

China Becomes World's Third-largest Producer of Research Articles

Story by: Kristine Novak, PhD, Science Editor, AGA Journals

Reviewed by Press Highlights Section Editor: Grace L. Su, MD, University of Michigan Medical School

China's research output has surged over the past decade, according to a series of [reports](#) from the US National Science Board. China is now the third-largest producer of research articles, behind only the European Union (EU) bloc and the US. The number of papers authored by Chinese scientists increased by an average of 15% annually from 2001 through 2011—from 3% of the global research article output to 11%.

The findings were presented in the [National Science Foundation's](#) (NSF's) *Science and Engineering Indicators*—a 600-page summary of trends in science and engineering research, education, workforce development and market economics for 2014.



[Nature News](#) wrote that the report is one of many signs that China is pushing to increase its share of global research and development. The economies of China and other Asian countries together accounted for more than one-third of the world's total \$1.435 trillion spending on research and development in 2011 — a greater share of global research and development, based on total dollars invested, than that of the US.

The report pointed out that China has almost tripled its number of researchers and science and engineering workers since the mid-1990s.

[US News](#) wrote that the US still offers the world's largest supply of scientists and engineers, but the report states that countries in East and Southeast Asia have “been catching up.”

Denis Simon, an expert on Chinese science and innovation at Arizona State University, told *Nature News* that there is nothing to indicate that the quantity of research coming out of China is consistently innovative. The share of Chinese research articles cited by scientists outside the

country has fallen over the past decades, indicating that China's increased research output is being used internally.

According to a citation index that takes into account the number of articles produced by each country, only South Korea and Taiwan cite Chinese research articles at a rate expected based on their number, wrote *Nature News*. The US, on the other hand, remains the leading producer of highly cited articles. "The center of gravity for creativity in research still resides in the West," Simon said.

The report revealed other major changes in technology occurring in Asia. *US News* wrote that from 2003 through 2012, China's high-tech manufacturing sector grew 5-fold—an increase that tripled its contribution to global high-tech manufacturing from 8% of the market to 24% in just 9 years. In comparison, the US made up 27% of the global total of high-tech manufacturing in 2012.

The rapid growth of China's manufacturing sector came as it continued to spend on education and research and development in science and engineering, said *US News*. In contrast, spending in these areas decreased in North America and Western Europe when the economy slowed in late 2008.

The NSF reports state that the global economic downturn had significant effects on trends in science and engineering—especially in developed economies. However, during the downturn, economic activity involving science and engineering increased in the developing world, continuing the gradual shift in the world's knowledge-based economic activity toward developing nations and away from developed ones. This increase, it continued, was especially "pronounced in Asia."

Research and development spending in China alone increased from 2.2% of the global total in 2000 to 14.5% in 2011. This contributed to the leap in East and Southeast Asia from 25% to 34%.

Similar spending in the US fell from 37% to 30% of the global total, and spending in the EU decreased from 26% to 22% over the same period, in large measure due to reduced government, industry, and university spending during the economic downturn.

"Many of those developments appear to have been temporary, and there are signs of a return to pre-downturn patterns and trends," the report said. However, the US has "a less dominant role in many areas" of science and engineering activity, so further "potentially disruptive developments" could be on the way.

Visit www.gastrojournal.org for more articles.
