Empirical Article

OJED
OPEN JOURNALS IN EDUCATION

Volume 14, Issue 5 (2022), pp. 134-170
Journal of Comparative & International Higher Education
DOI: 10.32674/jcihe.v14i5.4581 | https://ojed.org/jcihe

A Bibliometric Exploration into the Global Research Impact of China's Thousand Talents Brand

Ryan M. Allen[a*], and Yang L. Allen[b]

[a]*Soka University of America, United States*

[b]*New School for Social Research, United States*

*Corresponding author: Email: ryallen@soka.edu

Address: 1 University Drive, Aliso Viejo, California 92656-8081

Abstract

The Thousand Talents Plan was an ambitious government initiative to repatriate and/or recruit experts from the global Chinese diaspora, along with some non-Chinese experts. The plan has received much criticism from abroad, accusing it of taking advantage of the open international education sector and facilitating espionage. While the Thousand Talents Plan received the most international attention, it was just one of over 200 Chinese governmental talent recruitment plans, which we label broadly as the Thousand Talents Brand (TTB). Using bibliometric analysis from the Web of Science, we find that research connected to the TTB decreased following the recent outcry but was only roughly 1% of all Chinese research output at its peak in 2018. We also find that the research was mostly concentrated in the hard sciences, with relatively little in the social sciences. Our results show the research funded through the initiatives was most partnered with researchers from the Western powers, including connections to institutions with national security concerns. While the findings do illustrate a complex web of global research governance through international partnerships, they cannot alleviate scrutiny of the potential alignment between the TTB programs and sensitive sectors abroad.

Keywords*:* Thousand Talents Brand, China, global mobility, research and development, bibliometrics

Received February 01, 2022; revised May 01, 2022; accepted August 01, 2022

Introduction

In 2008, the central government of the People's Republic of China (PRC or China) launched the Thousand Talents Plan, an ambitious measure to repatriate those trained overseas or recruit others from the Chinese diaspora, along with some non-Chinese experts. The initial goal was to recruit roughly 2,000 elite scholars from mostly high-tech areas with generous research funding, relocation packages, and other attractive incentives (Miao et al., 2021; Zweig & Wang, 2013). Through the plan, China attracted world-renowned scientists to its institutions, including those in areas such as artificial intelligence and nanotechnology (Gao et al., 2016). Consequently, the success of the Thousand Talents Plan led to an expansion beyond the initial target, including various "Talents" funding from localities, adding to the plethora of other recruitment plans already established by the Chinese government such as the Thousand Young Talents Plan and the Ten Thousand Talents Plan (Kim & Allen, 2018; Zhu, 2019). These efforts were outcomes responding to the Outline of the National Plan for Medium and Long-Term Talent Development Plan (2010-2020) published by the central government in July 2010.

The initial Thousand Talents Plan has gained the most international attention, becoming shorthand for all of China's national recruitment initiatives, but these efforts were often a crisscross of various programs with slightly different foci that centered on the recruitment of experts from abroad. According to a report by the U.S. Senate (2019), the Thousand Talents Plan was the most prominent of the over 200 talent recruitment plans that China implemented. These Talents programs have operated at four levels: national, provincial, city, and even institutional (Zhu, 2019; Stoff, 2020). Recently, popular media and politicians outside of China have focused on the Thousand Talents Plans when discussing all talent initiatives (U.S. Senate, 2019; Armstrong et al., 2020). For instance, Jia's (2018) Career guide: China for *Nature* described opportunities through the various programs simply as the "Thousand Talents scheme", despite the guide referring to multiple programs. Given the haphazard nature and similar naming conventions, we have labeled these various plans under the broader umbrella of the Thousand Talents Brand (TTB), representing the era of the recruitment programs, innovation incentives, and young scholars' initiatives that proliferated since 2008. Thus, this research has labeled these "Talents" programs carried out by Chinese governments

under the Thousand Talents Brand. For instance, through this distinction, both the Thousand Talents Plan and Ten Thousand Talents Plan have been categorized under TTB—even as the latter was technically aimed at domestic scholars, many awardees still had backgrounds and research connections related to elite institutions outside of China (Cao, 2017).

The success and scope of the overseas recruitment efforts by China brought criticism and controversy from abroad. Stakeholders in Western societies argued that these talent recruitment efforts took advantage of the open international system, and some even called it espionage (Joske, 2020; U.S. Senate, 2019). Commonly, some professors in the U.S. were arrested or fired for not disclosing their involvement with the Thousand Talents Brand programs, a violation in some nations due to restrictions on government grant allocation and foreign monies, such as failing to list inclusion in the program on U.S. National Institute of Health (NIH) grants (Keen, 2021; Zweig & Kang, 2020). In the most high-profile case, Charles Lieber, a renowned professor from Harvard University and nanotechnology expert, was convicted over hiding his association on U.S. Federal grant applications that he had received millions of U.S. dollars to be affiliated with Wuhan University of Technology (U.S. Department of Justice, 2021a). Although there have been some cases of misconduct by a few scholars related to the Thousand Talents Plan (Zweig & Kang, 2020), observers have criticized the increased scrutiny of Chinese scientists and diaspora groups as xenophobic or racist (Lee & Haupt, 2020; Tollefson, 2019). Because of the controversies, it has been difficult to gauge the impact of the Thousand Talents Brand on the global landscape of higher education, as official data on the broader project has not been readily available and the fragmented nature of the funding schemes has been allocated by various levels of governments and localities in China. Furthermore, due to the international opposition toward the TTB, the Chinese government has wiped public documentation related to the programs. The official websites of the State Council and Ministry of Education (MOE) have deleted the relevant information regarding the “Thousand Talents Plan” in Chinese. There are some previous documents related to “*rencai*” (“人才”, Talent), but without direct connection to the TTB, which added obstacles to the study of the topic.

Research has explored various aspects of TTB operations (Miao et al., 2021;Zweig & Wang, 2013), outcomes (Fedasiuk & Feldgoise, 2020; Zweig et al., 2020; Zweig & Kang, 2020), and other project specificities (Kim & Allen, 208; Stoff, 2020; Zhu, 2019), but there have been few broader bibliometric analyses of the research impact of the initiatives (Marini & Yang, 2021). This research aims to interrogate the international critiques of the TTB, filling the gap in understanding the reach of the initiatives. We use the following research questions to guide this exploration:

1. How much and what types of research have been published through the Thousand Talents Brand and how does it compare to overall research output in China?
2. What institutions both domestically and internationally have been a part of research through the Thousand Talents Brand?
3. What has been the engagement of international joint-research publications through the Thousand Talents Brand in terms of nation-state comparison?

Literature Review

Chinese Research and Development Governance

The Chinese higher education sector has been critical to the Chinese Communist Party's (CCP) national development plan since the founding of the People's Republic of China in 1949, epically in terms of public good provision targeted at building an educated citizenry capable of innovation and technological advancement (Allen & Zhang, 2021; Sun & Cao, 2021). However, the sector was severed from the Western world during much of the Cold War, relying on expertise from the Soviet Union for technical assistance and sector emulation. With the post-1978 Reform and Opening, the higher education system began to connect to American, British, and other Western institutions for educational training and partnerships. In 1983, Deng Xiaoping (as cited by Miao et al., 2021), China's paramount leader who shepherded the opening period, argued: "Introducing foreign talents as a strategic policy that must be adhered to for long term" (p. 5). Over a period of thirty years, Chinese students fueled international education by sending students throughout the world, with the hope that they would return to help develop domestic innovations, known as "sea turtles" (Kim & Kim, 2020; Liu, 2021).

To harness the returning students and foster domestic innovation models, the Chinese government established a series of elite-making university policies that would fundamentally shape the national higher education hierarchy. In the 1990s, both the 211 Project and later the 985 Project were established to bring Chinese universities to international standards by funneling massive government investment to the top level of the sector. The policies were largely successful as measured by Chinese universities on the world stage such as through international partnerships and global university rankings (Allen, 2017; Lo & Allen, 2022). In conjunction with the heavy investment within the higher education sector, the CCP's 13th Five Year Plan (FYP) for 2016-2020 streamlined national research and development (R&D) funding through the Ministry of Science and Technology by converging research projects (Kenderdine, 2017). Similarly, the government launched a new policy in 2015 called Double First Class ("双一流") that built upon the previous policies by adding incentive mechanisms and focusing on specific disciplines (Allen, 2021). Universities within these schemes have attracted scholars, students, and other stakeholders from the world and have dominated the domestic higher education sector (Allen, 2017; Gao & Li, 2022; Lo, 2011). However, there has been critique that despite the growing international reputation, Chinese universities cannot truly innovate and that national R&D would stagnate (Altbach, 2016; Horta & Shen, 2020). To make up for these potential deficits, the nation has had an overreliance on academics and scholars trained abroad (Sun & Cao, 2021).

Thousand Talents Brand Era

China, even before the establishment of the PRC, has had a long history of tapping into its diaspora for trade and investment. The Western Returned Scholars Association (WRSA) was established in 1913 and continued to operate with over 220,000 individual members in China and throughout the world (Joske & Stoff, 2020). The organization reportedly has close ties to the Thousand Talents Programs and advocates technology transfer back to China through global working stations, contests, and other support programs. Scholars have shown that the reliance on foreign technology has been baked into the Chinese governance structure since 1949 and has been especially rampant since the post-1978 expanded overseas research and

development ventures (Hannas & Chang, 2020a; Miao et al., 2021; Sun & Cao, 2021). Further, the CCP realized the importance of the global Chinese diaspora in the 1980s as these groups offered the bridge between Western capital and Chinese manpower. In 1994, the Chinese Academy of Sciences (CAS) established the Hundred Talents Plan, while, in 1998, the MOE established the Changjiang Scholars Program (Stoff, 2020). In 2006, building directly upon the elite-making higher education policies, the 111 Project was launched with the explicit goal of recruiting overseas experts from the "top 100 research institutions in the world" (Spears, 2020, p. 31). Indeed, many of the leading scientists at the elite 211 and 985 universities had trained at Western universities (Li & Xue, 2021). Scholars have found that these programs have been directly tied to the international prestige of hosting institutions, connecting to university rankings and placements in a competitive sector (Allen, 2017; Shen & Jiang, 2021; Zhu, 2019).

