According to NSF figures, 1,276 Japanese students earned doctoral degrees in science and engineering in the United States over the 10-year period from 1986 through 1995. Students from the People's Republic of China, Taiwan, South Korea, and India earned 6 to 11 times as many U.S. doctoral degrees in that time. Hong Kong had almost as many science and engineering Ph.D.s to its credit as Japan. Moreover, with respect to recent doctoral recipients in the sciences with jobs in the United States, Japan ranked last among the top 10 countries, with only 30 in 1995. It had the third-smallest number of graduates and the lowest proportion of those remaining to work in American laboratories. China led the list with 2,446 postdoctoral workers. Japan did not even appear on the top-10 list of the country of origin of foreign-born science and engineering faculty in U.S. higher education.[7]

Japanese science does not seem any more cosmopolitan in terms of international coauthorship. From 1991 to 1995, the ratio of internationally coauthored scientific articles to all scientific literature coming out of Japan was 13 percent. That placed it in a multiple tie for last place with India and "other former USSR" countries.[8]

In conclusion, the business orientation of Japan's R&D was correctly identified in the past as the foundation of the country's technological strength. Now, that is a growing problem. In advanced countries, the linkages between basic research and the economy have intensified to such a degree that the practical orientation of much of Japan's scientific community and the acknowledged weaknesses of its basic research and university science may retard productivity growth in the future. ■

Notes

1. National Science Board, *Science & Engineering Indicators—1998* (NSB 98-1) Washington, D.C.: Government Printing Office, 1998), 5–41.
2. Robert M. May, "The Scientific Wealth of Nations," *Science*, February 7, 1997, 793.
3. Francis Narin, Kimberly Hamilton, and Dominic Olivastro, "The Increasing Linkage Between U.S. Technology and Public Science," *Research Policy*, 1997, 318–19.
4. Francis Narin, *Linkage Between Basic Research and Patented Technology* (Haddon Heights, N.J.: CHI Research, August 14, 1996).
5. Lynne Zucker, Michael Darby, and Marilynn Brewer, "Intellectual Human Capital and the Birth of U.S. Biotechnology Enterprises," *American Economic Review* 88, no. 1 (March 1998): 297.
6. Michael R. Darby and Lynne G. Zucker, *Star Scientists, Institutions, and the Entry of Japanese Biotechnology Enterprises* (Working Paper 5795) (Cambridge, Mass.: National Bureau of Economic Research, October 1996), 1.
7. National Science Board, *Science & Engineering Indicators*, Appendix tables 2-43, 2-38, 2-42.
8. Ibid., Appendix Tables 5-53.

Higher Education Reform in Benin in a Context of Growing Privatization

Corbin Michel Guedegbe

Corbin Michel Guedegbe currently works for UNDP-Benin as Project Officer and teaches at the Catholic Institute for Francophone Africa in Cotonou, Benin. Address: BP 03-0688, Cotonou, Benin. E-mail: mcgued@intet.bj

Over the last two decades, considerable progress has been made in expanding the knowledge base relating to the state of higher education in sub-Saharan Africa and of possible strategies and actions to improve its overall condition. This was facilitated by the numerous regional studies as well as diagnostic studies conducted at the country level. Nowadays, "revitalization" has become one of the most common and recurring themes in the literature concerning reform in higher education in the region and stands as the key strategy recommendation of the 1997 report prepared by the Association of African Universities and the World Bank.[1] In line with this report, the February 1999 meeting of the Conference of Rectors, Vice Chancellors and Presidents of African Universities in Arusha, Tanzania, focused on the theme "Revitalizing Universities in Africa: Strategy for the 21st Century."

Despite the availability of a solid, relevant, and reliable information base on which reform could be founded, not much has happened, and the condition of African universities keeps worsening. This situation is mainly due to the fact that the solutions proposed by the several studies are not being (or cannot be) implemented because of an inability to take the necessary actions. The reasons accounting for this inability include:

- the scope of the available information;
- the lack of will to effect changes as a result of conservatism (resistance to change) and various nonacademic concerns;
- a limited perception of the role of higher education in a country's development; and
- the nature and scope of the solutions proposed, which are sometimes too ambitious for the limited resources available.

