

Higher Education in Innovation and Economic Development: Changing Paradigms

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The past several decades saw a significant change in the way policymakers regard higher education. Today, many countries have explicit metrics about university engagement with the economy; some, such as England and Scotland, have established special government funding streams based on such metrics. The notion of desirable engagement is becoming broader, to include a broad range of roles for regional economic development through education, research, as well as culture-related activities. An awareness has also increased that different universities play different roles, depending on their capabilities and industrial contexts.

LICENSING

Obviously, not all universities can expect sizable licensing revenues or to break even. In the United States, universities that generate surpluses usually hold significant research capacity, with a critical mass of professionals in Technology Transfer Offices and a large portfolio of patents. Licensing incomes are also notoriously uneven—with a small number of “blockbuster” patents earning the bulk of revenues. In the United States, the number of new entrants in licensing activities is no longer large. The net royalties rose from US\$1,000 million in 2000 to nearly US\$1,600 million in 2005, though the US patents granted rose from 1,550 in 1995 to 3,450 in 2003 and thereafter declined to 2,944 in 2005.

Elsewhere, the statistics provide a buoyant image, though concerns have emerged about costs that are generally not reflected in these numbers. The Europeans reported annual increases in the number of patents granted (24%) and license incomes (12%) between 2004 and 2007. In Japan, the number of patents owned by universities increased by 80 percent from 2,313 to 4,225, with licensing revenues increasing by over 40 percent between 2003 and 2007. Chinese universities have been active in patenting since 1985, when China joined the World Trade Organization; nearly 40 percent of domestic applications came from public-research institutions and universities in 2005, two-thirds of which from universities.

UNIVERSITY SPIN-OFFS

The creation of spin-offs has also expanded in many Organization for Economic Cooperation and Development (OECD) countries. In the United States, the number of spin-offs stood at 555 in 2007, up from 454 in 2000, with a cumu-

lative total of 3,388 companies. In Europe, one survey reported that the number of start-ups increased by 10 percent annually between 2004 and 2007 and that European universities are more efficient in generating spin-offs per dollar invested in research compared with US universities. In Japan, the total number of university start-ups reached 1,773, tripling in 6 years. However, the number of companies does not reflect their commercial success, and attention is shifting to their performance (e.g., in generating jobs).

Chinese universities have been creating enterprises since the late 1980s. Some of them have been spectacularly successful, with 40 university enterprises listed in stock markets. These companies appear somewhat different from the classic spin-offs, in that they are managed directly by universities and are more often based on adaptation of existing technologies rather than scientific discoveries. Some argue that the main university contribution has been to bring together talented people into the high-tech industry, in the industrial context of limited technological capacity.

Industry-funded research. The share of industry-funded academic research in OECD countries rose from 3 percent around 1980 to 6 percent in the 2000s. However, such an indicator does not work universally, as some countries such as Korea and China showed high proportions of industry funding, because of limited government funding of university research. Developing countries with a limited industrial base also produce limited industry-funded research.

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Consulting. As a common activity, consulting is undertaken by many academics worldwide, though usually not visibly so, given that academics carry out most of such activities privately. This work's overall value has been more broadly acknowledged; in one survey, 32 percent of R&D managers rated consulting as significant for industrial R&D, as compared with 21 percent for contract research and 18 percent for patents and 10 percent for licenses. In another survey of Massachusetts Institute of Technology professors, consulting was perceived as the most vital channel of knowledge transfer; patents and licenses were deemed one of the least important channels. In the United Kingdom, the consultancy volume has more than doubled in real terms over the last six years (though this includes effects of institutionalizing contracts rather than pure increases); today, its size is significant at 37 percent of contract-research incomes.

THE ROLE OF RESPONSIVE EDUCATION

Highly skilled graduates are being recognized as key inputs for successful industrial development. In India and China, large numbers of graduates in science and engineering were critical to meet the growing industrial demand. In Ireland and Finland, professional institutions were created as an alternative to conventional university education, which was viewed as unresponsive to industrial needs. The development of the software industry was greatly facilitated by an early establishment of computer science as a new discipline in American universities; indeed, the American universities created and legitimated computer science as a new field, an ability unparalleled by European or Japanese universities.

COOPERATIVE EDUCATION/STUDENT PROJECTS

An emerging literature describes roles that students can play through their work-study programs. For instance, the co-op education program in the University of Waterloo serves three critically important functions: the program helps identify appropriate graduates for recruitment; students help firms acquire new skills and knowledge from the universities; and students help “circulate” knowledge across local firms and the university. The impact is not limited to developed countries; in Bolivia, a majority of academic staff rated student internship as one of the most relevant contributions to industry.

ENTREPRENEURSHIP EDUCATION

Today, many programs, from isolated courses on entrepreneurship to comprehensive practical programs, support the development of entrepreneurs. One Web-based review of 66 universities in sub-Saharan Africa found that over 80 percent offered some course in entrepreneurship, while four universities had specialized entrepreneurship centers. The Global Entrepreneurship Monitor, an international group of researchers who have been conducting an annual survey of entrepreneurship since 1999, introduced entrepreneurship training as a special topic in 2008. The findings generally involved positive relationships between entrepreneurship training and entrepreneurial attitude, aspirations, and activities. However, a wide variation was found in the proportion of 18-to-64-year-olds who received voluntary entrepreneurship training at colleges and universities—from 1 percent in Turkey or 4 percent in Korea, 13 percent in Chile, 16 percent in Finland, to 20 percent in Columbia.

EXECUTIVE EDUCATION AND PROFESSIONAL DEVELOPMENT

Executive education constitutes a critical activity in many business schools in North America (and increasingly elsewhere), and many universities also offer short-term, often tailored education programs for working adults. However, this part, rather like consultancy, represents another category of activity usually not monitored. In the United Kingdom, university incomes from this type of contracted activities significantly produced 62 percent of contract research incomes.

CULTURE-RELATED DEVELOPMENTS

Universities can play a less direct but still effective economic role, by setting the social, cultural, and intellectual tone of a locality, as highlighted by a recent OECD review. Universities in the Northeast of England worked actively to create a cultural quarter in Newcastle city center. The University of Pennsylvania embraced community development as part of its strategic mission. It is today engaged in a wide array of community development initiatives ranging from economic development plans in collaboration with local communities, extensive support to local schools, and a variety of “service” programs including student projects and volunteering.

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CONCLUSION

If different institutions are to play varied sets of roles, how should such roles be determined? External stakeholders are ill-positioned to define them. Internal stakeholders alone are often too complacent to define their roles. Further topics concern how institutions are developing their boundary spanning functions and how these in turn are helping them define their roles. ■

Measuring Learning in Higher Education in a Globalization Era

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Higher education is coming under increasing scrutiny, spurred by growing enrollments and rising college costs. In particular, stakeholders are increasingly asking whether students are learning and whether institutions are providing a quality of service that justifies their cost. Although little agreement to date has been reached on how to assess learning or even on the utility of imposing a single standardized measure