International talent policies have been directly tied to domestic development and the governance of research and development, ramping up since the launch of the Thousand Talents Plan in 2008 (Joske, 2020). Through a policy analysis of government documents, Spears (2021) argued that the CCP has three clear goals regarding overseas populations: 1) "return to China to work", 2) "start a company", and 3) "serve China" (p. 23), even if choosing not to return home. In a bibliometric analysis of the Youth Thousand Talents Plan, Fedasiuk and Feldgoise (2020) found that over 66% of the awardees came from the US. A key critique of Thousand Talents Brand efforts has been that the recruits have come from high-tech areas, sometimes related to national defense. Indeed, the various programs have attracted researchers in areas such as quantum physics, nanotechnology, and biomedical innovations (Dyer, 2020; Fedasiuk & Feldgoise 2020; Keen, 2021; Stoff, 2020). For instance, Mulvenon and Zhang (2020) reported that a handful of researchers were recruited from the Department of Defense, U.S. Air Force, and U.S. Navy, along with hundreds from within the Department of Energy. Likewise, researchers have found considerable collaborations between American researchers and the so-called "Seven Sons of National Defense" in potentially sensitive areas of national defense—some of the funding redacted from Chinese scholars' CVs and data had to be manually searched (Fedasiuk & Feldgoise, 2020; Stoff, 2020). These universities include Northwestern Polytechnical University, Harbin Engineering University, Harbin Institute of Technology, Beihang University, Beijing

Institute of Technology, Nanjing University of Science and Technology, and Nanjing University of Aeronautics and Astronautics. The U.S. government under Trump issued a ban on visas for researchers, scholars, and students from the Seven Sons of National Defense due to military ties (Kania & Wood, 2020; Mulvenon & Zhang, 2020).

Despite the intense efforts and resources put into the Thousand Talents Brand era by the Chinese government, scholars have found mixed results for these various talent initiatives. In terms of attracting top Chinese talent from abroad, the strongest scientists involved in the Thousand Talents Plan were generally only working in a part-time capacity with Chinese universities (Zweig et al., 2020) and awardees often favored quantity over quality in terms of publication output (Marini & Yang, 2021). Illustrating these struggles through qualitative interviews, Rezaei and Mouritzen (2021) found that returnees within these Talents Programs often felt isolated and "positioned outside Guanxi networks" (p. 7). Relatedly, Kim and Kim (2020) reported that despite the talents push, returning Chinese has had lower success in obtaining positions, even altering the sea turtle nickname to "Haidai (海待)" or "Haydai (海带)" (p. 88). The explorations of operations inside China that show the struggles of the TTB offer a differing picture compared to the concern of the endeavors that dominated discussion abroad.

International Engagement and Disengagement

Over the last few decades, China has been making unprecedented gains in terms of global research and development, often relying on international collaborations with scholars from Western institutions. Indeed, the Chinese government has made significant efforts to incentivize international metrics and indicators for domestic universities and researchers, such as publishing in the Science Citation Index (SCI) and Social Science Citation Index (SSCI) or moving up in world university rankings (Chou, 2014). Publishing within these elite indices has driven research agendas and brought with them significant cash rewards for scientists (Allen, 2019; Tian et al., 2016). However, recently the Chinese government pulled back from some of these foreign measures in evaluation like SSCI or SCI, leading some to wonder if the sector is in a new phase of development (Li, 2020; Lo & Allen, 2022). Regardless of the recent shifts, the high-level investments and

incentivization structures that dominated the sector for over two decades prior have made China one of the global leading powers in research and development.

Scholars have used bibliometric techniques to understand the research impact and growth China has made compared to peers around the globe. In a bibliometric analysis of China's Web of Science output, Liu et al. (2015) found that the nation's output of research output boomed from 2002 to 2013 and was dominated by the affluent universities on the eastern coast. Much of the collaborative research output was partnered with US-based researchers (Liu et al., 2015). In terms of global comparison, after years of catching up, researchers have found that China is only rivaled by the U.S. in terms of overall global research and academic output, overtaking the European sectors and other traditional powers (Kwiek, 2021; Marginson, 2021). However, scholars have still questioned the extent to which China has *caught up* to its global peers, critiquing the bibliometric measures and the nation's international governance position (Altbach, 2016; Horta & Shen, 2020; Marginson, 2021). Differing from the US, Chinese researchers have shown to be much more collaborative on a global scale (Lee & Haupt, 2020). During the global COVID-19 crisis, the U.S. and China led the world in research capacity on the pandemic and researchers argue that research cooperation between these two powers will be crucial in the coming years to tackle global challenges (see Lee & Haupt, 2020; Sun & Cao, 2021).

The growing dominance and expansion of internationalism in China's research and development coincided with pushback against globalism from around the world, especially in the West with the election of Donald Trump in the U.S. and Brexit in the UK. Cantwell and Grimm (2018) referred to the rise of nationalism and concerns of geopolitics within scientific fields as techno-nationalism. Indeed, the election of Trump to the U.S. Presidency marked a tumultuous period for US-China relations. Trump strongly campaigned against China, accusing the nation of taking advantage of the U.S. in trade and actively stealing technologies and innovations. His administration kept these promises by enacting tariffs, limiting and tougher vetting of student visas, and scrutinizing foreign donations to universities. Further, in 2018, Trump launched the China Initiative to target "trade secret theft, hacking, and economic espionage" by the Chinese government (U.S. Department of Justice, 2021b, para. 4). The initiative mostly targeted Chinese scientists,

emphasizing involvement with the Thousand Talents Program, and continued partly through Joseph Biden's presidency. However, in 2021, when several high-profile scholars who were arrested through China Initiative had their charges dismissed, scholars, activists, and NGOs such as the Committee of 100 (2021) called the endeavor a "New Red Scare" (p. 4) that was based on racism and ethnonationalism, demanding Biden suspend the plan (Tillman, 2020; Tollefson, 2019).

Overall, these actions and sentiments alarmed scholars involved in the mobility and Chinese educational sector, as it was feared students and scholars would be scared away from the U.S. as a destination and the larger decoupling of the universities between the two nations (Allen & Ye, 2021; Lee & Haupt, 2021). While the loudest and most fervent critique of China's talent endeavors stems from the Anglo West, scholars, and governments from around the world have raised concerns over these strategies, such as in Europe (Tatlow et al., 2020) and East Asia (Hannas & Chang, 2020b). Higher education stakeholders worry that rising insularity and nationalism will destabilize the international education sector, including people-to-people exchanges and international student flows, coupled with the barriers to the sector due to the COVID-19 pandemic (Lee & Haupt, 2021; Sun & Cao, 2021).

Methodology

The design of this study follows recent bibliometric analyses regarding the politics of publishing from a global perspective (see Kwiek, 2021; Lee & Haupt, 2020; Lee & Haupt, 2021) and others on Chinese talent programs (Fedasiuk & Feldgoise, 2020; Marini & Yang, 2021; Shen & Jiang, 2021; Stoff, 2020). The bibliometric approach can provide a macro view of broader trends to understand the research output of institutions, networks of experts, and entire nation-states from an interdisciplinary standpoint (Donthu et al., 2021). One of the essential features of bibliometrics analysis is to apply quantitative techniques to massive datasets. Given the large and wide scope of the collected data for this research, the bibliometric analysis serves as a powerful method to explore and analyze the empirical data and it helps to reveal the uncovered trends linked to TTB from a longitudinal perspective. Additionally, the statistical descriptions derived from the bibliometric method disclose the characteristics of research relevant to TTB and their

connections and comparisons to the overall research outputs in China. A summary of published research under TTB, such as their research interests (foci) and related intellectual fields, can be achieved through graphical representations and descriptive comparisons across the data (McMillan, 2015). Bibliometrics analysis offers a robust tool to encapsulate the structural evidence of a given field, via examinations of social, political, and power relations among various research actors that are present in the data (Donthu et al., 2021). In this specific research, the domestic and international institutions affiliated with TTB, joint-research publications, and collaborators provide this structural evidence.

The study relied upon two indices from the Web of Science: SCI and SSCI. Generally, the former index focuses on hard sciences while the latter on social sciences. These indices have been seen as elite publishing spaces due to their usages as measures in global ranking metrics and China has paid special attention to these international journal indices, offering handsome incentives to scholars who publish in them (Chou, 2014). Although, in 2020, the PRC government promised to deemphasize these indices, the effect of the proclamation is still too early to fully gauge (Li, 2021). Nonetheless, the usage of the indices as data can provide insight into global research outputs and scholarly engagement.

The dataset for this study was created by pulling bibliometric entries from the Web of Science over the timeframe of 2008-2020, beginning with the first year of the Thousand Talents Plan. Considering the database's primary function as a library search tool, the data from the Web of Science needed to be cleaned and organized to conduct proper analysis as designed in this study. Similarly, the system can still differ depending on the timeframe of data collection or publication reporting, as journals get added or removed from the various indices or publishing dates change to match print placement. Other studies in the field relying upon similar bibliometric data have faced similar barriers (Liu et al., 2015; Marginson, 2021), but the design can still provide macro insights into the broader trends of research and scholarship. We will further discuss the results in the context of the methodological limitations and choices in the conclusion section.

