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Evaluation of Scientific and Technological Research in China's Colleges: A Review of Policy Reforms, 2000–2020

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Abstract

Purpose: This study conducts a systematic review of policy reforms for the evaluation of scientific and technological research (E-STR) in China's colleges. In doing so, it identifies changes to past policies, as well as the objectives and realizability of the most recent policy reform.

Design/Approach/Methods: This study systematically reviews the contexts of E-STR policy reforms in China's colleges post 2000 using three important related policy documents from 2003, 2013, and 2020 as samples. Research findings were obtained via content analysis.

Findings: Unlike previous attempts, the most recent policy reform has incorporated the lessons learned while introducing highly targeted measures and a monitoring mechanism. Such reform should accelerate the promotion of major original scientific research in China's colleges, enhance the contribution of scientific research to socioeconomic development, and strengthen support for the cultivation of undergraduate talents.

Originality/Value: Initiated in the early part of 2000, China's latest E-STR policy reform constitutes an important turning point in the initiative to burst the research bubble and return to the essence of innovation. It will drive China's colleges to embark on a research path that places value on original innovation and contribution to socioeconomic development.

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In the mid-1990s, Scientific Citation Index (SCI) indicators were introduced into the evaluation of scientific and technological research (E-STR) in China's colleges. Subsequently, China's international publications have grown rapidly. But the original innovation performance has not improved accordingly. After 2000, the demand for reforming E-STR has grown. In 2020, the Chinese government released two policy documents that attracted widespread attention. The first was *Several Suggestions on Standardizing the Usage of SCI Papers and Related Indicators by Colleges and Establishing the Correct Approach Toward Evaluation*—jointly issued by the Ministry of Education (MOE) and Ministry of Science and Technology (MOST; MOE-MOST [2020] No. 2). The second was *Several Measures to Eliminate the Incorrect "Paper-Centric" Approach of Evaluating Scientific and Technological Research (Trial)*—jointly released by the MOST and Ministry of Finance (MOF) (issued by MOST [2020] No. 37). Both documents were immediately reported on and discussed by *Nature* (Mallapaty, 2020; Nature Editorial, 2020), while fervent debate occurred in China's mainstream media (Deng, 2020; Li, 2020; Zhao, 2020). This study provides a systematic review of E-STR reforms in China's colleges between 2000 and 2020. This systematic interpretation of how policy reform has changed over time offers valuable insights, including the identification of policy objectives and an evaluation of their realizability.

The differences between measures, 2000–2020

E-STR presents China's policymakers, colleges, and academic communities with a difficult and perplexing issue. Since 2000, there have already been three major E-STR policy reforms, including the current reform. This section explores the differences between the past and current measures.

In 2003, five ministries and commissions, including the MOST and MOE, jointly formulated *Decision on Improving E-STR Tasks* (issued by MOST [2003] No. 142). The policy identified several issues with E-STR, including the use of the same evaluation criteria for different types of STR activities, an emphasis on quantity over quality, and expert evaluations being influenced by personal relationships and connections. Further, the document clearly identified the need to properly examine the role of SCI, Engineering Index, and other databases in E-STR. The measure achieved some success, with the targeted approach and principles for category-based evaluation proposed in the document gradually becoming the consensus. However, there was no significant progress regarding the other stipulated requirements, such as prioritizing quality and addressing the shortsighted tendencies of seeking immediate benefits and fast returns.

This 2003 reform did not resolve issues with the E-STR system, including the emphasis on quantity over quality, singularization of evaluation indicators, and utilitarianism of evaluation results. Moreover, the measure failed to facilitate the conversion of STR achievements into practical applications and the use of science and technology to support talent cultivation. Consequently, the MOE's *Suggestions on Further Reforming E-STR in Colleges* was issued in 2013 (MOE-MOST [2013] No. 3), which proposed the evaluation goals of "encouraging innovation, servicing demands, integrating science and education, and developing characteristics." It established the evaluation approach of pursuing innovation quality and contribution and stipulated detailed regulations for category-based evaluation. The document received widespread praise upon publication. Further, the proposed approach toward reform was acknowledged by colleges, which were granted sufficient space to respond flexibly and according to their characteristics.

Finally, the MOE began drafting its 2020 policy in mid-2019. Entitled *Standardizing the Use of SCI*, the document deals with displaced behaviors related to colleges' use of SCI papers as evaluation indicators in reviewing faculty members (job title and performance), talents, disciplines, resource allocation, and college ranking. For example, it mandated that SCI papers and related indicators no longer be used as the bases for MOE-organized subject evaluations. In addition to recommending against using such indicators as the basis for decisions regarding the granting of cash rewards to individuals, the measure denounced the practice of requiring graduates to publish a certain number of SCI papers to obtain their degrees.