The inability to take necessary actions results from objective and subjective factors. Thus, it is necessary that effective policies should address both macropolicy issues regarding the relationship between higher education and development in general and internal questions specific to the institutions of higher education.

The recent "audit" (comprehensive review)[2] of Benin's higher education system addresses these aspects. It analyzed the overall functioning of the university (structures,

teaching, research, financial management, personnel management, and student services) as well as university relations to the state, and made recommendations for addressing the various issues. Among the external factors identified as working against higher education reform in Benin was the authorities' failure to reconcile a planned approach to higher education with the current liberal economic orientation. This method of initiating higher education reform is based on a comprehensive review. This is an approach most common in British Commonwealth countries and involves outside experts who periodically review all aspects of a higher education system or institution at the invitation of government.

The Background

The orientation of the socialist system of government in Benin, from the mid-1970s to the late 1980s, had a major impact on economic, political, and social life and particularly on the educational system, which underwent profound changes. Within the context of higher education reform initiated in the mid-1980s, a second group of institutions, called "professionalized schools or institutions" was established within the national university system. The declared objective of this planned approach was to adjust the training provided in higher education to the manpower needs of the country. The new types of entities included three integrated teacher training institutes and one advanced teacher training institute, which were to supply teachers for primary, junior secondary, and senior secondary institutions. As a result of the crisis of the late 1980s, the government could no longer guarantee jobs to all university graduates as before, which led to increasing graduate unemployment. The educational system suffered greatly from the situation since the government decided to close down the three above-mentioned teacher training institutes of the National University of Benin.

With the emergence of the democratic system of government, a free-market economy was established as opposed to the former state-planned socialist type. In the new context, private educational institutions including higher education ones flourished.

The Current Situation

At present, higher education in Benin is characterized by a rapid increase in the number of public and private institutions at all levels. In 1998 there were 27 authorized private higher education institutions totaling 16.72 percent of overall higher education enrollment, while no such institution existed in the early 1990s. The only teacher certification higher education institutions are not allowed to perform their function, which is essential to ensure quality teaching. Public higher education, which still has a leading role to play, is not responding to the needs of the other levels of the system because it is still suffering from past policies based on the planned approach. This was pointed out by the recent audit of public higher education.

What needs to be done?

Within the context of increasing demand for public education and of privatization of the educational services, there is an urgent need to get rid of all remnants of the past socialist philosophy that ensured public employment to all university graduates. In the coming years, public higher education will have to play a key role in the development of education not only in providing teachers to lower levels of the system but also in giving guidance and orientation to the emerging smaller private higher education institutions. Thus there is no longer any justification for closing down teachers colleges because jobs are no longer available in the public sector for graduates.

But to perform all these functions adequately, it is necessary that public higher education undergo profound changes as highlighted in the audit report. These changes are summarized in the 13 recommendations for reform proposed in the report, covering the following areas:

- appointment mode for the rector;
- composition of the university council and core commissions;
- status and organization of the faculties;
- accounts and budgets;
- student flows and adjustment of resources on the basis of enrollments;
- organization of teaching;
- conditions and regulation of research;
- personnel management and performance as a criterion for evaluation;
- reorganization of the central administration;
- academic structures;
- organization of university libraries;
- organization of student services (housing, transportation, catering, and health); and
- scholarship allocation system.

The audit provided a solid information base as well as proposals for good decision making. However, the willingness to engage in reform remains a key factor to fight the "inability" to take necessary actions. Pressure from the emerging private higher education sector will certainly be a determining factor in initiating these much-needed reforms. ■

Notes

1. *Revitalizing the Universities in Africa: Strategy and Guidelines* (Washingon, D.C.: World Bank, 1997).
2. The review was conducted by a team led by G. Verhaegen, former rector of the Université Libre de Belgique (Belgium).