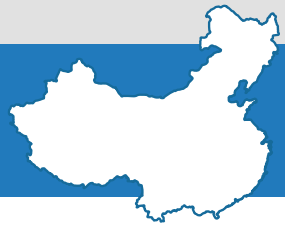
National Science Board
Science and Engineering Indicators
2018

THE RISE OF CHINA IN SCIENCE AND ENGINEERING



The global landscape of science and engineering (S&E) research, education, and business activities has undergone dramatic shifts since the turn of the century. China, as it invests heavily in building its S&E capabilities, is challenging the traditional leaders in the S&E enterprise - the United States, European Union, and Japan.

A country's strength in S&E arises from a skilled, STEM-capable workforce and sustained investment in research and development (R&D) to produce new knowledge and innovations. Four vital benchmarks of S&E performance are drawn from the *Overview* of the *2018 Science and Engineering Indicators* report, and highlighted here: R&D expenditures, production from high-technology manufacturing, bachelor's degree awards in S&E, and peer-reviewed S&E publications.

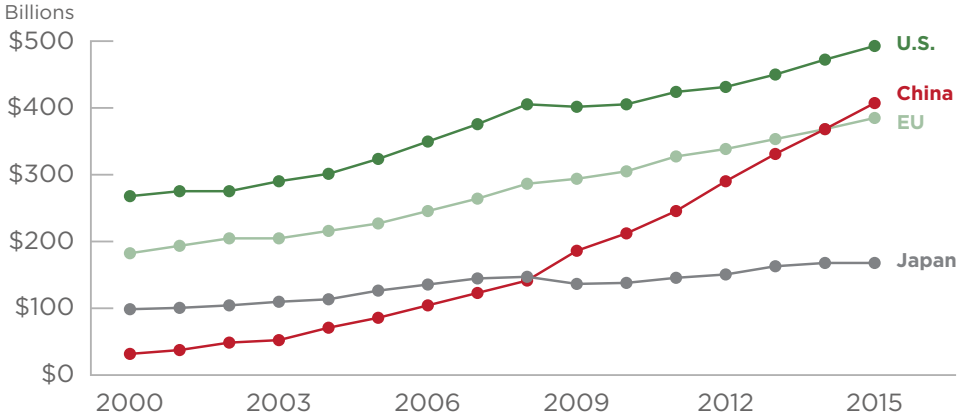
Research and Development

R&D spending is a driver of innovation. In 2015, the U.S. spent the most on R&D of any single country, accounting for 26% ($496 billion) of the estimated 1.9 trillion global total. China was a decisive second at 21% ($409 billion). China spends 5% of its total R&D funds on basic research and 85% on development, while the U.S. spends 17% on basic research and 64% on development.

China has rapidly increased R&D spending over time – an average of 18% per year between 2000 and 2015, compared to 4% in the U.S.

If current trends continue, the National Science Board expects China to pass the U.S. in R&D expenditures by the end of 2018.

Domestic R&D expenditures
by selected country or region: 2000 to 2015

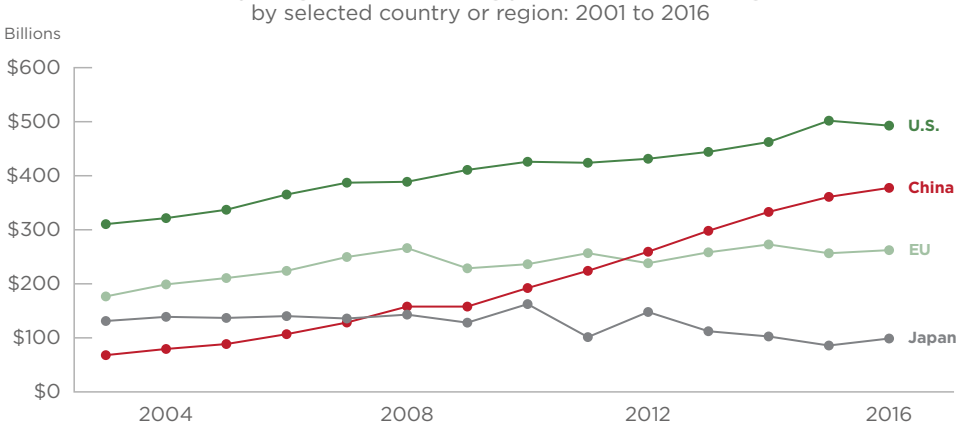


High-Technology Manufacturing

High-technology manufacturing industries include aerospace, computer and communications equipment, semiconductors, pharmaceuticals, and scientific instruments. The global output from high-technology manufacturing totaled $1.6 trillion in 2016. The U.S. (31%) and China (24%) were the largest providers of the global share. China's output has risen sharply over time and now exceeds that of the EU.

As of November 2017, China claims 202 of the fastest 500 supercomputers in the world. The U.S. has 143 of the world's fastest supercomputers, the nation's lowest share over the past 25 years.

