Remaking Chinese Science:

Institutional Reforms and the Bifurcation of Scientific Careers in 21st-Century China

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Introduction

Over the past decade, China's scientific field has undergone profound transformation, with publication output increasing nearly five-fold between 2009 and 2021. This expansion was driven by systematic institutional reforms that unfolded from the early 2010s onward. These reforms are best characterized as techno-nationalist in their core logic: the state strategically deployed neoliberal instruments, including competitive evaluation metrics, hierarchical talent classification systems, and the tenure-track system, as administrative tools to accelerate China's scientific catch-up. In doing so, they dismantled the long-standing "iron rice bowl" system and its accompanying culture of egalitarianism, producing pronounced stratification among scientists while significantly increasing both domestic and international mobility.

This study examines the sociohistorical process of transformation within China's scientific field over the past decade and addresses the following research question: how have institutional reforms reshaped the organizational landscape of science and influenced scientists' careers?

Existing scholarship in the sociology of science has largely shifted from Mertonian analyses of scientists' careers, norms, relations, and stratification to interrogating the social construction of scientific knowledge, in doing so relegating scientists' social lives to the margins of scholarly attention. Organizational ethnographies and single-institution case studies have produced richly textured accounts of scientific labor in particular settings; yet their bounded focus limits their capacity to capture the broader patterns of career formation and stratification that obtain across increasingly differentiated academic landscapes. This study addresses these gaps by examining the historical processes through which the social environment of science has been profoundly changed in China and its influence on scientists' careers, unravelling the evolving conditions under which science is produced and practiced.

I conducted 110 in-depth interviews with 109 participants from May 2025 to March 2026 across universities (51.4%), Chinese Academy of Science (CAS)-affiliated institutes (19.3%), and new-type R&D institutions (29.3%) in Guangzhou, Shenzhen, and Beijing. By academic role, faculty members—including professors, associate professors, researchers, and other permanent or tenure-track academic staff—constitute the largest group (47.7%), followed by postgraduate students (43.1%) and postdoctoral researchers (9.2%). The overall sample is 55.0% male and 45.0% female. In addition to interviews, I conducted fieldwork at a new R&D institution, attending laboratory seminars, institutional events, and informal activities. I also draw on archival research using historical documents related to scientific institutional reforms, with a particular focus on the core academic institutions involved in these reforms.

Scientific Institutions and Career Structures in the Pre-Reform Era

Following the establishment of the People's Republic of China in 1949, the first generation of Chinese scientists pursued domestic careers. They received tertiary education through planned assignment systems and were allocated to jobs or postgraduate programs, with a small number studying in the Soviet Union. Modeled on the Soviet system, the CAS became the primary research institution, while universities focused on teaching. University faculty ranks included Assistant, Lecturer, Associate Professor, and Professor; CAS positions were Assistant Researcher, Associate Researcher, and Researcher. Under the work-unit (*danwei*) system, mobility was administratively controlled, and lifelong employment was the norm.

Following Reform and Opening Up, younger scientists pursued postgraduate education abroad through state-sponsored programs, such as the CUSPEA program (1979–1989) in physics. By the 1980s, students gained greater autonomy in applying to U.S. graduate programs via exams like the GRE. Few doctoral graduates returned to China due to limited funding, facilities, and modest salaries, securing academic or industry positions abroad. Consequently, Chinese scientists predominantly followed domestic career paths from the 1980s through the 2000s. Elite institutions preferred retaining their most accomplished doctoral graduates as faculty, treating them as institutional talent pipelines.

Institutionally, the CAS adopted the PI system in the 1990s, while universities formed flexible research groups led by senior professors. In both systems, however, junior scientists who graduated domestically were typically appointed to be the Middle rank faculty and conducted research under the leadership of senior PIs or group leaders. They might attain institutional independence at relatively late career stage.

Hybridizing the American Model and State-Mediated Hierarchies: Institutional Reforms of the 2010s

As China sought to accelerate its scientific development, a series of reforms were implemented to attract scientists with overseas training and research experience. Two significant and interconnected processes shaped this effort: leading scientists advocating for reforms at the institutional level, and state mobilization on dynamic stratification among scientists and academic institutions on a national scale.

The pilot reform was originated in Peking University (PKU), where a few new faculties adopted "Specially Appointed Researcher" (*Te Pin Yan Jiu Yuan*) system around 2006, offering junior PIs the prestige to access national funding without conflicting with senior faculty conventions. This system was eventually subsumed under a standardized tenure-track system through the effort of returnee scientists Rao Yi and Shi Yigong, who led reforms in life sciences at Tsinghua University PKU and THU in the late 2000s and early 2010s. Both adopted independent PI and tenure-track systems, where junior faculty served as independent PIs rather than joining senior-led research groups. These positions, titled "Assistant Professor," came with start-up packages including lab space, funding, and student quotas, with international peer review determining tenure after six years. Postgraduate training reforms also supported the independent PI system. Doctorates from PKU and THU were required to complete postdoctoral fellowships elsewhere before faculty appointments, dismantling traditional career paths while enhancing training diversity.

By 2014, these personnel models were implemented among top universities. Other top universities, particularly under the 985 and 211 Projects, followed suit, completing reforms

by 2020. However, implementation varied: many institutions in fields like engineering maintained junior PIs within senior-led groups, and tenure decisions often relied on metrics such as publications and grants rather than international peer review. Across institutions, gaps widened between scientists with and without national talent titles, driven by state-level reforms.

At the state level, the national talent title system, rooted in the CAS Academician title formalized in the 1990s, expanded to include the Distinguished Young Scholars Fund (1994) and the Excellent Young Scientists Fund (2012). These awards evolved from grants into markers of scientific excellence, offering competitive advantages in funding, positions, and collaborations, and facilitated pathways toward Academician status—a dynamic resembling the “Matthew effect”.

Moreover, the state launched the “Double First-Class” program in 2015, replacing the static 985 and 211 Projects and introducing dynamic evaluations and stratifications of universities and disciplines each five years. This reform has prompted academic institutions to recruit high-performing scientists and exert productivity pressure to the untenured junior faculty, even through a rank-and-yank system. The development of science in universities spurred the CAS to pursue institutional reforms while still maintaining a more traditional structure. The state also supported new R&D institutions, modeled after the independent PI system. Early examples such as the National Institute of Biological Sciences (NIBS), Beijing, were followed by entities like Shenzhen Bay Laboratory (SZBL), supporting frontier research with minimal bureaucracy.

Techno-Nationalism and Bifurcated Scientific Careers

China’s approach to science policy has consistently reflected a techno-nationalist orientation. The 2010s represented a period in which neoliberal principles were strategically appropriated to mobilize scientific productivity: scientists were simultaneously subjected to fierce competition, elevated expectations of mobility, and deepening stratification, while remaining embedded within structures of administrative resource allocation. Following the COVID-19 pandemic, China's science policy underwent a partial reorientation toward state-directed research priorities shaped by geopolitical pressures; the structural consequences of this shift, however, remain limited to date.

In the current configuration, scientists' careers have bifurcated along two principal trajectories. The first is the path of the independent PI—typically characterized by overseas training or professional experience, early-career institutional independence, and the accumulation of national talent titles. The second is the path of domestically trained doctoral graduates and postdoctoral researchers who join large research groups under the direction of senior PIs, most of whom themselves hold prominent talent titles. This bifurcation reflects both the deepening institutional stratification produced by the reform era and the persistent influence of state-mediated recognition systems on individual career outcomes.