Japanese Universities Gain a Competitive Edge

Twenty-two academic institutions have been chosen to enhance Japan's ability for cutting-edge science and technology and keep Japan competitive among the world's top universities. The recruitment of high-quality researchers from overseas, revising university management, and improvements in global visibility are the major challenges ahead for the group of 22 institutes. ***By Adarsh Sandhu***

Initiating a nation-wide effort to boost Japan's scientific landscape, the Ministry of Education, Culture, Sports, Science and Technology (MEXT) has launched the Program for Promoting the Enhancement of Research Universities, which exemplifies new trends in research funding in Japan. Twenty-two academic institutions have been singled out from the hundreds of Japanese universities and institutes to lead Japan's efforts to stay at the forefront of science.

These now-elite institutions were chosen via a nontraditional, top-down selection process—a rarity for these types of initiatives in Japan. The funding process is simple: set strategic research targets and priorities, conduct preliminary surveys for potential researchers and institutes most likely to achieve the goals, and provide generous funding to small numbers of top scientists for long periods of time. Representatives from the smaller and newer institutes assert that this unusual metrics-based assessment has enabled them to take on projects that would be unheard of with the traditional bottom-up, proposal-based funding procedures, which can favor larger universities.

After being awarded the prestigious status and funds, these 22 universities are now responsible for developing Japan's scientific infrastructure and making the necessary infrastructure-related reforms to strengthen their research portfolios. This includes hiring research administration managers, recruiting top researchers from overseas, and analyzing global scientific trends in order to formulate new research strategies. The financial support to accomplish these goals ranges from US$2 million to US$4 million annually for 10 years, with a midterm assessment after five years that promises funding cuts in cases of poor performance.

The institutes selected (Table 1) include well-established former Imperial Universities (Hokkaido, Tohoku, Tokyo, Nagoya, Osaka, Kyoto, and Kyushu) as well as three smaller, newer institutes (the University of Electro-Communications, Toyohashi University of Technology, and Nara Institute of Science and Technology) and two large, research-based private universities (Keio and Waseda).

Intriguingly, despite having produced the largest number of Nobel Prize Laureates in Asia, Japan is not well represented in world university ranking tables. For example the *2013–2014 Times Higher Education World University Rankings* lists only two Japanese universities in the top 100, on par with Singapore, but behind South Korea and China with three each.

This lack of visibility and representation in world rankings is a source of considerable discussion in academic circles in Japan. Many of the 22 universities have declared that part of the funding from the MEXT program will be used to pull their institutes into the top 10 of the rankings tables by the end of the 10-year program, with others aiming for a more modest goal of being within the top 100.

Some of the major challenges these universities will be faced with overcoming are: the low birth rate that has led to major decreases in the number of high school children qualified to enter university; severe constraints on research funding for universities, and the need for greater internationalization and visibility.

THE DEMOGRAPHIC LANDSCAPE

Japan's coffers are feeling the pinch. As of May 2013 there were approximately 770 universities in Japan: 86 national institutes, 83 prefecture or city-run, and 601 private. They all rely on government subsidies to run education and research programs. Financing university education and research is putting a huge burden on government resources that are also being strained by increases in medical costs due to the rapidly aging population (24.1% are over 65 years old), the costs for reconstructing the Tohoku region following the devastating earthquake and tsunami in 2011, and demands for investment in trillion-yen international "big-science" projects.

Government subsidies are crucial for the majority of universities to exist. The falling birthrate in Japan has led to excess capacity within the education system, causing an increase in bankruptcies of private universities and forcing national universities to introduce early retirement plans to reduce personnel costs.

The MEXT program sends a clear message to university administrators that MEXT cannot continue to subsidize all the universities in Japan. Future funding for research will be limited and based on objective statistics, such as citations, revenue from technology transfer, and international rankings. This funding must be used to improve university infrastructure, hire top researchers and managers, and engender innovation to improve Japan's global competitiveness in science.

