

For China to realise its research and innovation potential the government may have to place greater trust in the academic community



*After three decades of being the world's manufacturing powerhouse, China is now looking to science and technology to drive its economic future. However, a recent study suggests that China's higher education research environment faces numerous challenges that may hinder the country from realising its research and innovation potential; from the promotion of short-term thinking, to an excessive level of bureaucratic and governmental intervention. **Xueying Han** and **Richard P. Appelbaum** argue that for China to reach the next level of research and innovation, the central government may have to cede control and trust the academic community to take a more active role in guiding the country's research direction.*

China has high ambitions of becoming a global superpower. After nearly three decades of being the world's manufacturing powerhouse, China is turning to advances in science and technology to drive its economic future. How long it will take for China to transition into an innovation-driven, knowledge-based economy is still up in the air and will likely depend on many factors. One of which is the research environment at its higher education institutions. This is because universities can help countries maintain or increase their international competitiveness by helping produce a skilled workforce, and by providing a constant flow of research and innovation.

The research environment at Chinese higher education institutions may, therefore, have a substantial role in the success of China's economic transition. Our [recent research](#) suggests that China's higher education research environment faces numerous challenges that may hinder China from reaching its full innovative potential. As many of these challenges are cultural in nature, they may not be as easily addressed by increased governmental spending as, say, the infrastructure challenges of the past have been.

To assess China's research environment, we surveyed faculty members in science, technology, engineering, and mathematics (STEM) disciplines from China's top 25 universities. Many challenges for China's research environment were identified, the top five of which were:

1. A promotion of short-term thinking and instant success
2. The research funding process
3. An excessive level of bureaucratic and governmental intervention
4. The evaluation system
5. A reliance on human relations.

Not surprisingly, many of the challenges are interrelated. For instance, the evaluation system at Chinese universities reinforces short-term thinking and instant success. Though evaluations vary by department and university, Chinese faculty are often assessed on many of the same factors used by Western universities to determine tenure such as the amount of research funding obtained, the number of publications accepted, and the prestige (i.e. impact factor) of the journals published in. Other factors often used as part of the evaluation include the number of classes taught, and the number of Master's or PhD students graduated.

On the surface, the Chinese evaluation system does not appear to be all that different from those in Western universities. There are, however, a few key differences. The tenure-track system is still new and not widely implemented in China. Most universities are [still using the contract system](#), in which faculty renew their contracts with the university every three years. Contracted faculty members are evaluated both annually and on a three-year basis. Because of the frequency of evaluation, many expressed frustration and angst in having to constantly meet evaluation metrics and lamented that, as a result, it is often detrimental to their careers to undertake risky or long-term research projects that do not yield in quick publications. In addition, when faculty members do not meet the minimum requirements that are established in their contracts, their salaries could be docked, which further disincentivises individuals to pursue high-risk/high-reward research.



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At this point, you may be asking questions like: “Why don’t universities change the evaluation system?” “Why don’t universities get rid of the contract system and thereby, the constant need for evaluations?” “Why don’t universities reduce the frequency of the evaluations?” A large part of why the system is the way it is, like many aspects of China’s society, is because the central government wills it so. Just as researchers are evaluated by their departments, universities are evaluated by the central government. And just as researchers face repercussions for not meeting their set requirements, universities can face repercussions for not facilitating China’s goal of becoming a scientific powerhouse. China’s central government is known for its heavy handedness and higher education is no exception. It is of little surprise, therefore, that even though excessive bureaucracy and governmental intervention was identified as only the third of the top challenges facing China’s research environment, decreasing governmental and bureaucratic intervention and increasing overall freedom in higher education was nonetheless the top solution suggested by survey respondents for how to improve China’s research environment. This is because decisions regarding China’s higher education system are typically not made by the academic community but by political officials often with little to no academic research experience.

Recent events suggest that the central government’s top-down control on directing the path of research and innovation may not change anytime soon. During the annual assembly of the National People’s Congress in March, Chinese leaders announced that the National Natural Science Foundation of China (NSFC), the major funding agency supporting basic science research, will no longer be managed by the State Council but will be moved under the auspices of the Ministry of Science and Technology (MOST). This realignment has caused concern among Chinese scientists that smaller, researcher-initiated projects may give way to bigger, national priority, mega science projects. Findings from our study suggest that researchers would like to see the academic community take a more active role in guiding and deciding which research direction the country takes but it appears, for now, that the government may be moving in the opposite direction. Only time will tell.

We fully acknowledge that China has made impressive strides over the past few decades. Increased investments in and policies in support of research and development, infrastructure, and education have made China a scientific force to be contended with in many fields. In addition, China likely benefits from the law of large numbers. Scientific breakthroughs will occur if only because of the sheer number of researchers and amount of money spent on S&T R&D. We argue, however, that to reach the next level of research and innovation that China wants to achieve in which scientific breakthroughs are more systematic and not based on chance, the central government may have to do what it hasn’t done before — cede control and trust that the academic and research communities will be able to meet the country’s research and innovation needs, and take on a more supporting role by continuing to fund research and development efforts.

Lastly, by establishing a baseline of where China's STEM research environment is right now, we view our findings as a stepping stone for future studies. We hope that in 10, 20, or 30 years down the line, future studies that undertake a similar assessment can evaluate what, if anything, has changed in China's STEM research environment at higher education institutions, what brought those changes, and how those changes have affected China's drive for research and innovation. Similarly, a comparative study with American or European researchers would yield interesting insights on the differences and similarities between Chinese and Western higher education research environments. Many of the challenges documented in our study (e.g. pressure to publish, meet evaluation criteria, the funding process, etc.) are challenges found in Western universities too. Whether these challenges are viewed as the most pressing challenges by researchers in the United States or Europe is another question, one that deserves attention and consideration. China, just like any other country, has unique characteristics that are reflected in its infrastructure systems. How these systems change over time and how they compare with other systems are larger questions that should be tackled.

This blog post is based on the authors' article, "[China's science, technology, engineering, and mathematics \(STEM\) research environment: A snapshot](#)", published in PLoS ONE (DOI: 10.1371/journal.pone.0195347).

The authors have a forthcoming book – co-written with Denis Simon, Cong Cao, and Rachel Parker – in 2018 from Polity Press on [Innovation in China: challenging the global science and technology system](#).

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