



Innovation Talent Development: The China Experience in the Development of Graduate Student Financial Aid System

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Abstract

This research provides an in-depth analysis of how China developed its innovation talents from the turbulent period following the founding of the PRC to the present time. The study looks at the transformative changes in its educational policies which were pivotal in China's effort to cultivate innovation talents. The core question for the study was, "How does China cultivate innovative talents with a post-graduate funding policy?" While most studies have been done on China's education and its impact in this regard, these studies have mainly been conducted on the broader aspects of China's educational development. There is a lack of study on the financial aid program employed to drive that innovation development. This study addresses that gap. It offers insights that can serve as frameworks for societies to build upon for their own innovation development or improvements. The adaptability of these frameworks for other societies can be topics of future studies. The study also looks at the sustainability of the system, given the overheating of graduates entering the job market, and suggests some policy modifications to address this issue.

Keywords

Innovation studies; educational funding; research and development in China; funding for innovation studies; financial aid system

1. Introduction

China's socioeconomic landscape has transformed significantly since the late 1940s, evolving from a war-torn, impoverished nation with a predominantly agrarian economy. Most of the population resided in rural areas, engaged in subsistence farming, with low literacy rates and limited access to healthcare and education (Lin & Nolan, 2003).

Recognizing education's role in fostering innovation and economic growth, the Chinese government has made substantial educational investments over recent decades. These efforts include expanding the school system, promoting adult literacy, and providing financial aid to disadvantaged students and graduate students focused on innovative talent development.

These investments were made amid economic instability and political upheavals, with limited resources and competing priorities. Although there is extensive research on China's educational system, such as studies by Li (2012) and Wang (2013) which offer comprehensive overviews, most works focus broadly on education without addressing the specific impact of financial aid on fostering innovation.

2. This Study Seeks to Answer the Following Questions

- (1) How has China managed to achieve trans-formative progress in innovation?
- (2) What were the challenges and how did China overcome these challenges?
- (3) Is China's financial aid system to develop innovation sustainable in the long run?
- (4) What lessons can countries learn from China's experience to develop their own framework?

3. China's Economic and Education Development

Emerging from WWII as an agrarian country with a weakened economy, China faced substantial socioeconomic challenges (Wang, 2015). After the Communist Party (CCP) took power in 1949, it prioritized socioeconomic reforms, particularly in education (Zhou, 2013). Early efforts aimed to expand primary and secondary education and establish universities. However, the educational system endured significant disruptions due to political and economic upheavals, especially during the Great Leap Forward and the Cultural Revolution.

The Great Leap Forward (1958-1961) aimed at rapid industrialization but led to economic failure and famine, causing school closures and displacing teachers in rural areas (Wang, 2015; Zhou, 2013). Similarly, the Cultural Revolution (1966-1976) halted education, leading to the persecution of teachers and setbacks for the system (Wang, 2015; Zhou, 2013).

Despite these obstacles, education retained its role as a means for social mobility, deeply valued in Chinese culture (Han, 2022; Wang, 2015). The CCP also viewed education as critical for national development but faced challenges in meeting the demands of a growing economy (Zhou, 2013).

Recently, the Chinese government has significantly boosted education funding, allocating 4.4 trillion yuan (\$680 billion) in 2021-4% of GDP-to initiatives promoting innovation (National Bureau of Statistics of China, 2022). Universities nationwide now host "Innovation and Entrepreneurship Education Bases" to encourage innovation (China Association for Science and Technology, 2022).

These investments have positioned China as a global innovation leader, with 2.79 trillion yuan (\$440 billion) spent on R&D in 2021 and over 1.5 million patents filed (World Intellectual Property Organization, 2022). This paper proceeds with methodology, analysis of findings, and key insights for future policy.

4. Methods

This study's methodology focuses on document analysis and reviewing existing quantitative data to examine China's approach to developing a financial aid system for nurturing innovative talents.

Document Analysis: This method involves an in-depth analysis of policies, reports, and official documents related to China's financial aid system in education, offering a comprehensive overview of its evolution and the government's innovation strategy. Key documents include China's five-year education plans, Ministry of Education annual reports, and innovation white papers from the Chinese Academy of Sciences.