UNIVERSITY MANAGEMENT

In 2004, the Japanese government overhauled the management of national universities by introducing a more corporate-like structure and giving presidents (elected by faculty) more autonomy to hire staff, determine salaries, and set long-term goals for education and research. Furthermore, MEXT started reducing government financial support to national universities by 1% per year. This has led to financial dilemmas for universities that are unable to fill the resulting funding gap with other sources of income.

Another common theme is revamping the role of university research administrators (URAs) to undertake a multitude of tasks including supporting researchers in procuring funding, interacting with industries to license university intellectual property, and analyzing trends in research themes to devise strategies for future, unexplored areas of research. Some universities plan to hire as many as 40 URAs as part of the program in order to take some of the administrative pressure off research faculty. More senior URAs will likely be recruited from the private sector, but many universities will tap into the postdoctoral pool, training them as part of new URA career paths. It's notable that Japan has a huge number of postdocs looking for permanent posts, particularly in the life sciences.

Table 1. Universities and research institutes selected for the MEXT Program for Promoting the Enhancement of Research Universities. (Numbers indicate annual funding in millions of Yen.)

Hiroshima University (300)
Hokkaido University (200)
Kobe University (200)
Kumamoto University (200)*
Kyoto University (400)*
Kyushu University (300)
Nagoya University (400)*
Nara Institute of Science and Technology (300)*
Okayama University (200)*
Osaka University (300)
Tohoku University (400)
Tokyo Institute of Technology (300)*
Tokyo Medical and Dental University (300)
Toyohashi University of Technology (200)*
University of Electro-Communications (300)*
University of Tokyo (400)
University of Tsukuba (300)*

Private Universities
Keio University (200)*
Waseda University (300)*

Other Institutes
High Energy Accelerator Research Organization (300)
National Institute of Informatics (300)
National Institutes of Natural Sciences (300)

*universities featured in this advertorial

INTERNATIONALIZATION

The projects in the MEXT program contain some common themes and goals. The universities have all made internationalization or *kokusaika* one of their highest priorities. *Kokusaika* has different meanings to different people. Here the interpretation is to increase the number of overseas researchers and students, and improve international collaboration by implementing various plans: increasing accommodation facilities for overseas researchers, introducing English language courses for students, training administration staff to produce bilingual documents, and introducing new salary scales commensurate with institutes in the United States and Europe.

So what are the challenges in hiring foreign staff? Short-term stays in Japan for young researchers can be highly rewarding and valuable for boosting their later employability, but establishing a long-term career may be more challenging due to potential family-related issues such as securing a job for a spouse and a good education for accompanying children.

The Japanese language can also be a stumbling block. Foreign researchers may feel isolated and conducting independent research can be extremely taxing; simple exercises such as ordering equipment and taking part in departmental meetings are difficult without reasonable proficiency in Japanese. Even with excellent language skills, foreign academics are unlikely to be awarded top positions such as dean and president in Japanese academia.

The emphasis on *kokusaika* reflects concerns about Japanese researchers becoming too inward looking. Several years ago journalists coined the term "Galapagos Syndrome" to describe the situation, exemplified by highly advanced Japanese mobile telephones that were incompatible with systems in other countries and thus globally irrelevant.

Improving global rankings and attracting top-class foreign researchers are two of the main challenges ahead as the MEXT program moves forward. Needless to say, project managers are well aware of them and have no doubt devised solutions to resolve these issues to achieve their goals. Only time will tell if the 22 institutes will each achieve their goal of becoming globally competitive. The main issue will be the degree to which Japan's academic community is recognized for its contribution to the global creation of knowledge. Perhaps this is the true meaning of *kokusaika*.

Adarsh Sandhu is a freelance science writer based in Tokyo, Japan.