Table 1

Selected Sample Titles of Various Thousand Talent Brand Programs from the Dataset

Administrative Levels	Examples of the Thousand Talent Plans
National Level	Recruitment Program of Global Experts 1000 Plan of China
	1000 Foreign Expert Distinguished Professor Plan
	1000 Youth Elite Program in China
	China 1000 Plan National Distinguished Professorship
	China 1000 Youth Plan Program
	China Youth 1000 Talent Program of The State Council of China
Provincial Level	Zhejiang Province Excellent Young Talents Fund Project of Traditional Chinese Medicine
	Six Talents Peak Project of Jiangsu Province
	Guangxi New Century 1000 Talent Project
	Hubei Provence for 1000 Talent Program
	Hundred Talent Project in Beijing
	Beijing Innovation Talent Project
	Beijing Excellent Talent Training Subsidy Program Youth Backbone
Municipality Level	Yunling Industry Leading Talents
	Taishan Industrial Leading Talents China
	Scientific Research Foundation for Peacock Talents of Shenzhen
	Science and Technology Innovation Talents Program of Ganzhou City
	Science and Technology Innovative Talents Support Program of Shenyang
	Qinghai 135 High Level Talents Training Project
Institutional Level/ Other	Ministry of Education 1000 Youth Program
	China Postdoc Innovation Talent Support Program China Postdoctoral Science Foundation
	Chinese Academy of Sciences 100 Talent Program
	Alberta Innovates Technology Futures and China's 1000 Talent Plan
	Tsinghua University Talents Support Program
	Research Foundation for Introduced Talents of Kunming University

Note. Compiled by the authors from the dataset to illustrate TTB at various levels of governance.

Through a Boolean logic search of the database, any journal article that reported a Thousand Talents initiates or any variant as a funder was included in the dataset. The inclusion of the funders offers a glimpse into the broader Thousand Talents Brand beyond the fragmented talent recruitment initiatives that have arisen through various levels of Chinese government. However, how authors report funders is not standard across individual journals. For instance, an author might report "1000 Talents Plan" and another "Thousand Talents Plan", causing a mismatch within the Web of Science database. Due to self-reported descriptions of funding from TTB, there were thousands of variations listed within the collected data. To clean the data, we collapsed these discrepancies together for the final analysis. There are three main categories of TTB:

Innovation-focused talent plans, experts' recruitment targeted schemes, and young scholars-centered projects. As displayed in Table 1, three major aspects of TTB were carried out at the national level, followed by the provincial, municipal, and then prefecture-level cities. Additionally, universities and local education entities enacted their versions of the Thousand Talents Plan. In view of the complexity, our research considers the Thousand Talents Brand under this umbrella.

The resulting sample included 20,008 journal articles, with each offering several pieces of information to draw a deeper understanding of the overall impact of the Thousand Talents Brand. First, the longitudinal TTB output was explored across the period of study, along with a comparison to total Chinese research output. Next, to explore the fields of focus for the research output, the data were compared by inclusion in SCI or SSCI, along with a similar comparison to overall Chinese research output in these two indices, which offers a comparison between hard sciences and social sciences in terms of the research focus of the initiatives. Furthermore, a snapshot of the specific fields of research for the TTB dataset was explored to understand where the initiatives centered funding. Finally, to explore the various institutions and collaborators connected to TTB funding, we offered a snapshot of the Chinese universities and research academies that were most affiliated with the journal articles in the dataset. Likewise, for international collaborators, we explored the non-Chinese institutions that were most affiliated with the TTB data, along with an overall tally of collaborators on these journal articles from other nations.

Limitations

Marginson (2021) warned that there are limits to dawning meaning from bibliometric data, noting the positivist and materialistic approach that drives these types of measurement. Our study was designed using other bibliometric research as foundational guides (see Kwiek, 2021; Lee & Haupt, 2020; Lee & Haupt, 2021). But these kinds of studies have limitations in the type of data. Using Web of Science in the manner that we have done within our bibliometric analysis comes with drawbacks set by the operating company, Clarivate. Due to user restrictions on scaping and downloads, the dataset can mostly provide a broad descriptive sample of the TTB's research impact. Likewise, because the database's main function is for reference search, research purposes are only secondary. Given that publications may be added or removed

to the various indices, the Web of Science could alter findings in the future, as well as publications altering dates of journal articles to match printed publications. Despite these barriers, the data can still offer a key snapshot of the given period in terms of research impact like other bibliometric analyses have shown in prior studies, even as the Web of Science database is tweaked and altered in the future. Finally, there is a kind of opaqueness in the study of Chinese governmental policy, especially those related to sensitives areas, which scholars working in this field have become accustomed to. While this research can offer glimpses and clues, there must be continued efforts to explore these policies at various levels.

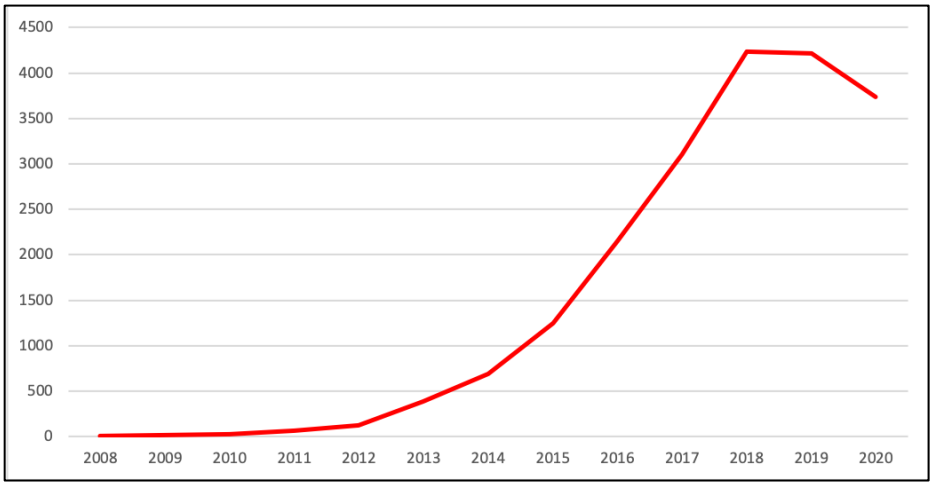
Findings

Thousand Talents Brand Longitudinal Comparison

Publications connected to Thousand Talent Brand funding mostly saw impressive growth since 2008. As displayed in Figure 1, in the early years of the TTB, given that scientific publishing takes years to produce, there were unsurprisingly few publications in the first three years, with only eight TTB-funded articles in 2008, up to 22 in 2009, and 24 in 2010, a 73.21% compound annual growth rate (CAGR), as calculated $\mathrm{CAGR} = \left(\frac{V_{\text{final}}}{V_{\text{begin}}}\right)^{1/t} - 1$, over the initial period. However, entering deeper into the new decade from 2011 onwards, there was a sharp increase year to year, exploding from 65 articles in 2011to 1,252 in 2015, and peaking in 2018 at 4,234 articles that year, a percentage increase of 81.60% compound annual growth rate between 2011 to 2018. In 2019, the frantic growth stopped and dipped that year to just 4,218 articles and dropped again to 3,735 in 2020, potentially due to new pressures described in the literature review, which will be posited in the discussion section. Overall, Thousand Talent Brand publications listed in the Web of Science had a compound annual growth rate of 66.89% from the beginning measurement year in 2008 to the final in 2020.

Figure 1

Number of TTB Articles in the Web of Science (2008-2000)

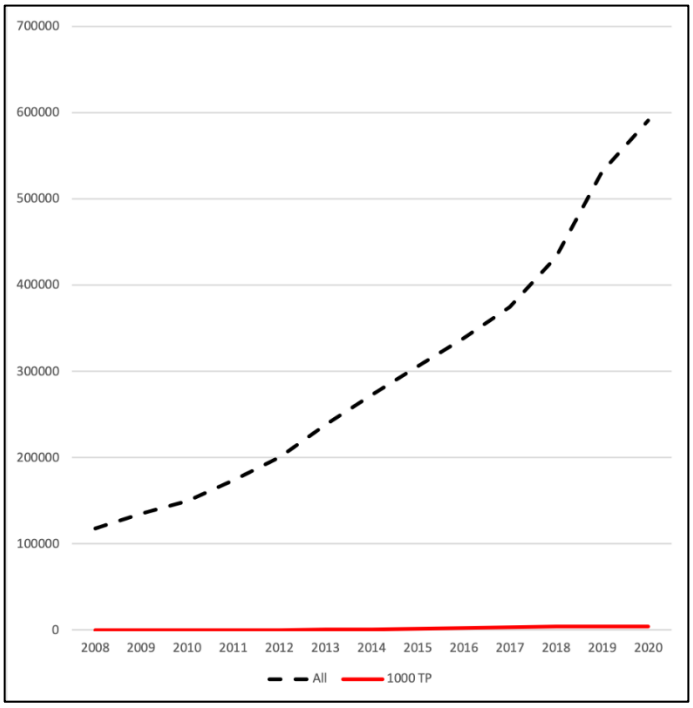


Note. Number of articles on the y-axis; year on the x-axis.

Given the international media and governmental scrutiny of the Thousand Talents Brand, a comparison to overall Chinese research outputs is crucial to recognize the impact and scope of the scheme. Overall, the TTB is barely visible compared to the scale of all Chinese research output displayed in Figure 2. Consistent with past work that highlighted the massive gains in Chinese research output, there were 117,764 articles in the Web of Science in 2008 with at least one Chinese author, jumping to 590,991 in 2020, a 14.39% compound annual growth rate over this period. It should also be noted that the overall Chinese research output did not see a slowdown in 2019 nor a drop in 2020, as discovered in the Thousand Talents Brand articles over this same period. To better understand the placement of TTB articles within this massive output for all of China, the yearly ratio was calculated. As shown in Table 3, the ratio of research related to the TTB rapidly rose from 2008 and peaked at just under 1% of the total output in 2018. However, converging with the other results in the study, the overall percentage fell in the subsequent years to just under 0.63% in 2020. The findings show that even at the peak, these initiatives accounted for just a fraction of the overall research output from China.

