and internship opportunities for all our undergraduate students. This will help our students to better prepare not only for successful careers but also for a lifetime of learning, impact, and service to society. To nurture entrepreneurs who drive innovation and contribute to Singaporeâ??s future as a Smart Nation, NTU will offer a new Second Major in Entrepreneurship. The University will also introduce new pan-university advanced degree programmes in interdisciplinary areas, such as neuroscience. To help graduates to continually upgrade their skills and remain competitive in the global talent market, NTU will establish new collaborations with corporate partners to create more industry-relevant, modular, and stackable courses. NTU will also expand its university-wide MiniMastersâ?¢, a new mechanism for upskilling launched during the COVID-19 circuit breaker in 2020, and continuing education and training programmes offered by its Centre for Professional and Continuing Education (PaCE@NTU) to help professionals, managers and executives upskill and keep pace with the changing nature of work transformed by rapidly emerging technologies.

In research, under the NTU 2025 plan, we aim to strongly support high-impact interdisciplinary research to address global grand challenges, and to create mechanisms that accelerate the translation of research discoveries into innovation that is of economic value and societal impact.

We have picked four global challenges to tackle, as part of NTU 2025: mitigating our impact on the environment; harnessing the science, art, and technology of learning; the fourth industrial revolution and its connection to human behavior and humanity; and responding to the needs of healthy living and aging.

How well prepared was the university when the pandemic hit and how did you manage to help your students?

About three years ago, unaware of the coming pandemic, we invested resources in digital and cloud-based technology, digitalizing most of our coursework on campus and migrated everything to the cloud in 2019. When COVID-19 hit, we were able to adapt immediately, migrating 630 courses onlinin 72 hours.

But we could not escape the reality of the situation; although Singapore is a relatively wealthy country, we have students whose parents lost jobs and were in deep financial stress, not to mention the international students that could not go anywhere. NTU made sure that we took care of them with financial help and other measures. The community has really come together.

Along with NTUâ??s five-year plan, Singapore also has a five-year plan on research and innovation. How are your plans tied into Singapore more broadly and the governmentâ??s plans?

We have our own aspiration with input from faculty and staff, but obviously they are very well aligned with Singaporeâ??s Research, Innovation & Enterprise 2025 plan. We are a public institution supported by taxpayers that educates a significant number of students from the country and the world. Naturally, our five-year strategic plan is aligned with Singaporeâ??s five-year R&D budget.

To what extent is the interdisciplinary work that different faculties and departments do a core part of NTU?

Interdisciplinarity has increasingly become a core part of NTUâ??s research and education offerings. Similar to most peer universities in the world, we started with a strong disciplinary focus. Within engineering for example, which is our largest college, we have traditional disciplines like electrical engineering, mechanical engineering, chemical engineering, civil engineering, and overtime these entities tend to become siloed in any institution. In the past few years, we have actively sought to break down these silos to foster cutting-edge cross-collaboration research and introduce interdisciplinary education to make our students future-ready.

For example, about three years ago, we started a requirement for all of our 24,000 undergraduate students to acquire a minimum number of credits for what we call â??digital literacy.â• The students love this because they have grown up in the digital age. The challenge is often convincing the professors, but fortunately, we did not have resistance.

I did my first degree at the Indian Institute of Technology, one of the premier institutions in engineering, and my background was in engineering, but I did not have a single biology course. Then, 20 years later when I was a professor at MIT, I decided I would move into biomedical engineering but lacked the knowledge and had to start from zero, borrowing my daughterâ??s high school books.

How would you characterize NTUâ??s approach to translational research and ensuring that the innovations being created become useful in peopleâ??s everyday lives?

Most universities, especially technological universities like NTU, focus on basic research, create new knowledge, and apply for patents, but additional economic and societal impact comes when someone takes your work and does something with it. NTU engages uniquely with approximately 250 global companies and has ten corporate laboratories. Companies such as Rolls Royce, Continental, HP, Delta Electronics, and Alibaba work with our 5,000 world-class faculty and researchers. In the case of HP, for example, the focus is on digital manufacturing. The advantage is that our faculty gets to know firsthand the issues facing the industry. In return, companies get to work with top academics and students. It is a three-way initiative where the government, industry, and university allocate resources to foster cross-collaborations and co-create innovative solutions leveraging NTUâ??s robust ecosystem of cutting-edge research, global talent, and state-of-the-art facilities.

What can you say about the Singaporean ecosystem and the opportunities it presents for industry?

Singapore has the second largest seaport in the world. It is one of the top financial centers today in Asia and the world,and serves as a highly reputed international education hub. The country has also attracted a large number of Fortune 500 companies that have chosen to establish their Asia Pacific headquarters here. Lee Kuan Yew, the founding father of Singapore, once said â??First world services at third world prices,â?• even though the country has become a first world country because of its good governance, efficiency, rule of law, intellectual property protection, infrastructure and much more.

Having spent most of your career at one of the global hubs for innovation in Boston, what are the areas that Singapore can improve in order to reach that level?

First, Singapore is relatively new to the innovation game. Second, the market is much smaller than the 330 million+ population of the United States. Nevertheless, the government has placed great emphasis on transformative innovation and entrepreneurship and I believe that it is a matter of time before it can achieve its bold ambitions.

To move to the next level of growth, in the last five to ten years, NTU has established a highly innovative and entrepreneurial ecosystem where the number of patents filed would put it among the top 100 US universities. So, for example, we had our first unicorn company go public at the Singapore Stock Exchange six months ago, a company called Nanofilm Technologies. The founder of the company was an NTU professor that worked with a patent created and owned by NTU.

What are your goals and expectations for the next four years as we move out of pandemic?

First and foremost, our goal is not only to continue but to exponentially accelerate the momentum of the universityâ??s recent rise in global reputation due to the outstanding quality of its education, research, and innovation. We will strive to create new knowledge by continuing to educate our students to be global citizens; further amplifying the impact of our innovation and research by solving critical global challenges; and growing NTUâ??s local, regional, and international contributions.

As part of our growth trajectory, NTU has established centers and institutes such as the NTU Institute of Science and Technology for Humanity (NISTH) as a vehicle for a new era of exploration

of how humanity will interface with technologies to enrich the human condition.

Further, for NTU to become a global pioneer and a testbed for innovation through its Smart Campus, we have set a goal to reduce the net energy and water consumption, and waste generation for the whole campus by 50 percent by early 2026, compared to the baseline levels of 2011 for each category.

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