

# Why is China falling behind on breakthrough innovation?

**Qiang Zha** 17 July 2021

In the past decade, enormous weight was placed on publications in journals sourced by the Science Citation Index (SCI), a commercial citation index that records citations of articles published in its indexed science, medicine and technology journals.

Those journals are thus considered to be leading, and publishing in those journals would not only lead to merit pay but also preference in appraisal exercises, leading to professional promotion and talent programme opportunities, in turn bringing increased personal income and research resources.

For example, a paper published in a top SCI-indexed journal could earn a bonus of up to US\$85,000. Consequently, China's annual outputs of papers published in SCI-indexed journals soared from 120,000 in 2009 to 450,000 in 2019.

Paradoxically, China's robust production of research publications did not translate into innovation. This was exposed by the US-China trade war, which revealed that China has been suffering from a severe deficiency in control over key technologies and intellectual property. Top Chinese universities are now perceived as being substandard in major technology development and transfer.

## Lack of innovation

A leading scientist in China, Shi Yigong, revealed a stunning reason for this behind the scenes: Chinese universities do not produce many original or breakthrough innovations. He further warned that the current campaign for boosting publications would not necessarily lead to a boost in science and engineering. Rather, it could usher in an appearance of prosperity, based merely on size and quantity of research publications.

As a result, China's ministry of education and ministry of science and technology released a policy document in February 2020 that officially discouraged the previously sanctioned practice of using the SCI as a main criterion for research appraisal.

According to the new policy, SCI-related indicators (for example, numbers of articles published in SCI-indexed journals, impact factors of the journals and numbers of citations of publications) were not to be accepted as direct evidence of research merit and the practice of paying researchers bonuses for publishing in SCI journals will be prohibited.

Recently, on 21 May 2021, the Chinese Communist Party's top leadership promulgated a guideline aiming to rectify the appraisal mechanism concerning science and technology outcomes. The document points out the problems of simplifying indicators, quantifying criteria and chasing trends blindly, and the utilitarianism in the current appraisal practices. It calls for a multivariate appraisal system with market-based assessment and mid-to-long-term evaluation as well as post-effect review.

## 'Involution' held responsible

A situation of "involution" has been cited as a factor responsible for this paradox. This

concept was originally used by anthropologists to describe how population growth in some agrarian societies is coupled with a decrease in per capita wealth. It is now becoming popular in China, where most people work harder yet wring out little progress in terms of social mobility.

When translated into the academic profession, “involution” refers to a paradoxical situation whereby most university-based researchers work harder and publish more papers, while the innovation strength of Chinese higher education does not grow significantly.

This paradox is vividly demonstrated by the fact that, on the one hand, a growing number of Chinese universities now make their way into the league tables of global rankings on account of their research publications and citations; yet, on the other hand, the United States could easily take advantage of China’s technology bottlenecks and hold China by the throat in the bilateral trade war.

### **Circumstances down the road**

The aforementioned policy measures demonstrate the effort of China’s government to break the circle of involution in which the country’s knowledge production appears to be trapped, and its commitment to restoring the production of innovative and high-impact research. Yet, outcomes might be contingent on, or constrained by, certain internal and external conditions.

Indeed, while the Chinese government has proscribed the use of the SCI-related indicators, it has not yet sanctioned any alternative appraisal mechanism. Externally, the dominance of academic capitalism carries features of the scarcity regime, which advocates focusing investment on top institutions and researchers – through constant and rigorous selections – in order to maximise research returns.

Researchers are thus propelled to publish as much and as quickly as possible in journals with high impact factors, which in turn generate good citation performance; their universities benefit hugely from such citations in the exercise of academic rankings. If Chinese universities’ ranking outcomes are hindered in this new policy environment, the government (and the universities as well) might want to revert to the old rules.

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