Figure 2

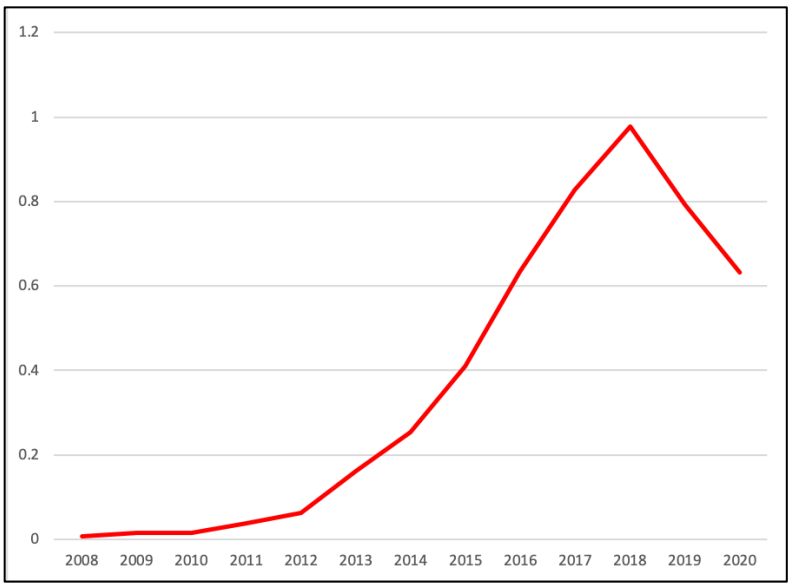
Longitudinal Comparison of All Chinese Research Output in Web of Science vs TTB



Note. Number articles on the y-axis; year on the x-axis.

Figure 3

Ratio of TTB Articles to the Overall Chinese Research Output in the Web of Science



Note. Ratio on the y-axis; year on the x-axis.

Thousand Talent Brand Research Foci

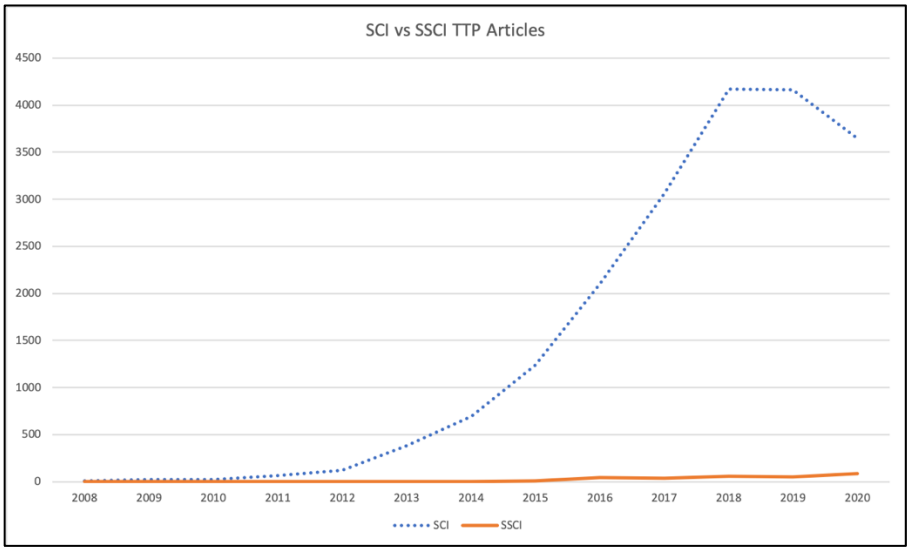
We explored the key critique that the various Thousand Talent initiatives target high-tech and sensitive areas. As displayed in Figure 4, the growth of the hard science articles dominated and shaped the entire output of TTB publications, with those in the social sciences hardly appearing on the chart (note that some interdisciplinary journals can be cross-listed on both indices, although these are minuscule relative to the total comparisons within the study). The first social science article with TTB funding was published in 2012, reporting two articles in the SSCI that year, while there were 122 hard science articles listed in the SCI. None of the years in our study had more than 100 social science articles in the SSCI, with the highest total coming in 2020 with 85, recording a compound annual growth rate of 59.79% from 2012 when an article in this index first appeared. There were already over 100 hard sciences articles listed in the SCI in 2012, ballooning to 4,174 in 2018 before dropping the subsequent years to 3,650 in 2020, a compound annual growth rate of 66.57% over the entire period. Indeed, over the selected period, almost all journal articles with TTB funding were from the hard sciences, adding up all the articles from this period, there were 19,708 listed in SCI and only 300 in the SSCI. These incongruencies between the datasets will be explored further in the discussion.

It is important to contextualize the TTB data within the overall research output of China as displayed in Figure 5. When looking at all of China's research output in the Web of Science, the results yield similar patterns as the Thousand Talents SCI and SSCI dataset, with the hard sciences massively growing from 115,187 in 2008 to over 573,880 in 2020, while the social sciences went from 4,045 in 2008 to 44,351 in 2020, growth rates of 14.32% and 22.09% respectively. In addition, we also examined the ratio between the types of output for both the total Web of Science and TTB data. As displayed in Figure 6, the ratio between SCI and SSCI articles has been consistently in favor of hard science articles for both comparisons in the research output over this period. However, we find that TTB articles have had a lower ratio of social science articles compared to the overall Web of Science output in China, peaking in 2020 for both datasets at .077% and .023% respectively. Furthermore, while the ratio for the TTB articles saw a short decline and

stagnation from 2017 to 2019, eventually bouncing back in 2020, the overall Web of Science only saw consistent growth of SSCI articles.

Figure 4

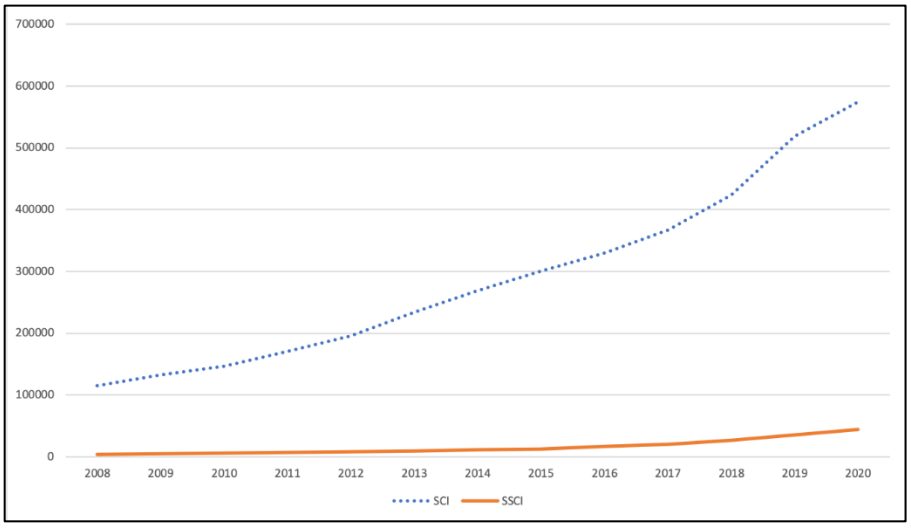
Longitudinal Comparison Between TTB Articles listed in SCI vs SSCI



Note. Number of articles on the y-axis; year on the x-axis.

Figure 5

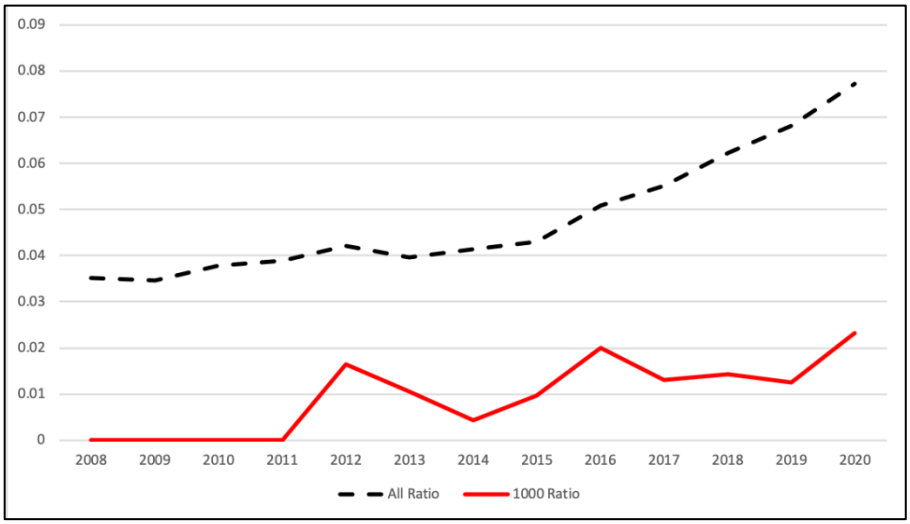
Longitudinal Comparison Between All Chinese Research Articles Listed in SCI vs SSCI



Note. Number of articles on the y-axis; year on the x-axis.

Figure 6

Longitudinal Comparison Between the Ratio of SCI to SSCI in TTB vs. All Chinese Research Output

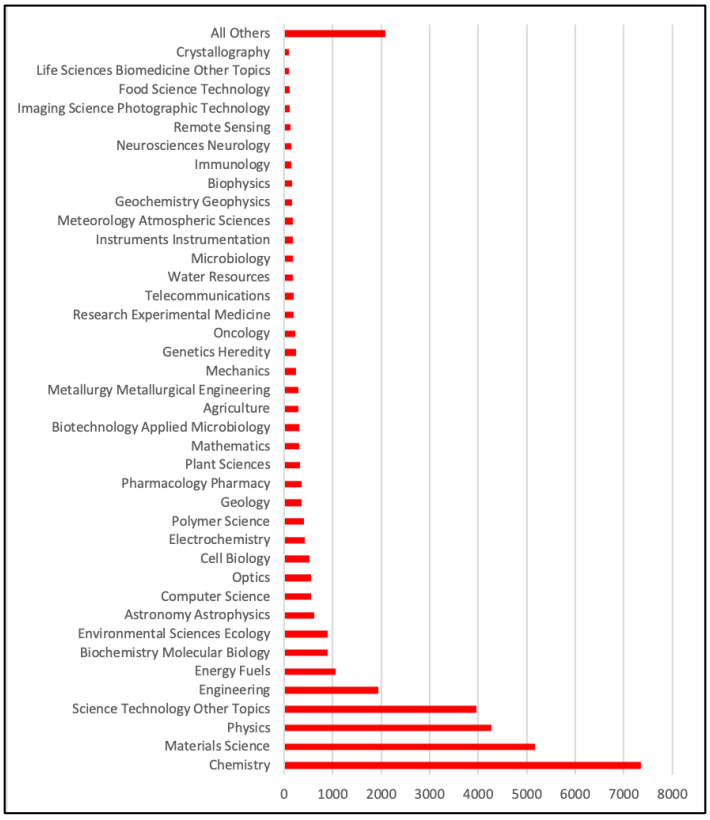


Note. Ratio on the y-axis; year on the x-axis.