Review of Quantitative Data: This research utilizes external quantitative data sources relevant to the relationship between financial aid, educational attainment, and innovation output. Key data sources include the World Bank, OECD reports, and statistics from China's National Bureau of Statistics, Ministry of Finance, and Patent Office.

5. Findings

China's Innovative Talent Financial Aid System (ITFAS) comprises policies and initiatives, such as scholarships, grants, and allowances, designed to nurture innovation. Key initiatives include the National Science Foundation of China (2023), the "Made in China 2025" initiative (2015), and the "Double First-Class" program (2015), which collectively aim to build a skilled and innovative workforce.

Graduate education is crucial in developing innovation-driven talent. At the 20th National Congress of the Communist Party of China (2022), leaders underscored talent as China's primary resource and innovation as its growth engine, setting a 2035 goal to establish China as a strong education and talent nation. Graduate education, supported by ITFAS, is recognized as a pivotal phase for cultivating innovative talent.

China's commitment to education has yielded substantial progress. Literacy rose from 12% in 1949 to over 97% in 2022, with tertiary education enrollment increasing from 4% in 1990 to 54% in 2020. Patent applications reflect this growth, climbing from 253 in 1947 to over 538,000 in 2022, showcasing China's innovative advancement.

In fostering innovation, China has implemented several key measures:

- (1) Innovation-Oriented Schools: Schools emphasizing creativity and entrepreneurship nurture students' innovative skills.
- (2) Increased Education Funding: Education spending rose from 2.63% of GDP in 2010 to 4.26% in 2021, supporting various innovation programs.
- (3) Teacher Training Investment: Training programs equip teachers to foster creativity in classrooms.
- (4) Curriculum Reform: New curricula prioritize critical thinking, problem-solving, and creativity.
- (5) Support for Innovation Competitions: Competitions provide platforms for students to present their innovative ideas.

Additional programs supporting innovation include the National Natural Science Foundation of China (NSFC) Youth Fund, the Ministry of Education's (MOE) Innovative Talents Cultivation Plan, and the "Double First-Class" University Construction Plan. These initiatives have contributed to China's position as a global innovation leader, with the country ranking first in scientific publications and second in the Global Innovation Index in 2021.

6. Historical Development of ITFAS

China's ITFAS development has progressed through three stages:

- (1) Transition and Experimentation (1949-1977). This phase focused on increasing educational access amid ideological shifts. Key initiatives included the 1952 Notice on Adjusting National Student Grants and the 1963 graduate education conference. However, political disruptions, notably the Cultural Revolution, significantly impacted educational progress.
- (2) Streamlining and Growth (1978-2001). With economic modernization, the government implemented a cohesive financial aid strategy, exempting research students from tuition fees in 1978, reestablishing the Graduate Scholarship in 1980, expanding eligibility, and raising scholarship standards. Major projects, such as the "211" and "985" programs, directed funds to build world-class universities and fostering innovative research.
- (3) Refinement and Sustainability (2002-present). Current efforts focus on policy refinement, launching the "Three Assistantships" program, and enhancing funding transparency. To meet the rising demand for graduate financial aid, the government has encouraged private sector involvement, a strategy used by Hong Kong to address similar funding challenges.

