(Re)Centralization: How China is Balancing Central and Local Power in Science, Technology, and Innovation

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Summary

China is centralizing its science and technology (S&T) sector while attempting to mitigate the costs of centralization. To this end, policymakers have designed "central-local joint action" mechanisms that balance the powers of central and local authorities. These mechanisms involve consultative processes led by the central government that aim to negotiate shared S&T investments in national priority areas with local authorities.

This policy brief details how these mechanisms are being implemented across three programs: the National Key Research and Development Program, the National Guidance Fund for Technology Transfer and Commercialization, and the National Centers of Technological Innovation. It also explores the challenges associated with recentralization and power balancing, which threaten to diminish China's ambitious S&T goals to mere slogans, rather than unified and well-resourced national efforts.

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Key Findings

- Since Xi Jinping took office, there has been a notable shift toward recentralization in China. This is particularly evident in the science and technology sector. This shift is demonstrated by the innovation-driven development strategy, the establishment of the Central S&T Commission, and China's "new-style whole-of-nation system" aimed at promoting S&T self-reliance.
- China is taking steps to mitigate the risks associated with centralization in S&T. Since 2007, local governments have enjoyed a high level of autonomy and have contributed a significant proportion of spending in China's S&T sector. Centralization may create an information gap and result in inefficient central government investments as Beijing encroaches on traditionally local domains. To balance central and local roles in S&T, "central-local joint action" mechanisms have been incorporated into national S&T programs.
- In the National Key Research and Development Program, central-local joint action is facilitated through ministerial-provincial joint projects, which grant provinces greater influence in project management in exchange for their increased financial contributions. However, this program has predominantly involved agrarian and economically challenged provinces, limiting its impact.
- In the National Centers of Technological Innovation, central-local joint action is used to encourage local governments to focus on national S&T goals by reducing their financial responsibilities in establishing the centers. This initiative has shifted from business-led to government-led approaches to mitigate financial and talent challenges.
- In the National Guidance Fund for Technology Transfer and Commercialization, central-local joint action is manifested through local sub-funds, which leverage central financial support to stimulate local investments in national S&T priorities. Currently, adjustments are being made to ensure that provinces increase their investments into these sub-funds to help promote innovation.
- These three programs demonstrate that central-local joint action mechanisms are broadening in reach and scope and adjusting to secure greater local contributions to national S&T priorities. However, problems persist. Local engagement often deviates from national needs, there remains insufficient participation from more developed areas, and organizational structures are inefficient. These issues put China's S&T ambitions at risk of becoming empty slogans.

Introduction

Since Xi Jinping took office in 2013, there has been a noticeable trend toward recentralizing political power in China, reversing three decades of decentralization. The 2018 constitutional amendment eliminating term limits for Xi Jinping has intensified recentralization.[1] The trend was further fueled by the centralized response to the U.S.-China trade war, as well as Xi's own governing style, which encompasses strict ideological control and a Maoist approach to power across crucial policy domains.[2] By personally running various party commissions and "leading small groups," Xi has strengthened his authority in areas including national security, cybersecurity, and military reform.[3]

Amid escalating rivalry with the United States, China's recentralization is particularly pronounced in science and technology (S&T). This shift first became evident with the launch of the innovation-driven development strategy (IDDS) in 2016. It was cemented by the official launch of the "new-style whole-of-nation system" (NWNS, 新型举国体制) in 2019, which aims to mobilize all of China's resources to realize "S&T self-sufficiency and self-empowerment" (科技自立自强).[4,5]