While the SSCI and SCI data can provide overall trends, looking at specific fields of research offers a look at the focus of the research agenda for the government-backed funding. Trending with our other findings, hard science fields dominated the publications that had funding through the initiative. We have displayed the fields that contained at least 100 articles in Figure 7. While the total number of different fields was 128, only 39 met this threshold and were dominated by a handful of hard science fields. The only fields to have over 1,000 articles during the period of the analysis were Chemistry (7,354), Material Sciences (5,170), Physics (4,266), Science Technology (3,969), Engineering (1,949), and Energy Fuels (1,054). Likewise, other notable fields in the dataset that have raised concerns from policymakers and other stakeholders in the past were identified as Computer Science (561), Biotechnology and Microbiology (306), and Telecommunications (190). Furthermore, given the importance of global response to the COVID-19 pandemic, it should be noted that fields that could be critical to the pandemic made the list such as Research Experimental Medicine (196) and Immunology (155). There were no social science fields represented on the displayed list, as none met the 100-article threshold. The highest social science field comes from Psychology with just 35 articles.

Figure 7

Total Number of TTP Articles by Field From 2008-2020



Note. Count is in terms of articles.

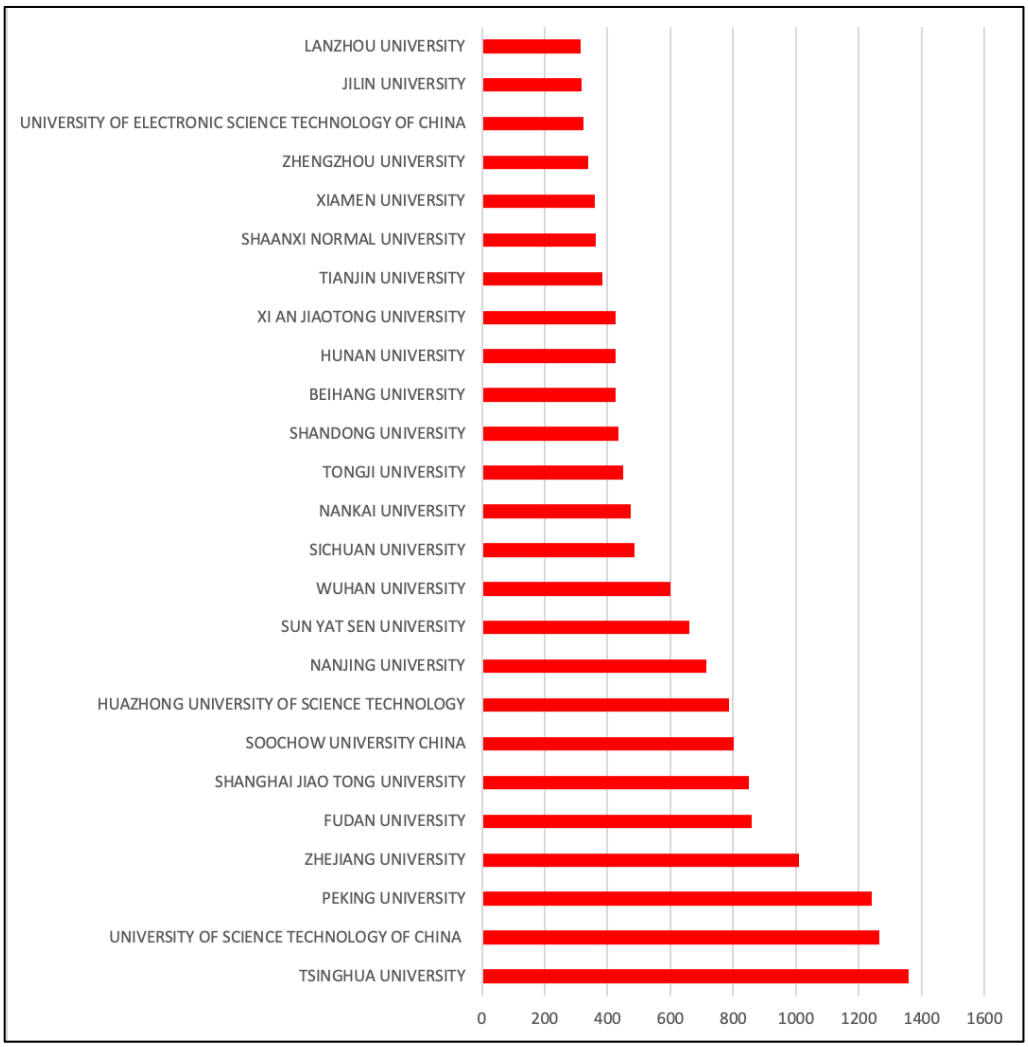
Thousand Talent Brand Institutions and Collaborators

Our research also explored the critiques of the types of institutions involved in the various Talents programs. We have displayed the traditional Chinese university affiliation shown in Figure 8 for the leading institutions with over 300 articles with TTB funding, not including research academies and institutes. Leading the university count was Tsinghua University with 1,359 articles, followed by the University of Science and Technology of China with 1,264 and Peking University with 1,242, the leaders producing the most TTB articles of traditional Chinese universities. While there is a relative drop after these three elite Chinese universities, the next three are Zhejiang University (1,010), Fudan University (859), and Shanghai Jiao Tong University (851). The university list is dominated by leading C9 League universities and other top technical institutions. Furthermore, a considerable amount of research in China funnels through the

various Academies, along with the broader Chinese Academy of Science, which can be cross-affiliated with individual universities. Looking at the specific Academies in this dataset illustrates the hard science and technology focus of published research, as shown in Figure 9. Physics labs dominate the list, such as Dalian Institute of Chemical Physics (325), Institute of Physics (222), and Institute of High Energy Physics (270), along with Chemistry labs, with the Institute of Chemistry (212), Shanghai Institute of Organic Chemistry (197), and Xinjiang Technical Institute of Physics Chemistry (185). These Academies have been critiqued for their connection to military technology transfer. Similarly, in terms of the so-called Seven Sons of National Defense, only Beihang University had more than 300 articles funded through TTB with a total of 427, as displayed in Figure 10. Other Seven Sons still had an impressive amount of these types of funded articles, such as Beijing Institute of Technology (277), Northwestern Polytechnical University (253), and Harbin Institute of Technology (195), while the other three had a drop-off for Nanjing University of Science and Technology (71), Harbin Engineering University (51), and Nanjing University of Aeronautics and Astronautics (47). With a view to the uneven spread of the Seven Sons, the TTB research seems to be more dominated by traditional C9 League universities, former 985 listed universities, and other high-profile technical institutions.

Figure 8

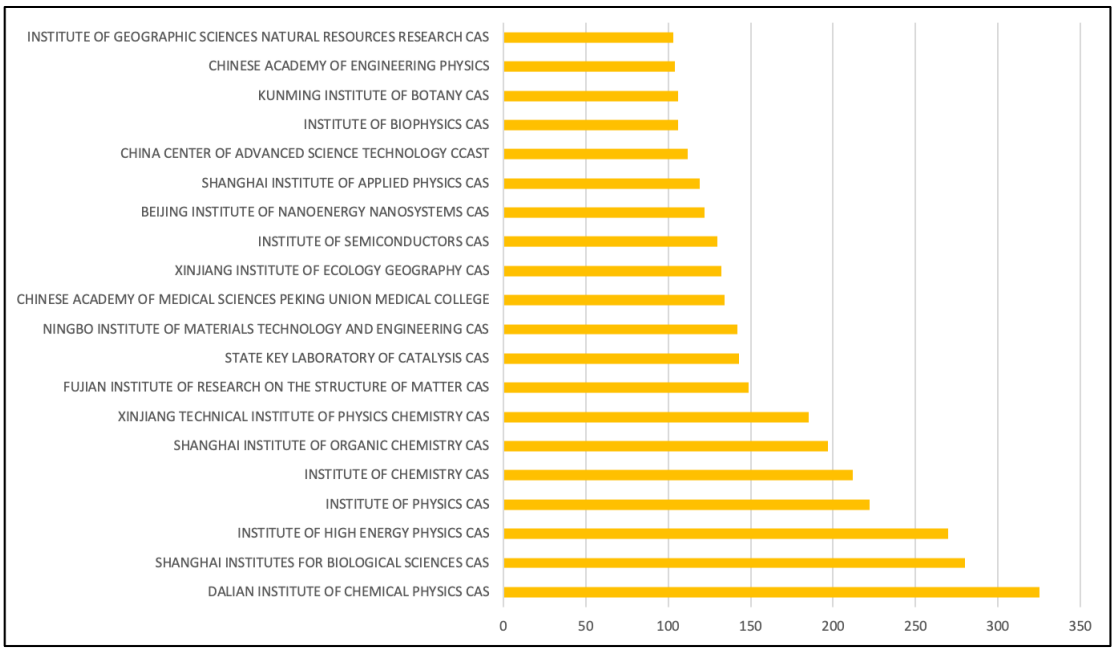
Leading Producers of TTB Articles by Chinese Universities From 2008-2020



Note. Count is in terms of articles.

