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Turning Discovery Into Health

GLOBAL COMPETITIVENESS – THE IMPORTANCE OF U.S. LEADERSHIP IN SCIENCE AND INNOVATION FOR THE FUTURE OF OUR ECONOMY AND OUR HEALTH

The National Science Board's [Science and Engineering Indicators 2012](#) provide insight into how crucial decisions on research and development (R&D) funding may affect our nation's ability to thrive in an increasingly competitive and knowledge-driven global economy. An increasing number of indicators—from trade balances in pharmaceuticals and shares of global pharmaceutical-industry output to higher education—show that expanded investment and policies designed to enhance their life science industry have enabled several countries' life sciences industries to become competitive with that of the United States. These indicators, in conjunction with a recent report, [Leadership in Decline: Assessing U.S. International Competitiveness in Biomedical Research](#), provide a clear picture: the competitive position of the U.S. life sciences industry has been eroding over the past decade.

Global Research Investment

- The U.S. life sciences industry supports more than 7 million jobs and contributes \$69 billion annually to U.S. gross domestic product (GDP), but trails the developed world in government investment in medical science R&D as a share of GDP. In 2011, a \$1 billion public investment in medical R&D would increase GDP by 0.048 percent annually, or roughly \$6 billion.
- Between 1999 and 2009, the Asian region's share of worldwide R&D expenditures grew from 24 percent to 32 percent while the U.S. R&D expenditures declined from 38 percent to 31 percent.
- In 2011, the European Community recommended increasing investments in research budgets to \$108 billion in 2014-2020, a 40 percent increase over the previous seven year period.
- In 2011, the United Kingdom adopted a national *Strategy for U.K. Life Sciences* mandating substantial new targeted investments in life sciences research, and reforms taxes, regulations, and talent policies to make the United Kingdom a global center for life sciences, even after the conservative government passed a tough package of austerity measures.
- China's government pledged to increase its basic research investment by 26 percent in 2012 and will put more than \$300 billion into biotechnology over the next five years, twice what the United States is currently expected to invest.
- China has attracted a significant share of private-sector investment and is now the world's second largest source of venture capital for inventions involving medical technology.
- China is becoming the world leader in genome sequencing. The country's recent \$60 million purchase of 128 cutting-edge genome sequencers through the Beijing Genomics Institute (BGI) has

given it the world's largest next-generation sequencing capacity—with more sequencing capacity than the entire United States or about one-third of total global capacity.

International R&D Comparisons

- The top three R&D-performing countries: United States, China—now the second largest R&D performer—and Japan represented just over half of the estimated \$1.28 trillion in global R&D in 2009.
- The United States, the largest single R&D-performing country, accounted for about 31 percent of the 2009 global total, down from 38 percent in 1999.
- Asian countries—including China, India, Japan, Malaysia, Singapore, South Korea, Taiwan, and Thailand—represented 24 percent of the global R&D total in 1999 but accounted for 32 percent in 2009, including China (12 percent) and Japan (11 percent).

Trade and Other Globalization Indicators

- China's share of pharmaceutical industry output increased nearly seven-fold, from 2.5 percent in 1995 to 18.3 percent in 2010. The U.S. share held steady over this period, starting at 25.8 percent in 1995 and ending at 26.6 percent in 2010.
- The United States has run a negative trade balance in pharmaceutical products every year since 1997 in stark contrast to countries such as Singapore, which increased its pharmaceutical trade balance as a share of GDP by a factor of ten, from 0.25 to 2.63 percent in the 2000s.

Global Science & Engineering Labor Force

- Worldwide, the number of workers engaged in research has been growing since at least 1995. Among countries with large numbers of researchers, growth has been most rapid in China, where the number of researchers tripled, and South Korea, where it doubled.
- The United States and the European Union experienced steady growth but at a lower rate than in China or South Korea; both increased from about 1 million in 1995 to nearly 1.5 million in 2007.
- China is actively recruiting highly-qualified Chinese nationals living abroad to return home, offering substantial financial rewards and prestigious titles. The Chinese government is specifically targeting researchers with patents in promising areas like nanotechnology and cellular biology.

International Science & Engineering Higher Education

- In 2008, about 5 million first university degrees were awarded in science and engineering (S&E) worldwide. Students in China earned about 23 percent, those in the European Union earned about 19 percent, and those in the United States earned about 10 percent of these degrees.

- In 2007, China overtook the United States as the world leader in the number of doctoral degrees awarded in the natural sciences and engineering.
- The U.S. leads the world in numbers of international students, with roughly 40 percent of international students in the United States reporting at least part of their studies as being financed by grants and scholarships based in the United States; however, there is no program specifically designed to facilitate – or incentivize – permanent residency, not even for highly talented and marketable graduates.

Outputs of S&E Research: Articles and Patents

- Scientific publications are a key indicator of R&D investments. S&E article output worldwide grew at an average annual rate of 2.6 percent between 1999 and 2009. The U.S. growth rate was much lower, at 1.0 percent.
- The United States accounted for 26 percent of the world's total S&E articles in 2009, down from 31 percent in 1999. The share for the European Union also declined, from 36 percent in 1999 to 32 percent in 2009.
- The United States remains the world's leading grantor of biopharmaceutical patents, but during the past decade its share of all biopharmaceutical patents awarded fell by 5 percent, from 38 percent to 33 percent while China's share of patents experienced a dramatic rise, increasing 12 percentage points from 4 percent in 2000 to 16 percent by 2009.

Resources

Atkinson, Robert, et al., [“Leadership in Decline: Assessing U.S. International Competitiveness in Biomedical Research.”](#) Information Technology and Innovation Foundation and United for Medical Research May, 2012.

National Science Board. 2012. [Science and Engineering Indicators 2012](#). Arlington VA: National Science Foundation (NSB 12-01).

The Partnership for a New American Economy & The Partnership for New York City. [“Not Coming to America: Why the US is Falling Behind in the Global Race for Talent.”](#) May 2012.