The MOST's 2020 policy covers all types of STR units. Its primary policy points advocate the following: (i) encouraging to publish papers in high-quality local STR journals; (ii) stipulating the maximum number of representative papers to be included in various types of evaluations; (iii) formulating the scope necessary for the recognition of "three types of high-quality papers," as well as encouraging the publication of STR results in related journals; and (iv) preparing a blacklist of journals that prioritize commercial gains and prohibiting the use of funding to pay for the publication fees of blacklisted journals.

A comparison of the policies underscores how the 2020 policy measures are highly targeted, with specific measures stipulating the actions that colleges should and should not undertake. Further, the 2020 policy required colleges to modify and delete any internal management regulations involving the use of SCI papers as indicators within a stipulated period, as well as promptly submit feedback to the MOE regarding the modification situation.

The targets of the 2020 policy reform

Another paper in this issue notes that the number of SCI papers published by China's researchers surpassed that of the United States in 2018, with China currently ranked first in the world (Liu, 2020). However, this number is not representative of innovation capabilities. In fact, the blind

pursuit of publishing more papers hinders scientific progress (David, 2007; Génova et al., 2016; Nature Editorial, 2017). As such, China needs to actively burst the STR publishing bubble and return to the original intentions of science. This is the primary purpose of the 2020 policy reform.

In terms of general research, the 2020 measure emphasizes the pursuit of major original innovations. By eliminating the lopsided pursuit of the number of SCI papers, researchers are encouraged to concentrate on their research and the accumulation of achievements in the long term, focus on the scientific frontier and common challenges facing humanity, solve critical problems, and produce major original results. While the number of published scientific papers might decrease, the contributions to humanity and science will increase.

Regarding applied research and technological innovation, the 2020 policy reform encourages the pursuit of practical contributions to socioeconomic development. Removing the evaluation system based on SCI papers encourages researchers to solve the key technical problems encountered during socioeconomic development, as well as make practical contributions with significant application potential. This will result in real impact, including the realization of industrial applications through new technologies, products, and processes. This is in line with the MOE's approach as stated in *Several Suggestions on Improving the Quality of Colleges' Patents and Promoting Their Conversion to Actual Applications* (MOE-MOST [2020] No. 1). By eliminating the pursuit of the number of authorized patents, greater emphasis is placed on the quality of these patents and their conversion into actual applications.

To address the current emphasis on scientific research at the expense of teaching, the 2020 policy measure encourages the use of STR resources for talent training. China's colleges have long emphasized STR over teaching, reflecting the prioritization of previous evaluation systems. In addition to STR resources being unavailable to undergraduates, the latest STR findings were not incorporated as teaching materials on time. Indeed, renowned professors rarely taught undergraduate courses, resulting in undergraduate training not being supported by STR. The latest policy reform seeks to address these issues.

The potential impact of the 2020 policy reform

There are several possible reasons for why E-STR in China's colleges keeps changing and why progress has been so slow. First, various global ranking of colleges appeared successively from 2003, including the Academic Ranking of World Universities and Times Higher Education World University Rankings. As an internationally comparable indicator, the number of SCI papers became widely used in the ranking of colleges. Meanwhile, China accelerated its development of world-class colleges. Some colleges erroneously perceived ranking changes as reflective of their effectiveness at becoming first-class institutions and pursued higher numbers of published SCI papers to improve their ranking. However, these actions offset the effects of policy reform.

After the MOE released its 2013 policy reform, the government launched the "double first-class" program for higher education. Based on the SCI, the Essential Science Indicators index was an important reference factor in the selection of key colleges for the program. Further, the SCI indicator remained heavily weighted during the fourth round of evaluating the disciplines organized by the government. The lack of synergy among the various government policies undermined their ability to achieve the expected results.

Nonetheless, there are several reasons to look forward to the effects of the 2020 policy reform. First, China's government and colleges have reached a consensus on bursting the bubble of producing STR papers. Indeed, the government recognizes that the voluminous increase in the number of low-quality papers is just an STR bubble. Rather than being beneficial, this situation only serves to consume substantial amounts of STR resources and ruin the STR atmosphere. Further, colleges aiming to become world-class institutions have realized that they cannot enter the ranks of the world's top colleges by relying on increasing the number of SCI papers alone. After all, the number of SCI publications is not used to calculate colleges' contributions to the human sciences and the country. Second, the measures introduced with the latest policy reform are specific and clear: Colleges are required to provide feedback to the MOE regarding their revisions of internal rules and regulations by July 31, 2020. Finally, and most importantly, corresponding adjustments will be made to the system of indicators for the evaluation of disciplines organized by the MOE, including the removal of SCI papers as an indicator. The realization of these adjustments will be crucial to the effectiveness of the 2020 policy reform.

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