Figure 9

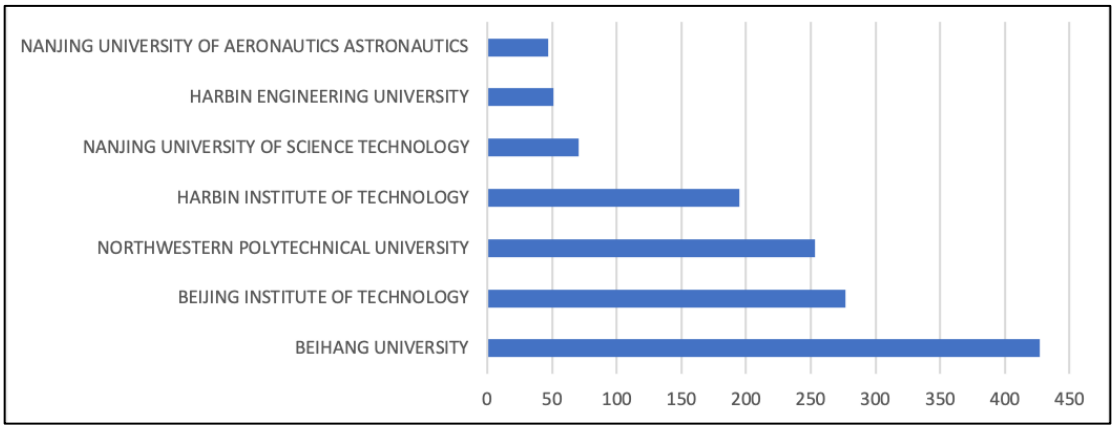
Leading Producers of TTB Articles by Specific Chinese Academies From 2008-2020



Note. Count is in terms of articles. The general category of "Chinese Academy of Sciences" has been removed from the graph as it skews the visualization and can potentially count across different affiliations.

Figure 10

TTB Articles Produced by the Seven Sons of Defense From 2008-2020

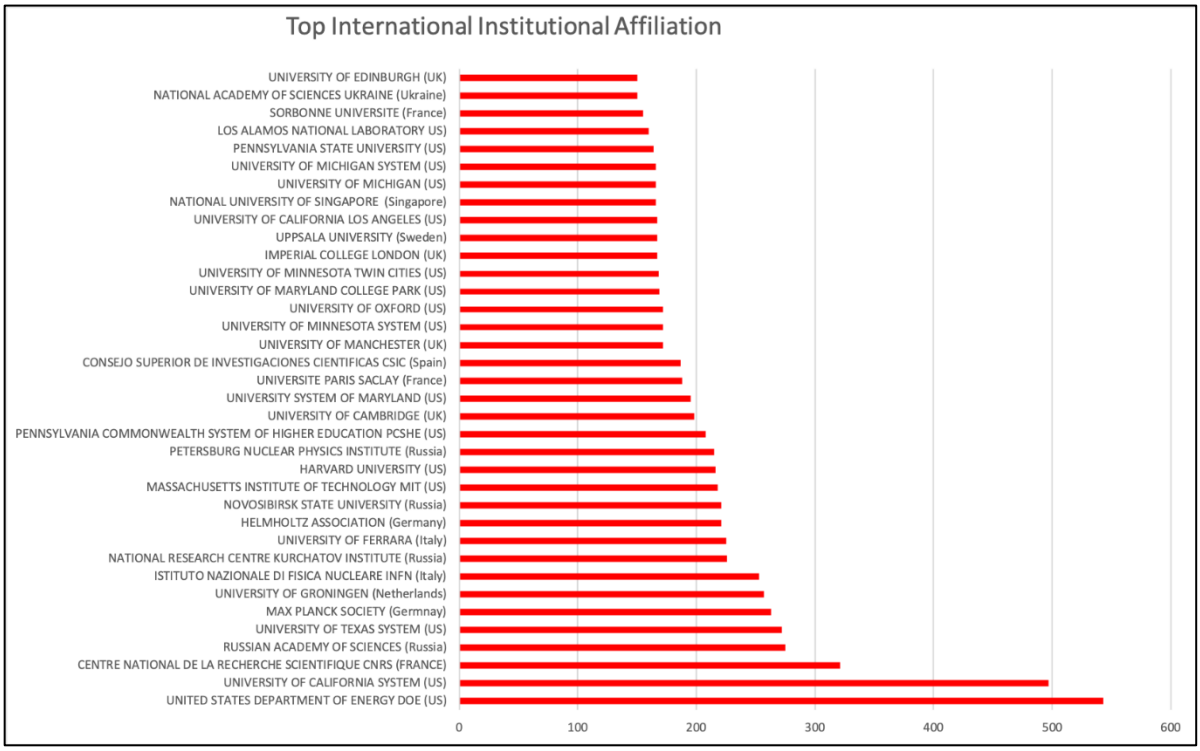


Note. Count is in terms of articles.

Another concern explored in the research related to the issue of technology transfer from researcher institutes and facilities outside of China. We explored the non-Chinese affiliations with research that had Thousand Talents Brand funding from at least one author, displayed in Figure 11 of those with 150 or more entries. The United States dominated the list, with the U.S. Department of Energy surprisingly topping all institutions with 543 articles, followed by the University of California System with 497, and the University of Texas System at 272. However, European powers were also found represented with articles that were connected to TTB funding, with several having over 250 articles: France's Centre National de la Recherche Scientifique (321), Russian Academy of Sciences (275), Germany's Max Plank Society (263), the Netherland's University of Groningen (257), and Italy's Istituto Nazionale di Fisica Nucleare (253). The only non-Western institution to make the list came from Singapore, the National University of Singapore at 166. It should be noted that all these international institutions are recognized as leading research and development facilities within their given domestic sector, which will be further discussed in the concluding sections.

Figure 11

Top International Institutional Affiliations of research with TTB Funding



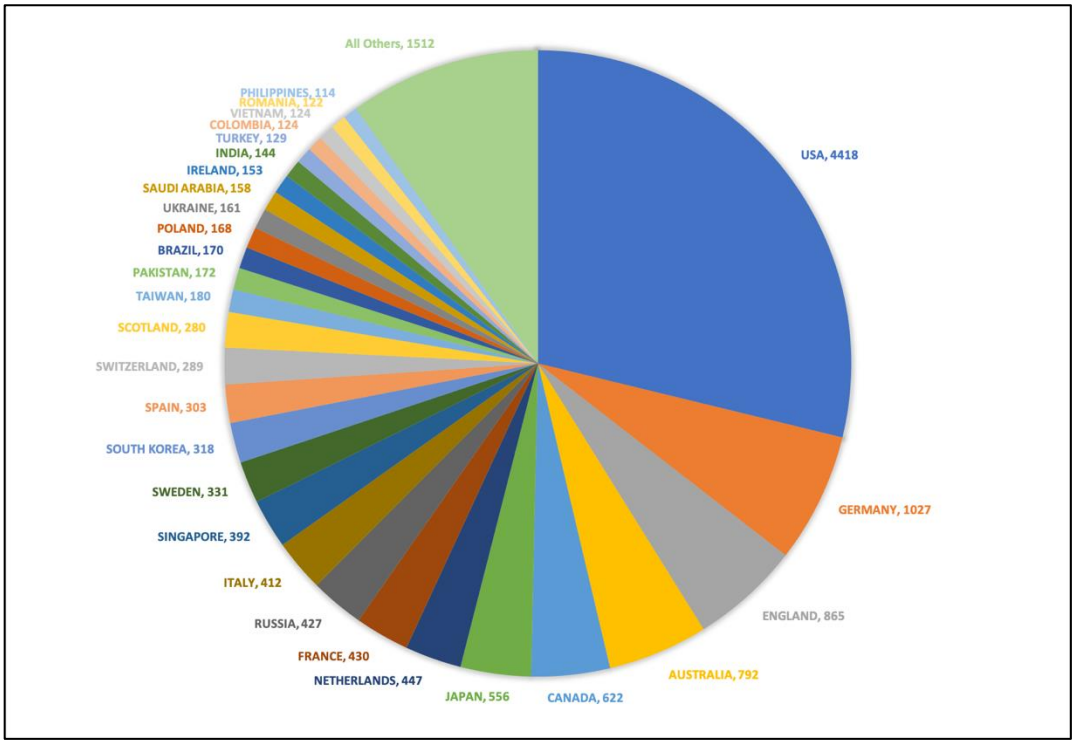
Note. Count is in terms of articles.

Overall, this research sought to understand the global reach of the Thousand Talents Brand. We found nations across the world held partnerships with TTB-funded research through articles published in the Web of Science, as displayed in Figure 12 of locales with 100 or more entries. Researchers from the United States were by far the most active in producing research jointly with TTB colleagues with 4,418 articles over this period, which accounted for roughly 29% of all publications of the non-Chinese institutions in the dataset. Joint publications with U.S. researchers were more than the next six nations combined. The dominance illustrates the reliance on partnerships between the U.S. and China. Furthermore, other nations most connected with joint research of Thousand Talents Brand funding were dominated by other Western powers. The other leading nations in terms of TTB articles were Germany (1,027), England (865), Australia (792), and Canada (622), as represented in Illustration 1. China's Asian neighbors also had connections to the funding. Japan was the highest non-Western nation with 556 articles, while Singapore and South Korea

also appear with 392 and 318 respectively. Outside of the US, Europe, and East Asia, other regions were more sparsely represented in the joint research data. In terms of the Middle East, there were 129 TTB-funded articles with authors from Turkey and 158 from Saudi Arabia, as no other nations in the region were over 100 articles over this period. Furthermore, Brazil had 170 entries to lead the representation of South America, while Colombia had 124 articles. Following the trend, Africa was relatively excluded from the program, with no countries in the entire region scoring more than 100 articles. The highest total from the region was South Africa with only 44 articles. The totality of the results highlights the connection the TTB had in favor of the strong, traditional research powers.