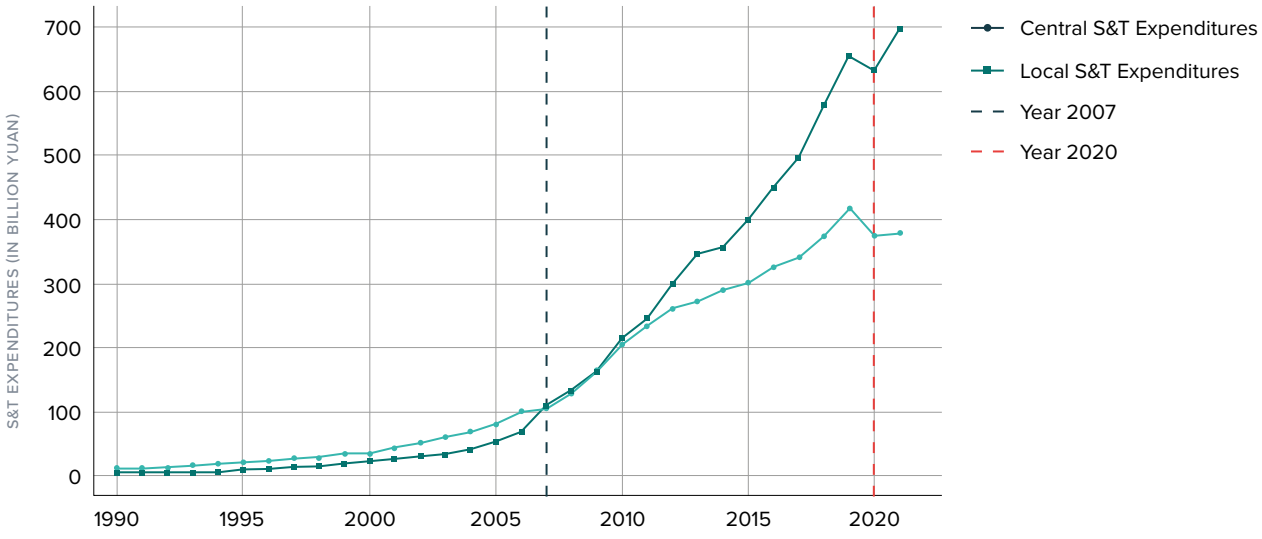
Finally, a March 2023 bureaucratic revamp established the Central S&T Commission (CSTC) as a key decision-making body to centralize S&T leadership, with the reformed Ministry of Science and Technology (MOST) executing CSTC directives.[6]

This is a big change from how things have worked over the last four decades. In China, there exists a deep-rooted culture of local autonomy in economic policymaking, including in the S&T sector.[7] S&T growth in China is deeply tied to market competition, and the central government has traditionally given local governments significant autonomy to compete with each other and capitalize on their presence near centers of innovation.

In fact, local governments' S&T expenditures surpassed those of the central government in 2007, and have grown ever since (see Figure 1). Consequently, there is an enormous information gap between central and local governments in S&T markets. Without the active involvement of local governments, the central government risks making poor investment decisions if it takes direct control over S&T projects previously managed by local authorities.

FIGURE 1

Central Versus Local S&T Expenditures from 1990–2001



China's leaders are aware of the risks of centralization and are attempting to address them. Central to these efforts are "central-local joint action" mechanisms, which emerged around the introduction of the IDDS and aim to align local S&T plans with national targets. These consultative processes are led by the central government and aim to negotiate agreements on shared S&T investments with local authorities. In short, central-local joint action reflects both the intensified efforts toward centralization and the essential role of local government autonomy in the successful execution of national S&T initiatives.

This policy brief identifies the functions and institutional forms of the central-local joint action mechanisms across three national-level S&T initiatives: the National Key Research and Development Program (NKRDP), the National Guidance Fund for Technology Transfer and Commercialization, and the National Centers of Technological Innovation (NCTIs) (see Table 1).

TABLE 1

"Central-local Joint Action" Mechanisms in Three National S&T Initiatives

	National Key Research and Development Program	National Centers of Technological Innovation	National Guidance Fund for Technology Transfer and Commercialization
Primary Target of the Innovation Phase	Idea generation and conversion	Conversion	Diffusion
Implementation Form	Ministerial-provincial joint projects	Centers co-established by central and local governments	Local sub-funds invested by the national guidance fund
Implementation Status	Expanding tech areas, geographical and administrative reach; Predominantly involving agrarian and economically challenged provinces	Expanding tech areas and geographical reach; Transitioning from business-led to government-led approaches	Expanding geographical reach; Increasing local investments into sub-funds
Start Year	2017	2017	2011

The National Key Research and Development Program: Provinces Gain Influence at a Cost

The National Key Research and Development Program (NKRDP) is a cornerstone of China's S&T initiatives. Emerging from the integration of previous national programs, it is geared toward producing strategic and innovative scientific research crucial for China's development and security.

