

Innovating the Innovation System: Changes in Japanese Universities

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Background: The Need for Change

There are approximately 750 four-year universities in Japan, including 87 national universities. National universities are the engines of advanced academic research; they accounted for 72% of the almost 16,000 doctoral degrees awarded in 2006 (Table 1). Six of the national universities regularly appear in lists of the world's top institutions of higher education (Table 2). However, patterns of funding, regulatory constraints, and cultural factors isolated the university sector from much of the practical innovation in Japan, which has been largely industry-internal. Other issues, such as language and geographic distance, have made it difficult for Japanese universities to collaborate with foreign partners and be integrated into the international flow of top students and scholars. And, Japanese universities will face even more severe challenges as Japan's low birthrate leads to declining numbers of students and reductions in the national tax base.

The primary channel of government funding for university research in Japan is the Ministry of Education, Culture, Sports, Science and Technology (MEXT). Until recently, almost all MEXT research funds were allocated to university depart-

ments according to the track record and seniority of their professors. In contrast, US professors must compete for research funds, and they actively seek matching funds from industry to strengthen their proposals for US government grants.

The regulatory framework likewise isolated Japanese universities. As government employees, professors in national universities were prevented from almost all outside consulting. They were locked into a rigid personnel hierarchy that discouraged younger faculty from embarking on new directions of research and from collaborating across departments. Universities lacked both the legal framework and the infrastructure necessary to market intellectual property.

Moreover, cultural factors distanced the university from industry in Japan. The tradition of lifetime employment made it more practical for a company to hire younger researchers for their general potential and then provide them with extensive on-the-job training. In the United States, companies pay a premium to hire researchers (often with Ph.D. credentials) who can immediately contribute expert knowledge to a particular R&D challenge, but in Japan companies typically pay about the same wage to all new hires, regardless

of whether they have a Master's or a Ph.D. Indeed, Ph.D. graduates are often regarded as too narrowly focused and unresponsive to the company's real-world needs.

Regulatory Reforms

Government reforms affecting Japanese universities have been accelerating since 1991, when regulations on the creation and reorganization of universities were relaxed. More recent reforms have focused on integrating universities more closely with industrial innovation as well as on improving the competitiveness and management efficiency of the universities. These reforms amount to a sea change in the intellectual property frameworks, funding mechanisms, and management structures that form the core of the university system in Japan.

For example, the 1998 Law Promoting Technology Transfer from Universities to Industry established for the first time a system of Technology Licensing Offices (TLOs) to market intellectual property on behalf of universities and their professors. At present, TLOs fall into various types: some are for-profit, others nonprofit; some are university-internal, others external; others are region-wide. Many universities subsequently established separate intellectual asset management offices within their organizational frameworks. As a consequence of such changes, patent filings from Japanese universities have increased dramatically over the last 10 years, and licensing revenues to Japanese universities have grown from less than ¥30 million in 1999 to almost ¥1.1 billion in 2005.

Universities must now obtain an increasing share of their budgets from competition-based programs. MEXT has been reducing its allocations of core operating funds to the national universities by about 1% per year since 2004, but some university budgets are actually growing as the universities obtain more competitive grants. MEXT is still by far the largest

Table 1 Graduate degrees awarded by Japanese universities (2006)

	Total	Engineering	Science	Social Science	Humanities	Health	Other
Master's	72,531	30,617	6,281	8,679	5,157	4,682	17,115
National Universities	41,580						
Other Public	3,999						
Private	26,952						
Doctoral	15,973	3,679	1,522	1,302	1,298	4,920	3,252
National Universities	11,429						
Other Public	818						
Private	3,726						

Source : Data from MEXT website <<http://www.mext.go.jp>>

Table 2 Japanese universities in world rankings (2007)

	ARWU* ranking	THES** ranking
University of Tokyo	20	17
Kyoto University	22	25
Osaka University	67	46
Tohoku University	76	102
Nagoya University	94	112
Tokyo Institute of Technology	99	90

Source : * Academic Ranking of World Universities, Institute of Higher Education, Shanghai Jiao Tong University (2007), ** The Times Higher-QS World University Rankings (2007)

Table 3 Major New Features of National University Corporations

Budget and financing	As a legal entity, the university can secure private financing, buy and sell land and other assets, and enter into various legal agreements, including partnerships with private-sector firms. Most financing continues to come from MEXT, but the process has shifted away from prior approval to post facto evaluation. Universities file action plans and are awarded funding based on their performance in achieving proposed goals.
Personnel	Because university personnel are no longer government employees, they can participate in consulting, serve as directors of corporations, and engage in other outside activities. Universities have more freedom in hiring; they have local authority to determine individual pay based on performance.
Management structure	The university president appoints a board of directors, which may include outside directors. The president and the board bear legal responsibility for the university. The power of the university president has been increased. For example, the president has discretionary funds to seed new projects and areas. The university management reports to a management council, which includes at least as many outsiders as university personnel. A subcommittee of outsiders on the management council conducts the selection and evaluation of the president.