Production by high-technology manufacturing industries
by selected country or region: 2001 to 2016



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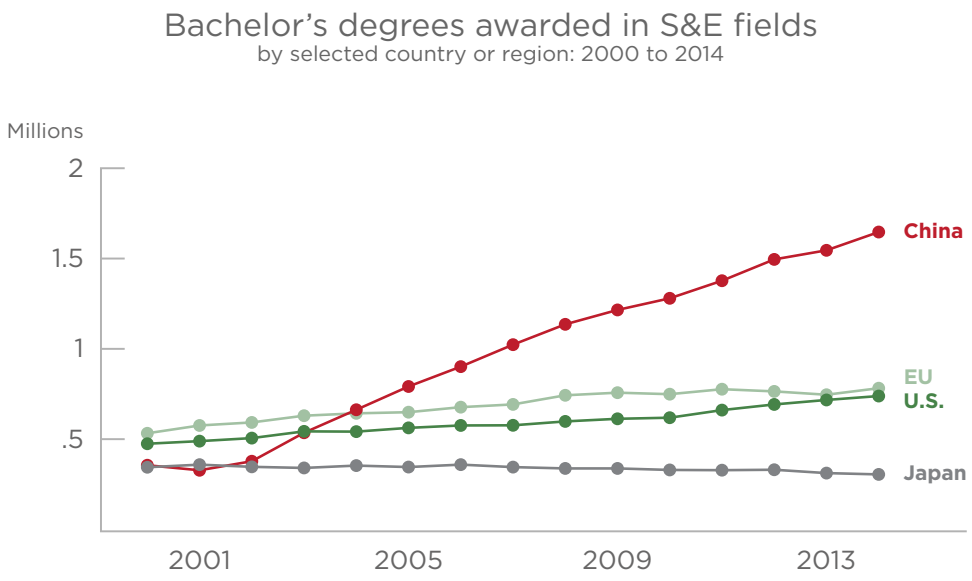
Science and Engineering Bachelor's Degrees

A country's investment in S&E education leads to a skilled, STEM-capable workforce. Globally, bachelor's degrees in S&E fields totaled more than 7.5 million in 2014. Almost half of these degrees were conferred in two Asian countries: India (25%) and China (22%). India is not shown due to intermittent data. The EU and U.S. followed with 12% and 10% of the global share, respectively.

Between 2000 and 2014, the number of S&E bachelor's degrees awarded in China rose more than 360% to 1.7 million. The U.S. had more moderate growth (54%) over the same period.

Between 2000 and 2014, the number of non-S&E bachelor's degrees awarded in China rose 1200% to 1.8 million.

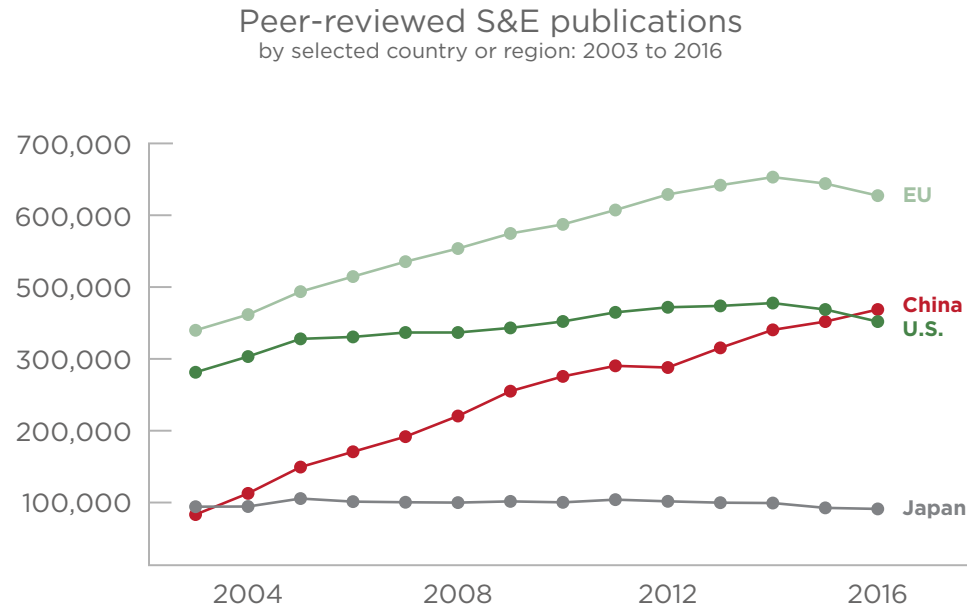


Science and Engineering Publications

Scientific research produces new knowledge that may spur innovation. The top two single countries producing peer-reviewed S&E articles are China (19% global share) and the U.S. (18% global share). When treated as one entity, the EU produces 27% of the global share.

China increased its production of peer-reviewed S&E articles by 8% annually between 2006 to 2016, compared to only 1% in the U.S. In 2016, China surpassed the U.S. in publications of S&E research papers. The publications included in these data have been vetted for quality by international experts using consistent standards across countries.

In 2014, publications with U.S. authors were almost twice as likely to be among the world's top 1% most-cited publications than would be expected based on the volume of U.S. publications.



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