During the 13th Five-Year Plan, it pumped 76 billion yuan ($10.56 billion) into 69 critical projects.[9] By 2022, its scope had widened to include foundational research spanning fields from agriculture to space technology.[10] While the number of projects continues to grow, their overall effectiveness in advancing national priorities is still up for debate.

The NKRDP is advancing central-local joint action through "ministerial-provincial joint" (部省联动) projects which aim to align local and national goals. These involve complex partnerships between MOST and provincial governments, with funding responsibilities shared between the two.[11]

In contrast to standard NKRDP projects, provinces which collaborate on the joint projects are required to contribute annually to a "central funding pool" controlled by MOST.[12] In 2021, provincial governments were required to contribute one yuan for every two provided by the central government. By 2022, the ratio increased to one-for-one. This approach aims to engage local governments and leverage their strengths and resources while advancing national priorities.[13]

NKRDP ministerial-provincial joint projects were first launched in Guangdong, a wealthy coastal province in southeastern China, under the leadership of MOST. A collaboration agreement was signed between MOST and Guangdong's provincial government in 2017, focused on a key project called "Broadband Communications and New Networks."

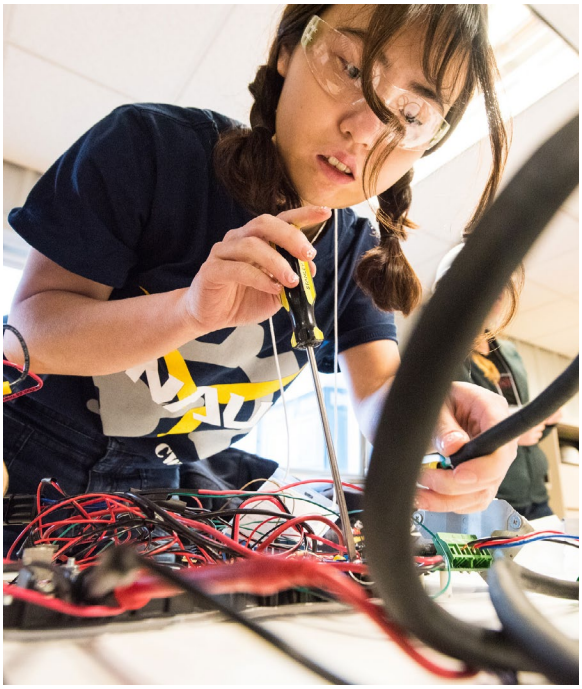


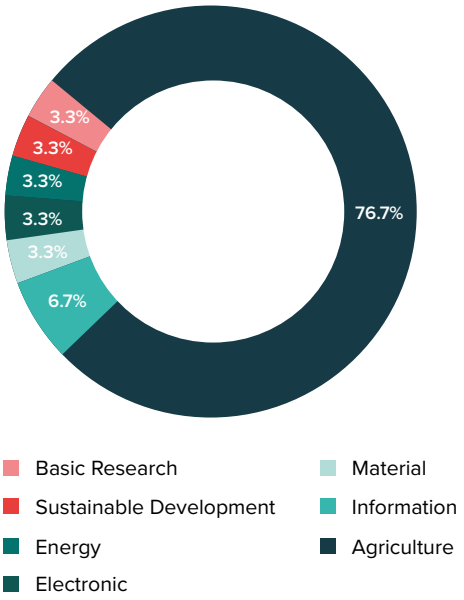
Photo: Rawpixel

The project encompassed 21 research tasks aiming to establish China as a global leader in network technologies, and involved diverse participants across China, including national labs, universities, and both state-owned and private companies.[14] The project was implemented between 2018 and 2022, and describes in its guiding principles that projects be "state-led," "demand-driven," and focused on what Beijing describes as "major issues."[15]