Source : Author's compilation from MEXT and other sources

source of such competitive funding, which includes a number of programs aimed at elevating existing research strengths into world-class efforts. For example, from 2002, MEXT introduced the “21st Century Center of Excellence” program. In 2003, this program awarded 133 five-year grants to national and also private universities in the range of ¥100–¥500 million per year, including 25 grants to establish interdisciplinary research programs. This program is also innovative for MEXT in that it is managed by an outside third party, the Japan Society for the Promotion of Science (JSPS).

JSPS has taken on the management of an even more high-profile MEXT initiative that began in 2007, the World Premier International (WPI) Research Center program. This program establishes five globally visible research centers at Japanese universities and research institutes with awards of over ¥1 billion per year to each grantee for up to 10 years. The WPI center requirements aim to have a transformative effect on the host institutions. The centers are international: at least 30% of the investigators in each center must come from outside Japan, and the official language of the review process is English. The WPI centers aim at interdisciplinary approaches that involve collaboration across multiple departments or even multiple institutions. And, the grantees must make major matching commitments with funds from the host institutions or external partners.

The single greatest change in the Japanese university system since World War II, however, occurred on April 1, 2004, when the national universities were transformed into “national university corporations.” Under the new National University Corporation Law, the national universities interact with the Japanese government from the fundamentally different legal status of “independent admin-

istrative institutions.” The new status immediately changed the way the national universities conduct their budgeting and financing, personnel management, and governance (Table 3). The universities are taking advantage of their new status, but the full effects of the legislation are still filtering into university culture.

Change in Progress

I have been able to view such changes as a participant, having been appointed as an outside member of the board of directors of Tohoku University from April 2004. After a one-year term, I moved to the university's management council and took on the additional role of advisor to the president. During this time, the university has elected a new president, reorganized its central administration twice, created major new programs and a network of overseas facilities, and embarked on a major land development project. (The university is buying an old golf course, on which it will build a major new campus that will include a science park. It is partially financing this venture through the sale of some of its existing land and property.)

Bolstered by the government reforms, universities have strategically emphasized internationalization and the development of new relations with industry. For example, many have established overseas offices to market university research results and administer new overseas study programs. These programs typically include visits to companies and presentations by business leaders. So many Japanese universities have established such offices in the Silicon Valley area that they have formed an association, the Japanese University Network in the Bay Area (JUNBA), to exchange information on best practices. The 2008 JUNBA Symposium included a technology fair that featured 15 Japanese

universities.

Japanese universities are also hiring more faculty from outside the academic community, often on special contracts that are separate from the core budget. One mechanism is the creation of *kifu kouza* (“donated chairs”) from private companies. Similar to a “faculty development chair” in the United States, the company provides the university with an expendable gift that supports the salary and research expenses of a professor for a contractual period, typically three years. The number of such chairs and special-hire professors has expanded rapidly since 2004.

The universities have also become more aware of some areas that still need to change. The difficulty of interdisciplinary cooperation has led to calls for matrix management. Universities are looking for ways to change the conservative attitudes of faculty councils toward hiring and promotion, which has discouraged faculty mobility inside Japan. Universities are struggling with how to use the new evaluation standards and procedures in order to reward their brighter stars while incentivizing other faculty to improve their performance.

The Outlook

Within the next few years, Japan's changing demographics (fewer young people and a shrinking tax base) will present Japanese universities with their greatest challenge. Strong universities are likely to become more competitive; mergers and consolidation of other schools are likely to increase. In this process, universities will naturally come to supply graduates with more practical knowledge and international sophistication as society, especially the companies that hire the graduates, comes to demand it. Similarly, closer integration of university and industry into an innovation system will likely occur as the economics of industry R&D become more severe. Government reforms have provided Japanese universities with the flexibility to meet these challenges; it is now up to them to do so. **JS**

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