

China becomes world's third-largest producer of research articles

But quantity is being favored over quality, experts say.

Chinese science is on the rise: the country is now the third-largest producer of research articles, with its output surging during the last decade, according to a report released today by the US National Science Foundation (NSF). The number of papers authored by Chinese scientists grew an average of more than 15% annually between 2001 and 2011, rising from 3% of global research article output to 11% over the decade — even as production from the combined 28 nations of the European Union and the United States declined.

The finding from the 2014 edition of the NSF's [*Science and Engineering Indicators*](#) — a 600-page round-up of trends in science and engineering research, education, workforce development and market economics — is one of many signs that China is pushing to increase its share of global research and development (R&D).

The economies of China and other Asian countries together accounted for more than one-third of the world's total US\$1.435-trillion spending on R&D in 2011 — a greater share of global R&D, based on total dollars invested, than that of the United States. And in 2012, China spent slightly more of its gross domestic product on science than the European Union, according to [figures released in January](#) by the Paris-based Organisation for Economic Co-operation and Development.

That rise threatens the United States' position as a global leader in science and technology, says Mark Boroush, an NSF statistician who co-authored the indicators report for the National Science Board, which oversees the National Science Foundation. But that does not mean that US capabilities in science are eroding, Boroush says: "This is more of a catch-up by other parts of the world."

Denis Simon, an expert on Chinese science and innovation at Arizona State University in Tempe, says that there is nothing to indicate that the quantity of research coming out of China is consistently innovative. The number of citations of Chinese research articles by scientists outside the country has fallen over the last two decades, suggesting that China's increased research output is being used mostly within its borders.

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 the expected rate. The United States, 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 says.

In order for China to truly compete with the United States, investments in basic research would need to increase and a culture that discourages risk-taking would need to fade away, Simon says — adding that the leadership in China understands this. "It just means that the period of catch-up will be

somewhat slower than what is suggested by the rapid increase in publications.”