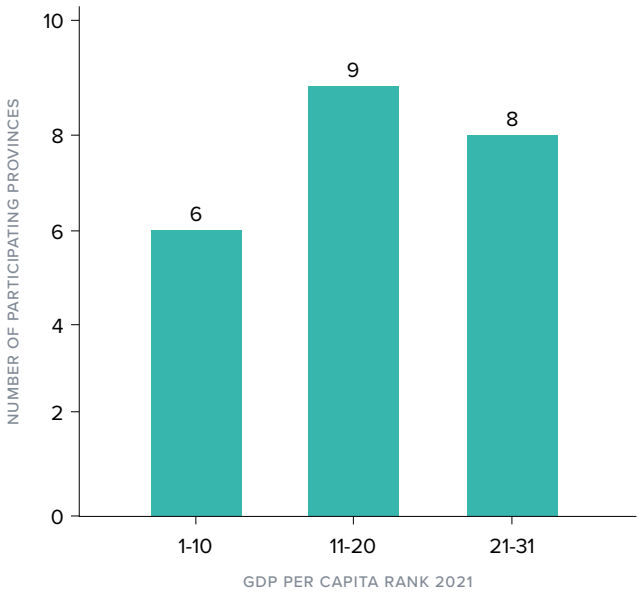
FIGURE 2

Participating Provinces, Tech Areas, GDP Per Capita Rank[20]

Number of Participating Provinces by Tech Area



Number of Participating Provinces by their Rank in Terms of Agriculture's Share of Per Capita GDP (Ranked 1-31)



Guangdong's provincial government exerted significant influence at every project stage. The province partnered with MOST to develop application guidelines, scrutinize applicants, evaluate outcomes, and oversee technology transfer and commercialization.[16] For instance, when applying to direct certain research tasks, applicants from outside Guangdong province had to first get approval from Guangdong's S&T office. Evaluation of their application was then conducted by a third-party entity chosen by the S&T office.[17]

The 2017 pilot between MOST and Guangdong paved the way for more provinces to take part in ministerial-provincial joint projects beginning in 2021. These new collaborations often involve economically challenged rural provinces and focus mainly on agricultural technologies.

By 2023, the number of projects had surged and the range of technologies diversified, although most projects still focus on agriculture in underdeveloped provinces, as shown in Figure 2.[18] Meanwhile, technology-rich provinces like Shanghai are missing from these initiatives.

Ministerial-provincial joint projects are a key example of the central government's attempts to engage provincial resources in national initiatives. However, the cost of attracting local engagement—allowing provinces to wield significant influence—is diminishing their effectiveness in implementing national goals.[19]

National Centers of Technological Innovation: Creating Incentives for Local Governments to Prioritize National Goals

China's National Centers of Technological Innovation (NCTIs) demonstrate how Beijing is navigating the complex interplay between central and local governance in its S&T policies. NCTIs consist of "Industry-University-Research" collaborations (产学研) crafted to harness local technological resources, streamline the innovation chain, and bolster efficiency within downstream innovation processes.

As of September 2023, China housed 22 NCTIs, including three comprehensive NCTIs and 19 which are sector-specific.[21] Figures 3 and 4 show that all NCTIs are based in S&T industrial parks, were primarily established in 2021 and 2022, and are mostly located in China's affluent coastal provinces and around Beijing.

Initiated by the central government, NCTIs aim to bridge the gap between research and applied technology. Unlike individual research projects or funding mechanisms, NCTIs are designed to play the role of "connective tissue" within the innovation chain.

In the initial phase of the NCTIs from 2017 to 2020, businesses led by constructing the centers' infrastructure and investing in equipment. Local governments were responsible for allocating and approving land resources while the central government offered guidance. This approach has shifted following early-stage implementation challenges, as exemplified by the NCTI for High-Speed Rail in Shandong. In that case, the Qingdao prefectural government was a co-architect with minimal financial obligations, while the CRRC

FIGURE 3

The Birth of NCTIs: Dates when Key NCTIs were Established[22]

