

The Political Economy of Science, Technology, and Innovation in China: Policymaking, Funding, Talent, and Organization

Yutao Sun and Cong Cao. Cambridge: Cambridge University Press, 2023. 244 pp. £95.00 (hbk). ISBN 9781108490580

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Yutao Sun and Cong Cao provide a comprehensive and up-to-date examination of the science, technology and innovation (STI) landscape of post-1978 China. Being both theoretically and empirically informed, their book draws on more than a decade of research and publications. This includes their analysis of policy documents, Research and Development (R&D) expenditure, scientists' CVs and public information, government agency reports and funding data, and interviews with policy makers and analysts, academics, entrepreneurs and other stakeholders.

The authors' main argument is that a political economy perspective is essential for a more nuanced and thorough understanding of the development of China's STI system. Accordingly, the book shifts the focus of STI studies from markets and enterprises to the Chinese state and its internal structure. The state here is not a vague, monolithic entity, but consists of cooperating and competing government agencies. The authors examine the impact of these agency dynamics on four central government functions: (1) policymaking, (2) funding, (3) talent acquisition and (4) the organization of R&D programmes. These constitute the book's analytical framework and its chapter organization.

The introductory chapter reviews the literature on the political economy of STI. It introduces the conceptual framework to uncover the "black box" of state involvement in these domains (p. 5). Additionally, it provides an overview of the main Party and government agencies in STI in China and their power relationships, including the latest restructuring in 2023.

The following two chapters focus on policymaking. Chapter two traces the historical evolution of China's post-1978 innovation policy. Based on analysis of more than 600 policies from 1980 to 2019, it shows that innovation policies have become more diversified, including financial, tax and fiscal aspects. Moreover, policies are increasingly formulated by multiple collaborating government agencies rather than just one.

Chapter three investigates the innovation policy network through a social network analysis of government agencies up to 2012. It spotlights three mechanisms driving inter-government agency relations in China: the policy agenda, power concentration and heterogeneity dependence (interdependence among diverse agencies with unique roles, knowledge, power and resources). It demonstrates how the network has been maintained through its policy agenda, while becoming self-organized due to power concentration and heterogeneity dependence.

Based on central government agencies' R&D expenditure from 2011 to 2020, chapter four scrutinizes their research funding. It contends that decentralization and diversification of the central government's R&D disbursement has introduced new challenges for budget management. It illuminates budgeting procedures, expenditure patterns and funding structures, i.e. "who spends how much money on what" (p. 127). Key actors include the Ministry of Science and Technology, the Ministry of Industry and Information Technology, the Chinese Academy of Sciences and the National Natural Science Foundation of China.

Chapter five centres on the effects of the government's talent acquisition programmes since the mid-1990s. It examines the 2008 Youth Thousand Talents Programme, analysing programme, CV



and website data from 736 candidates, showing how the government aims to reverse brain drain and reattract Chinese-origin overseas academics, often from the US. Considering factors like university rankings, tenure models, length and position of work abroad, gender, age and return benefits, the chapter highlights who is likely to return, finding that talent initiatives have yielded only modest gains in enticing top scientists to return.

Chapter six explores the Chinese government's organization of R&D programs, in particular, "mission-oriented mega-research-and-development programs" (p. 157). It has both theoretical and empirical aims. Mostly based on secondary material, the authors propose a technology-organization-market framework for investigating a programme's outcomes. They test this framework using different periods, sectors (e.g. defence, communications, health care) and regions (US, Japan, China, Europe), then apply it to Chinese mega-engineering and science programmes. In the Chinese case the "whole-of-the-nation system" (*juguo tizhi*) prevails, i.e. a comprehensive state-led system that leverages and deploys resources to achieve national strategic objectives.

The concluding chapter is the most critical. It highlights the successes, challenges and failures of China's state-led innovation, identifying inherent tensions and suggesting reforms. These include tensions between research and development, state-led and enterprise-centred innovation models, investigator-initiated and mission-oriented research, and indigenous and open innovation. It notes an increasing mission-oriented emphasis at the expense of scientists' autonomy and creativity, as well as the risks of moving towards techno-nationalism and protectionism in the context of the Sino-American trade war and COVID-19 pandemic. The authors conclude by advocating for an enterprise-centred and market-oriented Chinese innovation system that is both open and indigenous. They suggest integrating multiple stakeholders, including government, enterprises, universities, research institutions and users, and cultivating a favourable environment that upholds norms and values, acknowledging "different views [...] to collide and contend, encouraging independent and thinking" (p. 213).

Discussing STI in China, the authors arguably navigate a minefield both domestically and internationally. One must read this book against the backdrop of the dilemmas they likely faced. The book is written for an international audience. While the authors have profound knowledge of the Chinese innovation system with experiences of working within it themselves, it is highly critical of the Chinese state and innovation system, such as limitations on academic freedom. Yet, except for their conclusion, the geopolitical implications of the authors' findings remain mostly implicit. Moreover, they appear somewhat downplayed by an underlying modernization discourse, prevalent also among Chinese policymakers, which sees China as a "latecomer" in a "catch-up stage," not sharing the same "level of progress" as "developed countries" (pp. 18–26), as the book seeks to improve the Chinese innovation system.

Nevertheless, this is a thoroughly researched, clearly structured and well-written book. Despite being mainly quantitative and privileging official sources over grassroots innovation, it benefits from unique insights gained from the authors' years of in-depth qualitative and quantitative engagement with the Chinese innovation system. Overall, this is a much-needed and timely overview of the Chinese state's intricate workings in innovation, including historical perspectives. The findings will be relevant not only for economists, political scientists, innovation scholars and practitioners from policy and business, but also for scholars and students from various fields interested in the operations and contradictions of the Chinese state, academic landscape, technology and economy more generally.