Figure 12

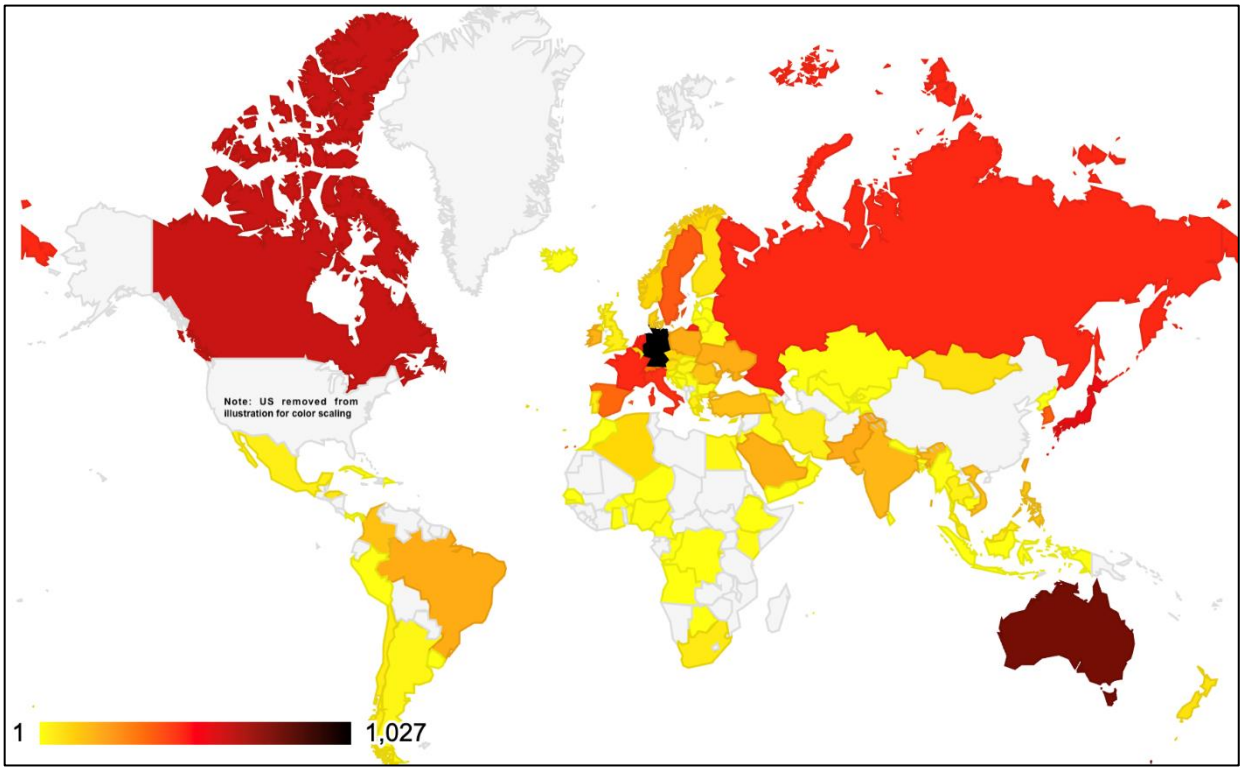
Global Collaborations with TTP Articles From 2008-2000



Note. Count is in terms of articles.

Illustration 1

Geo Mapping of International TTB-Published Research from 2008-2020



Note. Count is in terms of articles. The U.S. was removed from the color-coded mapping due to its outlining dominance skewing the color scaling.

Discussion and Conclusion

The study aimed to understand the global impact of the Thousand Talents Brand through a bibliometric analysis of Web of Science data. Much of the findings align with past research on Chinese recruitment initiatives. Regarding the first research question, we find massive growth in research connected to the various programs from 2008 to 2018. However, post-2018, we find that research funded through the TTB stopped growing and suddenly dipped in 2020. We believe that these results are related to the intense pressure that manifested around the world, especially in the U.S. and other Western nations, to curb the influence of these programs due to espionage and other misconduct. As China has perceived the foreign antagonism toward TTB, most of the related information was taken down and the government also stopped promoting such programs. However, this does not mean that similar recruitment efforts have been

abandoned by the Chinese government. Instead of confronting and further irritating the global community, China has phased down the specific TTB and redesigned corresponding policies and directions. On September 27 and 28, 2021, at the Central Talent Work Conference in Beijing, Chinese leader Xi Jinping delivered a speech emphasizing the strategy of strengthening the country with talents in the new era (Xinhua, 2021). According to Xi's vision and ambition, China seeks to become home to accommodate professional talents and a major world center of innovations. The Strategy of Reinvigorating China Through Human Resource Development was not something new, it was first brought up in the 11th Five-Year Plan in 2006. The reiteration of talent management shows that China will continue with aspects of TTB, but in a different and low-key manner. Despite the intensive focus by stakeholders outside of China that caused this behavior change, we also find that research funded through TTB represented just a fraction of total research output by the nation, peaking at just under 1% in 2018. The results suggest that if the programs are curbed or even completely scrapped, the overall research capacity of China will not be greatly impacted.

The second research question reflected the concerns from around the world towards targeted areas in high-tech innovations and perceived attempts at technology transfer. Indeed, there have been high-profile cases of questionable research practices of TTB participants that may have resulted in undercutting technical capacities in sensitive areas (Fedasiuk & Feldgoise, 2020; Joske, 2020; Stoff, 2020). Our findings in the bibliometric analysis will not alleviate these concerns. For this question, we find that the TTB funded almost no research in the social sciences relative to hard sciences. There were only a handful of studies in fields that would not cause any alarm or suspicion, such as Urban Studies, Archaeology, History, and Psychology. The leading fields were all hard sciences like Chemistry, Materials, and Science Physics. In these findings of the field-specific articles that had TTB funding, Chemistry was by far the most represented field of research, with over 1,000 more articles published than even the second-highest field of Material Science, tracking with the chemist Charles Lieber as the most high-profile case of misconduct related to the TTB. Our findings by themselves do not reveal any nefarious doings by the various talent initiatives, only that the specific guidelines for the programs do explicitly focus on advancing the nation's technical

prowess. Our findings show that the Thousand Talents Brand has been effective in fostering research published in highly cited journals in these areas. However, given this clear goal, the rest of the world is likely to continue to distrust these endeavors, potentially limiting their effectiveness in the coming decade, which likely connects to the Xi government's decision to deemphasize the brand.

Our third question focused on the institutions connected to the TTB, as a critique has been levied at the connections to the Chinese military, namely through the so-called Seven Sons of Defense, especially for researchers based in sensitive institutions abroad. Given these concerns, our results reveal that the awarded funds through the TTB privileged those from elite institutions in China, focusing on the top Chinese C9 League and former 985 universities for these opportunities. Rather than connecting to explicit foreign policy goals, these findings align with long-held hierarchies within Chinese higher education (Allen, 2017). Conversely, we did not find any overrepresentation of the Seven Sons of Defense within the TTB-funded research. While this does not suggest that there are no connections between the military and the TTB programs, it highlights how the output more resembles the domestic order of the education sector rather than foreign policy goals. The current study illustrates how China's lower-tiered institutions have been broadly excluded from high-level funding, aligning with past reports on the operations of universities in China (Altbach, 2016; Gao & Li, 2022).

Finally, we explored the international partner institutions and home countries of research partnerships through the TTB-funded journal articles. The results of our third research question show that the traditional Western powers have been favored as partners for these various projects. The U.S., Germany, England, Australia, and Canada accounted for roughly half of the research output in the dataset, highlighting previous concerns (Stoff, 2020; Tatlow et al., 2020,). Joint publications by scholars associated with American institutions especially dominated this indicator in the study at over 22% of all articles. Some of China's Asian neighbors such as Japan, Singapore, and South Korea were also well represented as research partners, aligning with Hannas and Chang (2020b). Overall, though, the global partnerships mirrored that of the global research landscape. Likewise, the individual foreign institutions most represented within TTB-funded articles came from within these locales, like large U.S. state higher education systems or renowned

research universities in Europe. These types of institutions have massive research scopes and connections around the world, meaning that it should be no surprise to find them on a list of this kind. However, some of the partners found in the research highlight the concern that scholars and other stakeholders have raised. For instance, the leading partner for articles with TTB funding was the U.S. Department of Energy, along with other scientific research institutes and affiliates from Europe. It should also be noted that there were relatively fewer partnerships with non-Western, non-elite universities or institutions abroad.

Future Directions

The results from this bibliometric analysis will not alleviate concerns from policymakers regarding espionage and technical theft levied at these Talents programs. There has certainly been a central focus on technical capacities and recruitment of experts from elite institutions. Our data cannot show the actions taken by individual scholars nor does it prove espionage. The results can only offer hints about the state of the program, building from other past work for the discussions and interpretations of the findings. Thus, our study recommends future research into more detailed and nuanced comparisons of those recruited through the TTB. Likewise, future work must consider the strategies used by the government regarding TTB operations. Considering these points, researchers should emphasize the returnee Chinese scholars via TTB, their publication performance, and career trajectories.

The key aspect of this research is that these are still partnerships between scholars, with information publicly available on research articles and readily available on the Web of Science. Western observers have viewed the TTB programs as antithetical to the open international system, taking advantage of the people-to-people and scholarly exchanges that have dramatically increased post-WWII, especially with the end of the Cold War (Joske, 2020). While the Chinese government has been keen to work within the international order during its rise, there are signs that the nation is now turning inwards regarding education and other sectors (Li, 2020; Lo & Allen, 2022). Our findings only add to this possible turn by the Chinese government, with a critique of the TTB era giving way to something new that is less globally focused. Sun and Cao (2021) argued, “There is real risk of decoupling between the two countries in technology and talent” (p. 6). For instance, Xiao-Jiang Li was fired from Emory University after it was discovered that he was part of the

Thousand Talents Program, derailing his research Huntington's disease (Keen, 2021). Because Li was a world-leading researcher in this specific illness, the space potentially lost years in finding a cure.