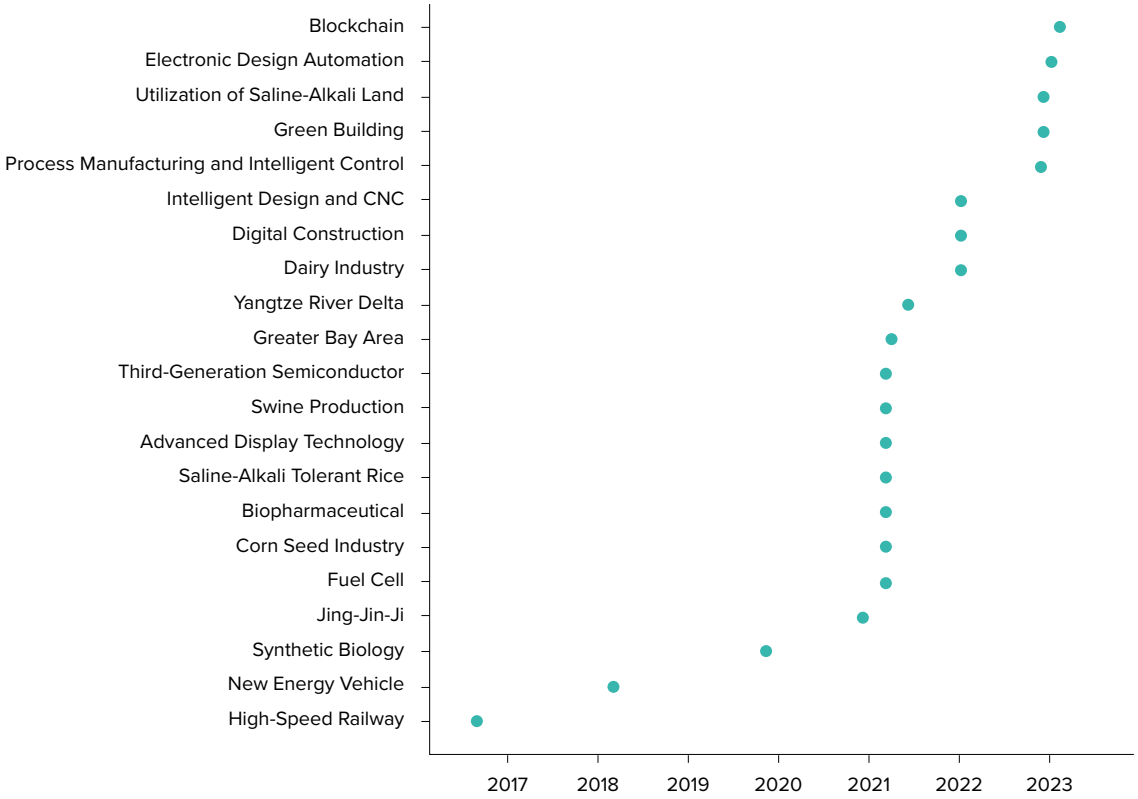
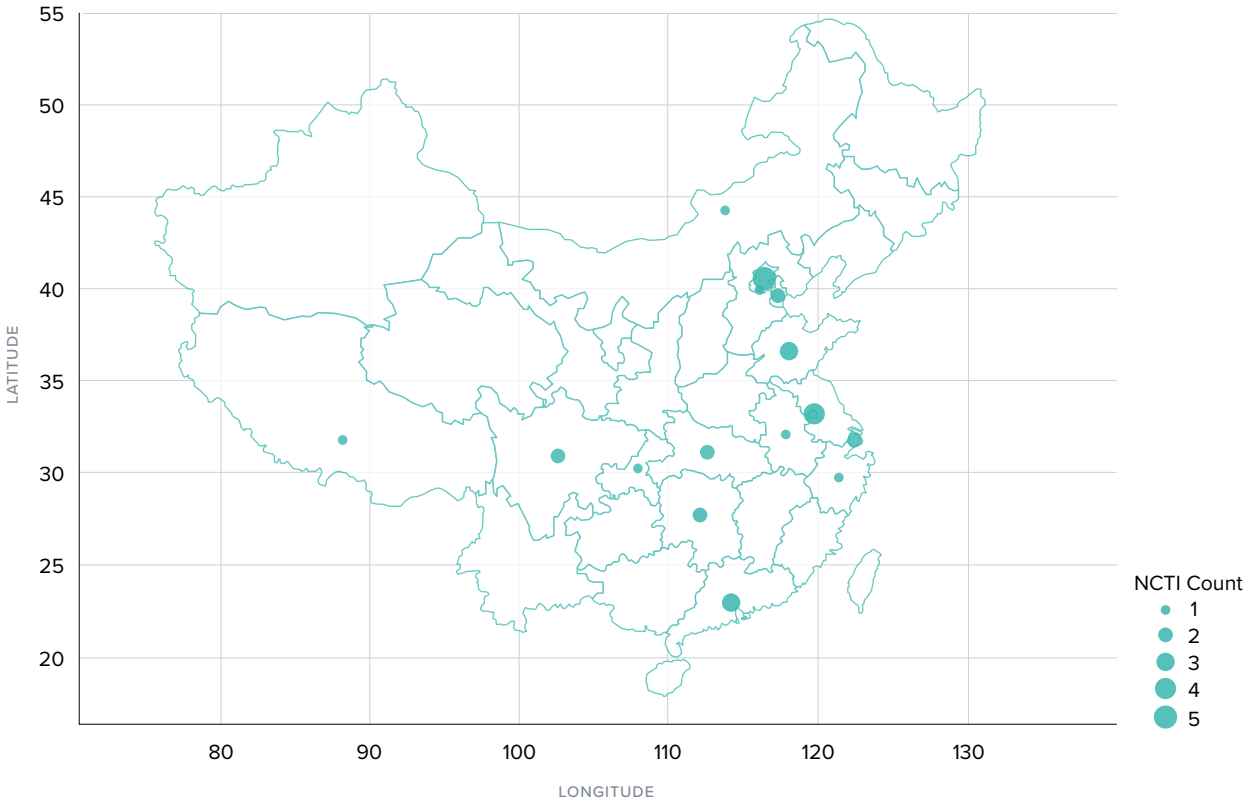