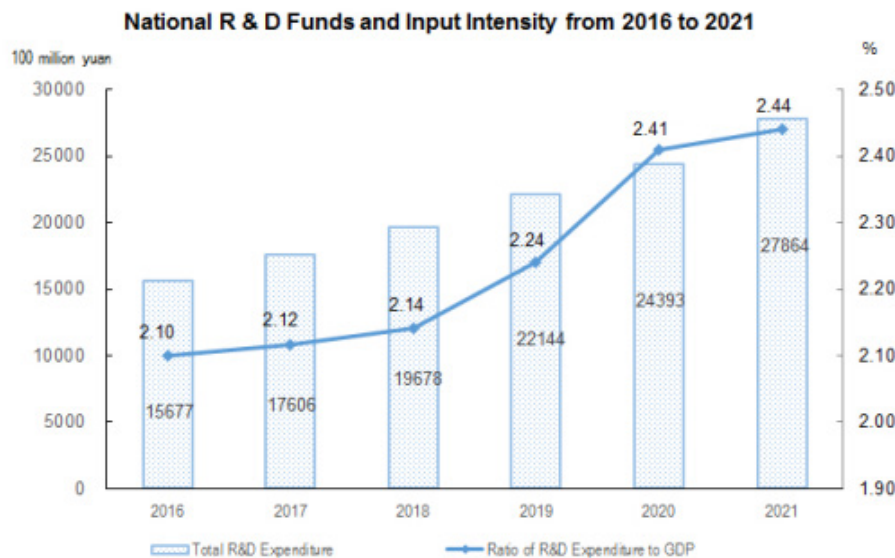


Figure 1. National R & D Funds and input intensity from 2016 to 2021.

Challenges and Solutions. Key challenges include sustaining funding, equitable access, and global competitiveness. The rapid increase in graduate enrollment requires diversified funding sources. Regional funding disparities and international competition for talent have also prompted China to promote exchange programs and expand scholarship opportunities. Solutions include encouraging private-sector support, aligning research funding with national goals, and creating targeted support for top innovators through programs like the National Key Research and Development Program.

Outcomes and Global Leadership. As shown in Figure 1, China's ITFAS investment has bolstered its R&D capabilities, with spending rising from 104 billion yuan in 2000 to 2.79 trillion yuan in 2021. This commitment to innovation is seen in China's leading patent filings and contributions to scientific advancements in artificial intelligence, robotics, and renewable energy.

The ITFAS has been instrumental in positioning China as a hub for global innovation. By attracting and cultivating skilled talent, supporting groundbreaking research, and fostering an environment conducive to innovation, China's financial aid policies have laid the groundwork for sustained progress in innovation.

China's ITFAS has evolved from an experimental phase to a refined, sustainable system that supports a broad pool of innovative talent. Despite challenges in funding and equity, ITFAS continues to drive China's ascent as a global innovation leader, highlighting the strategic importance of education and research in national development.

7. Discussion and Implications

The findings reveal that financial aid in graduate education is essential for cultivating innovative talent in China, as shown in Table 1.

Table 1. Policies and related contents of student financial assistance

Time	Policy	Related content
1953	Notice on Interim Measures (Draft) for Training Graduate Students in Institutions of Higher Learning	China's first management measures specifically for the graduate student funding system put forward to train college teachers and scientific research talents.
1986	Notice on Improving and Strengthening the Work of Graduate Students	In the treatment of graduate students, it is necessary to gradually reform the current way of issuing master's living subsidies, promote work-study, actively establish the teaching assistant system of graduate students, and implement the scholarship system.
1991	Measures for the Trial Implementation of the Scholarship System for Graduate Students in Ordinary Institutions of Higher Learning	We will try out a graduate scholarship system to reward graduate students with outstanding professional study and research achievements, and provide post allowances for research assistants, teaching assistants, assistant managers, etc.
1996	Notice on Raising Scholarship Standards for Graduate Students of Ordinary Institutions of Higher Learning	We will raise the standard of general scholarships for graduate students and encourage them to study hard and develop in an all-round way.
2012	Interim Measures for the Administration of National Scholarships for Graduate Students	National scholarships for graduate students are set up to reward outstanding graduate students in universities. 10,000 doctoral students, and the award standard is 30,000 yuan per student per year; There are 35,000 graduate students, and the award standard is 20,000 yuan per student per year.
2013	Opinions on Improving the Investment Mechanism of Graduate Education	We will improve the policy system of grants, encourage graduate students to devote themselves to study, and motivate students to participate in scientific research.
2013	Opinions on Deepening the Reform of Graduate Education	Improve the investment mechanism of graduate education, in which government input is the main factor, educatees reasonably share the training cost, and training units raise funds through multiple channels. We will strengthen the incentive role of national scholarships and scholarships for graduate students.
2014	Measures for the Evaluation of National Scholarships for Graduate Students of Ordinary Institutions of Higher Learning	We will expand the influence of national scholarships for graduate students and their role in stimulating and guiding them, and increase the number of reviews that are conducive to personnel training. The evaluation criteria of academic graduate students and professional graduate students have different focuses.