Keio University

Inspiring Multidisciplinary Environmental Research


Keio University Library (old building)


Shonan Fujisawa Campus

Keio University is committed to the "protection of the global environment and the development of a sustainable, zero-waste society," according to their 2012 Environmental Policy Statement, which informs the university's research and teaching focus. Founded in 1858, it is one of the oldest and most prestigious private universities in Japan, offering courses in the arts, social sciences, physical sciences, engineering, and medicine. This large and influential academic institution has 10 undergraduate schools, 14 graduate schools, approximately 1,400 tenured faculty, and 33,000 students. The challenging research and education programs at the university reflect the spirit of "independence and self-respect" espoused by the university's founder, **Yukichi Fukuzawa.** Just two of these world-class programs are outlined below.

Keio University:
www.keio.ac.jp/index-en.html

Global Environmental System Leaders Program

"Our faculty, administration staff, and students are aware of their individual responsibility to contribute to a sustainable global ecosystem," says **Yasushi Kiyoki** from the Graduate School of Media and Governance, and leader of the Global Environmental System Leaders (GESL) program. "Education and research at Keio University are intrinsically linked with environmental issues. The GESL program is an excellent example of our multidisciplinary approach to environment-related research."

With full backing from the Ministry of Education, Culture, Sports, Science and Technology (MEXT) Program for Promoting the Enhancement of Research Universities, the GESL program aims to nurture global leaders with a deep understanding of social and technological issues, with the ultimate goal of spearheading global efforts to preserve the Earth's ecosystem.

Students in the GESL program take a five year course—two years for their Master's and three additional years for their Doctoral training—choosing major and minor specialties from four courses taught at the Graduate School of Media and Governance and Graduate School of Science and Technology. Notably, GESL students spend up to six months doing fieldwork at one of the partner institutes, which include Princeton University in the United States, the University of Cambridge in the United Kingdom, Tampere University of Technology in Finland, and the United Nations Environment Program (Asia Pacific Adaptation Network).

Kiyoki's research on a Mathematical Model of Meaning (MMM) is central to the running of the GESL program. "MMM links the cyberworld with the physical world," explains Kiyoki. "It enables context-dependent web searching for environment-related media data, such as video and photographs." GESL students share this highly intercorrelated information with researchers at other institutes in real time, to analyze and monitor natural disasters. "We expect 30%–40% of the GESL graduates to join international institutes, such as the United Nations," says Kiyoki. "This is Keio University's contribution to environmental research and policy making."


Yasushi Kiyoki

Global Environmental System Leaders Program:
gesl.sfc.keio.ac.jp

Challenges in Cross-Border Recycling in Asia

Eiji Hosoda is an economist who studies waste management, specifically the cross-border movement of recyclable products. "The mid-1980s saw major increases in exports of so-called end-of-life products from economically mature countries to nations such as China that had a strong demand for raw materials," he explains.


Eiji Hosoda

The early, uncontrolled cross-border movement of recyclable products had two major effects in Asia. In Japan, strict extended producer responsibility (EPR) laws were enacted in 1997 to recycle packages, home appliances, and end-of-life vehicles. Yet despite these laws, the outflow of recyclable goods to developing countries severely limited the reuse of valuable resources within Japan itself. This led to recycling businesses going bankrupt. The second issue was that end-of-life goods transported to other Asian countries were potential sources of pollution, such as "e-waste" from electrical goods.

"I realized that incinerators and other such technology alone would not be enough to prevent potential environmental problems," says Hosoda. "We needed to develop an internationally viable system to deal with the whole process of cross-border recycling and waste management."

In 2006, Hosoda and colleagues in Kitakyushu City, Japan, and Tianjin, China, joined in a three-year pilot project for recycling mixed plastics. The results were published in a 2009 report entitled, "A Guideline on Cross-Border Trading for Recycling: Kitakyushu-Tianjin Method." The combination of using electronic tags for tracking the movement of plastics, establishing an institute to certify private companies, and the participation of representatives from the cities of Kitakyshu and Tianjin, have been key to the success of the project. "This model for waste recycling and management is globally transferable across national borders," says Hosoda.

Hosoda Laboratory:
web.econ.keio.ac.jp/staff/hosoda/