FIGURE 4

NCTI Locations Across Chinese Cities and Provinces



Group (中国中车集团有限公司)—a state-owned enterprise—shouldered most of the financial load. CRRC's expected investment in infrastructure and equipment was 14.2 billion yuan ($1.97 billion) over five years. However, the NCTI's non-profit status conflicted with the CRRC Group's profit goals. As a state-owned enterprise, CRRC could not invest without assured returns, and ultimately withheld its planned investment, which significantly impacted the construction progress of the center and the advancement of technological research and development.

Afterwards, the central government adjusted its policy. In a new regulation issued in 2021, local governments became the primary NCTI stakeholders. Now, regional NCTIs are governed solely by local bodies, while domain-specific NCTIs can be collaborations between local governments, universities, research entities, and corporations.

Local governments now play the primary role overall, rather than business—they assume the major construction responsibility through financial support and land resource allocation, while enterprises participate in research and development.

Another change was the central government's commitment to back NCTIs through national S&T projects and post-evaluation financial subsidies.[23] This new model shows that while Beijing expects localities to align with national goals, it will still allow some level of autonomy. This adjustment is not only intended to relieve local pressures; it aims to fulfill strategic objectives through mutually beneficial relationships.

National Guidance Fund for Technology Transfer and Commercialization: Indirect Influence to Stimulate Local Investments in National S&T Priorities

The National Guidance Fund for Technology Transfer and Commercialization was initiated by the central government to influence local S&T initiatives and guide them toward national objectives. The fund's evolution illustrates the nuanced approach Chinese decisionmakers have taken to balance central control and local autonomy.

While programs like the NKRDP focus on early-stage innovation, and National Centers of Technological Innovation target mid-stage innovation, the National Guidance Fund aims to accelerate the final steps of the innovation cycle—transforming S&T research into market-ready products.

As Figure 5 shows, by establishing sub-funds with local governments and investment firms, the central government is showing its commitment to boosting the efficiency of technology commercialization through increased financial resources and the implementation of incentive mechanisms.[24] Sub-funds, led by local governments, are financially backed by national funds to stimulate regional technology commercialization efforts. By the end of 2022, the National Guidance Fund had expanded significantly to oversee 36 subsidiary funds with a total capacity of 62.4 billion yuan ($8.67 billion).[25]

The National Guidance Fund was first conceived of in 2011, before both the NKRDP joint programs and NCTIs. The 2011 regulation that established the National Guidance Fund made clear its centralizing objective and specifies that sub-funds can only invest in MOST-listed enterprises or high-tech sectors that align with the central government's strategic priorities.[27] When the fund was formally launched in 2014, the central government took an equity stake of between 20 and 30 percent in three sub-funds.[28] The central government also provided incentives to award high-performing sub-funds.