- (1) **Constructive Role:** Guided by policies like the *Opinions on Strengthening Graduate Education* and the *Regulations on the Management of Scholarships for Graduate Students*, the financial aid system has expanded the graduate scholar base, fostered specialized talent, and promoted academic innovation.
- (2) **Significant Accomplishments:** Evolving from simple grants to a diverse approach—including scholarships, grants, post allowances, loans, and tuition exemptions—this system, supported by policies such as the *Measures for National Scholarships*, has driven technological and educational progress in China.

8. Lessons from China's Financial Aid System for Other Countries

China's financial aid system offers valuable insights for countries aiming to foster innovation:

- (1) **Clear Goals at the Governance Level:** China's system is built on high-level objectives aligned with national development. Establishing cohesive goals and understanding key drivers are essential for an equitable, effective framework.
- (2) **Institutionalized Equity Measures.** A legal framework ensures fair implementation. Objectives should guarantee equitable access, outline stakeholder responsibilities, and ensure fair distribution and management of funds.
- (3) **Feedback Mechanism:** Continuous feedback and adjustments sustain relevance and stakeholder support. For instance, as graduate numbers grew, measures included increased funding, industry integration, expanded research funding, and diversified funding sources.
- (4) **Standardized Evaluation Metrics:** A strong measurement system reduces waste and improves fairness and efficiency. China's enhancements focus on refining eligibility, valuing research results, and prioritizing innovation quality.

9. Ongoing Challenges and Recommendations

Despite progress, China's system faces challenges:

- (1) **Policy Framework Redesign:** Currently reactive, the system lacks specific legislation for innovative talent funding. Targeted laws would ensure sustainability.
- (2) **Boosting Financial Resources:** Limited resources restrict support for growing student numbers. Enhanced government, private sector, and international investments would accelerate innovation.
- (3) **Improved Incentive Mechanisms:** Transparent and rewarding evaluation is needed to foster genuine innovation, creating a dynamic academic environment.
- (4) **Supporting Overseas Students' Return:** To counter global competition, improved funding and opportunities for self-funded students abroad could encourage them to return and contribute.
- (5) **Long-Term Strategic Planning:** Responsive, long-term strategies, such as the "Medium and Long-term Education Reform and Development Plan," are essential for adapting to evolving talent needs.

10. Conclusion

China's focus on promoting innovation in education has fostered a generation of creative, skilled individuals contributing to economic and technological growth. This study analyzed China's innovation development through educational financial aid by addressing four questions, summarized below:

China's progress reflects a systematic approach involving experimentation, refinement, and adaptation, which enabled flexible responses to challenges. Issues such as lack of focus, funding shortages, limited research areas, and rising student numbers were tackled through targeted actions and feedback mechanisms, ensuring transparent improvements.

Sustainability is a concern, with future stability dependent on establishing a legal framework, increasing funding, enhancing incentives, and retaining students studying abroad. Key lessons include setting long-term goals, enacting legally supported policies, implementing cross-functional feedback mechanisms, and establishing standardized evaluation systems—though these may require adaptation for different contexts.

Future research could focus on retaining high-performing talent, especially overseas students, and managing system fragmentation as stakeholders increase, with Hong Kong's approach providing valuable insights.

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References

- China Association for Science and Technology. (2022). *China R&D Outlook 2022*. Beijing: China Association for Science and Technology.
- Han, Y. (2022). *The role of education in China's development*. Springer Nature.
- Li, Y. (2012). *The Chinese education system: A critical analysis*. Routledge.

- Lin, C., & Nolan, P. (2003). The transformation of the Chinese economy. In *The Chinese economy in crisis: State failures and market forces* (pp. 1-33). Oxford University Press.
- National Bureau of Statistics of China. (2023). *Statistical Yearbook of China 2023*.
- Wang, J. (2013). *China's education reform: A historical perspective*. Springer.
- Wong, L. L. (2015). *Education in China: Policy, innovation, and reform since 1949*. Routledge.
- World Intellectual Property Organization WIPO. (2022). *World Intellectual Property Indicators 2022*. Geneva: World Intellectual Property Organization.
- Zhou, N. (2013). *China's education system in the 21st century: Issues and challenges*. Routledge.