The year 2021 marked a new phase in the program, initiated by a new National Guidance Fund regulation that adjusted the balance between centralization and local autonomy. The legal range of the central government's equity stakes in the sub-funds was widened from 20-30 percent to 10-30 percent.[29]

This move freed up central government money to be spread in smaller amounts across a larger number of sub-funds. It also necessitated greater financial contributions from local governments. The central government's financial contributions hit a record low of 20.9 percent in 2021 (see Figure 6).

The 2021 regulation also imposes stricter investment rules on the sub-funds. Sub-funds must now invest at least three times the National Guidance Fund's contribution and more than 50 percent of the sub-fund's total equities in technology commercialization projects. The updated document proposes significant changes in risk management and accountability. It also removes many earlier incentives, replacing them with punitive measures to prevent corruption and non-compliance with the regulation.

FIGURE 5

National Guidance Fund, Sub-funds, and Other Investment Sources[26]

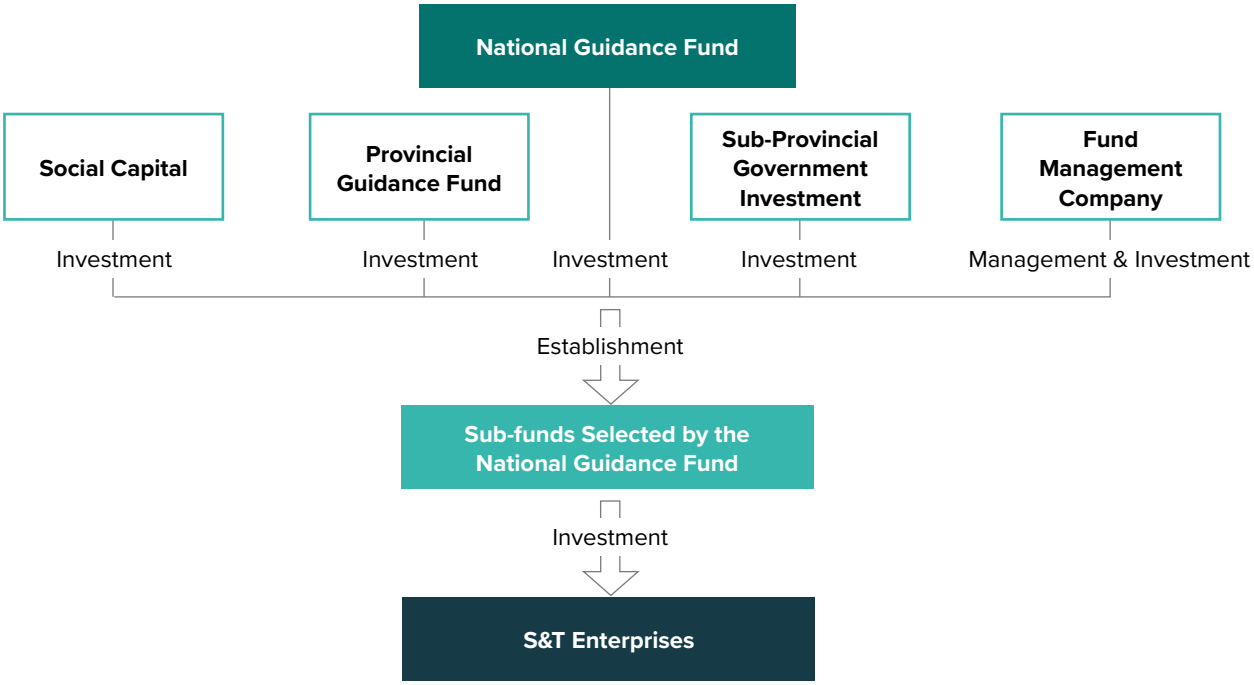


FIGURE 6

Share of Central Government Contribution in Sub-funds of the National Guidance Fund

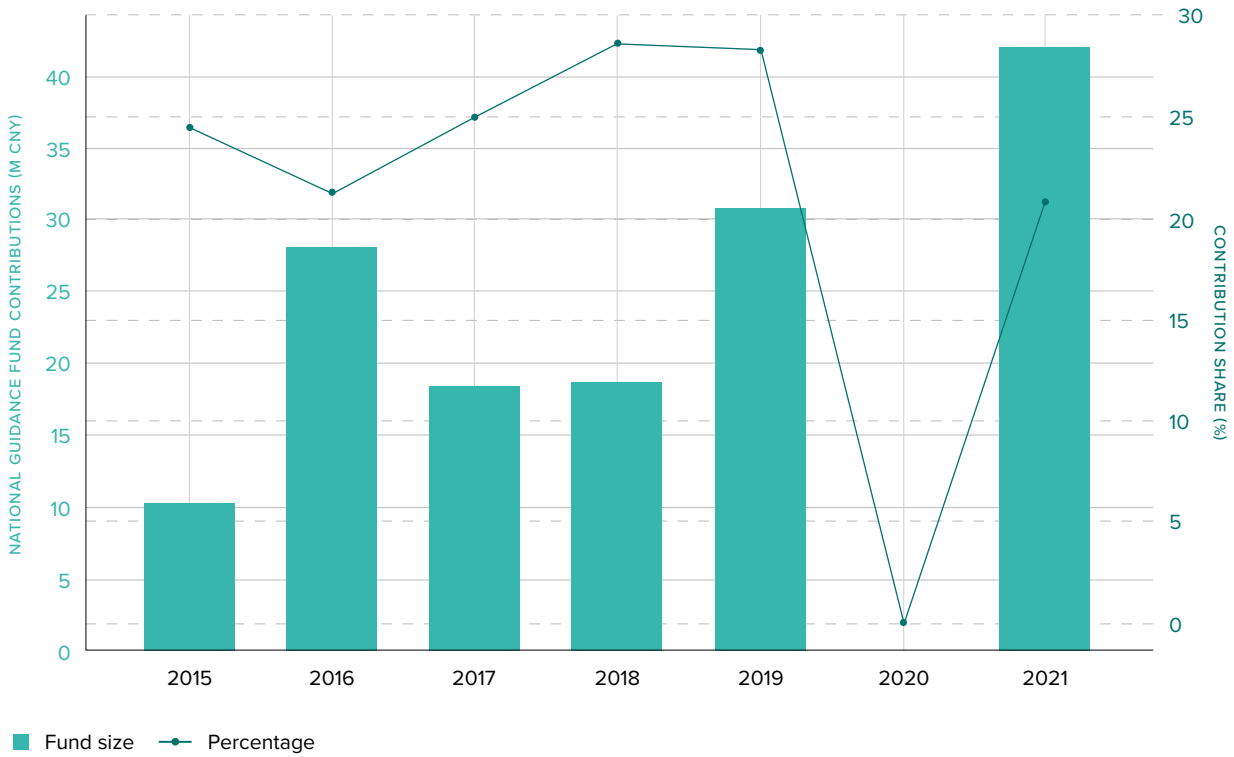


Photo: Rawpixel

Policy Implications

China is working to mitigate the risks associated with S&T centralization through central-local joint action mechanisms. However, the effectiveness of these mechanisms is still up for debate.

The semi-institutionalized setup of the mechanisms risks local non-compliance and could tilt resources toward local needs over national ones. Local governments, with their market insights and historical autonomy, are needed by the central government to implement policies efficiently, but they often ignore central directives. This leads to a misalignment between local initiatives and national priorities. There is also a noticeable absence of participation from more economically developed areas, and the organizational structures of the central-local joint mechanisms are often inefficient. In a context where local debt is soaring and central S&T spending lags, calls for S&T self-sufficiency and self-empowerment risk becoming empty slogans instead of coordinated endeavors that leverage resources from across the nation.

Currently, these joint mechanisms are experimental. The adaptability of China's governance model suggests that these mechanisms are likely to evolve and become more entrenched while expanding into a wider array of S&T initiatives. Their effectiveness, adaptability, and long-term impact, however, require more scrutiny. Therefore, a question mark hangs over China's ability to achieve the claimed goal of S&T self-reliance.

Conclusion

As China aims for greater centralization in the S&T sector, it is walking a tightrope. Beijing is forging ahead but remains conscious of the inherent risks. Local governments and firms have greater access to information and still expect some measure of autonomy in economic policymaking. Beijing's solution—to implement centralization through central-local joint action mechanisms—has yet to prove it can mitigate these risks.

Endnotes

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21. The authors have collected the list of NCTIs, with sources from a variety of news outlets.

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