After decades of growing international cooperation and an open scientific system, the future might bring a much more closed world akin to the Cold War for higher education, research and development, and people-to-people exchanges. Today, there are parallels between Chinese scholars and programs in the current geopolitical environment. Although China may also choose a more inward path as it navigates a post-COVID-19 world (Li, 2020; Lo & Allen, 2022; Yang, 2020). While politicians and scholars squabble over the foreign policy tactics of China's international recruitment endeavors, potential individuals within these programs may not even fully recognize nor care about the geopolitical meaning of their participation. Indeed, individual scholars, academics, and other researchers returning to China have stronger economic and local grassroots incentives for returning home (Liu, 2021). However, the true cases of infractions and espionage related to the Thousand Talents Brand have tainted the broader relationship between China and partners around the world, hurting individual scholars trapped on either side and setting back global knowledge production.

References

Allen, R. M. (2017). A comparison of China's "Ivy League" to other peer groupings through global university rankings. *Journal of Studies in International Education*, *21*(5),395-411. https://doi.org/10.1177/1028315317697539

Allen, R. M. (2019). Commensuration of the globalised higher education sector: how university rankings act as a credential for world-class status in China. *Compare: A Journal of Comparative and International Education*, *51*(6), 920-938. https://doi.org/10.1080/03057925.2019.1686607

Allen, R. M. (2021). Adding an international lens to the university striving model: How both global and national indicators influence the Chinese higher education hierarchy. *International Journal of Chinese Education*, *10*(1), 1-16. https://doi.org/10.1177/22125868211006201

Allen, R., & Ye, Y. (2021). Why deteriorating relations, xenophobia, and safety concerns will deter Chinese international student mobility to the United States. *Journal of International Students*, *11*(2), i-vii. https://doi.org/10.32674/jis.v11i2.3731

Allen, Y. L., & Zhang, W. (2021). Rural–urban satisfaction towards China's public goods and services provision. In Batabyal, A.A., Higano, Y., Nijkamp, P. (Eds.), *Rural–urban dichotomies and spatial development in Asia* (pp. 71-89). Springer. https://doi.org/10.1007/978-981-16-1232-9_4

Armstrong, D., Waldman, A. & Golden, D. (2020, March 18). Hounded out of U.S., scientist invents fast coronavirus test in China. *The Chronicle of Higher Education*. https://www.chronicle.com/article/hounded-out-of-u-s-scientist-invents-fast-coronavirus-test-in-china

Altbach, P. G. (2016). Chinese higher education: "Glass ceiling" and "feet of clay". *International Higher Education*, (86), 11-13. https://doi.org/10.6017/ihe.2016.86.9364

Cantwell, B., & Grimm, A. (2018). The geopolitics of academic science. In Cantwell, B., Coate, H., & King, R. (Eds.), *Handbook on the politics of higher education* (pp. 130–148). Edward Elgar Publishing. https://doi.org/10.4337/9781786435026.00016

Cao, C. (2017). *China's approaches to attract and nurture young biomedical researchers.* National Academies.

Committee of 100. (2021, Month Date). *Racial disparities in economic espionage act prosecutions: A window into the new Red Scare.* https://www.committee100.org/projects/white-paper/

Chou, C. P. (2014). *The SSCI syndrome in higher education: A local or global phenomenon*. Sense Publishers. https://doi.org/10.1007/978-94-6209-407-9

Donthu, N., Kumar, S., Mukherjee, D., Pandey, N., & Lim, W. M. (2021). How to conduct a bibliometric analysis: An overview and guidelines. *Journal of Business Research, 133,* 285-296. https://doi.org/10.1016/j.jbusres.2021.04.070

Dyer, O. (2020). US cancer centre leaders secretly worked for China, internal report finds. *BMJ: British Medical Journal (Online), 368.* https://doi.org/10.1136/bmj.m262

Gao, Y., Jin, B., Shen, W., Sinko, P. J., Xie, X., Zhang, H., & Jia, L. (2016). China and the United States—global partners, competitors and collaborators in nanotechnology development. *Nanomedicine: Nanotechnology, Biology and Medicine*, *12*(1), 13-19. https://doi.org/10.1016/j.nano.2015.09.007

Gao, J., & Li, C. (2022) Version 2.0 of building world-class universities in China: Initial outcomes and problems of the Double World-Class Project. *Higher Education Policy*, *35*, 397-413. https://doi.org/10.1057/s41307-020-00211-z

Hannas, W. C., & Chang, H. M. (2020a). Chinese technology transfer—an introduction. In W. C Hannas & D. K. Tatlow (Eds.), *China's quest for foreign technology: Beyond espionage* (pp. 3-20). Routledge.

Hannas, W. C., & Chang, H. M. (2020b). Japan and South Korea. In W. C Hannas & D. K. Tatlow (Eds.), *China's quest for foreign technology: Beyond espionage* (pp. 149-166). Routledge.

Fedasiuk, R., & Feldgoise, J. (2020, Month Date). *The Youth Thousand Talents Plan and China's military*. Center for Security and Emerging Technology. https://doi.org/10.51593/20200041

Horta, H., & Shen, W. (2020). Current and future challenges of the Chinese research system. *Journal of Higher Education Policy and Management*, *42*(2), 157-177. https://doi.org/10.1080/1360080X.2019.1632162

Jia, H. (2018). China's plan to recruit talented researchers. *Nature*, 553(7688), S8. https://doi.org/10.1038/d41586-018-00538-z

Joske, A. & Stoff, J. (2020). The United Front and technology transfer. In W. C Hannas & D. K. Tatlow (Eds.), *China's quest for foreign technology: Beyond espionage* (pp. 258-274). Routledge.

Joske, A. (2020). China's talent programs. In W. C Hannas & D. K. Tatlow (Eds.), *China's quest for foreign technology: Beyond espionage* (pp. 38-54). Routledge.

Kania, E. and Wood, P. (2020). The People's Liberation Army and foreign technology. In W. C Hannas & D. K. Tatlow (Eds.), *China's quest for foreign technology: Beyond espionage* (pp. 225-240). Routledge.

Keen, C. (2021). Academic espionage: How international trade law can protect higher education. *Georgia Journal of International and Comparative Law, 49(1),* 211-242.

Kenderdine, T. (2017, Month Date). *How can China afford its science and technology goals*. East Asian Forum. http://www.eastasiaforum.org/2017/10/13/how-can-china-afford-its-science-and-technology-goals/

Kim, H., & R. M. Allen. (2018). Glocalizing cures for China's brain drain ills: The Thousand Talents Plan in Shanghai, Tianjin, and Guangdong. *International Journal of Comparative Education and Development, 20* (1): 16–32. https://doi.org/10.1108/IJCED-10-2017-0028

Kim, B. G., & Kim, I. S. (2020). A study on policies of Chinese overseas talents and entrepreneurial activities in distribution industry. *The Journal of Distribution Science, 18*(11), 79-90. https://doi.org/10.15722/jds.18.11.202011.79

Kwiek, M. (2021). What large-scale publication and citation data tell us about international research collaboration in Europe: Changing national patterns in global contexts. *Studies in Higher Education*, *46*(12), 2629-2649. https://doi.org/10.1080/03075079.2020.1749254

Lee, J.J. & Haupt, J.P. (2020). Winners and losers in U.S.-China scientific research collaborations. *Higher Education, 80,* 57-74. https://doi.org/10.1007/s10734-019-00464-7

Lee, J. J., & Haupt, J. P. (2021). Scientific collaboration on COVID-19 amidst geopolitical tensions between the US and China. *The Journal of Higher Education, 92*(2), 303-329. https://doi.org/10.1080/00221546.2020.1827924

Li, S. Q. (2020). The end of publish or perish? China's new policy on research evaluation. *Observations, 1*. https://doi.org/10.17617/2.3263127.

Li, J., & Xue, E. (2021). Returnee faculty responses to internationalizing "academic ecology" for creating world-class universities in China's elite universities. *Higher Education, 81*(5), 1063-1078. https://doi.org/10.1007/s10734-020-00599-y

Liu, J. M. (2021). From "sea turtles" to "grassroots ambassadors": The Chinese politics of outbound student migration. *International Migration Review,* 1-25. https://doi.org/10.1177/01979183211046572

Liu, W., Hu, G., Tang, L., & Wang, Y. (2015). China's global growth in social science research: Uncovering evidence from bibliometric analyses of SSCI publications (1978–2013). *Journal of Informetrics*, *9*(3), 555-569. https://doi.org/10.1016/j.joi.2015.05.007

Lo, W. Y. W. (2011). Soft power, university rankings and knowledge production: Distinctions between hegemony and self-determination in higher education. *Comparative Education*, *47*(2), 209-222. https://doi.org/10.1080/03050068.2011.554092

Lo, W. Y. W., & Allen, R. M. (2022). The rankings game. In D. Kapur, L. Kong, F. Lo, & D. M. Malone (Eds.), *Oxford handbook on higher education in Asia (the page number)*. Oxford University.

Marginson, S. (2022). Global science and national comparisons: beyond bibliometrics and scientometrics. *Comparative Education*, *58*(2), 125-146. https://doi.org/10.1080/03050068.2021.1981725

Marini, G., & Yang, L. (2021). Globally bred Chinese talents returning home: An analysis of a reverse brain-drain flagship policy. *Science and Public Policy*, *48*(4), 541-552. https://doi.org/10.1093/scipol/scab021

McMillan, J. H. (2015). *Fundamentals of educational research* (7th ed.). Pearson.

Miao, L., Zheng, J., Jean, J. A., & Lu, Y. (2021). China's International Talent Policy (ITP): The changes and driving forces, 1978-2020. *Journal of Contemporary China*, 1-18. https://doi.org/10.1080/10670564.2021.1985843

Mulvenon, J., & Zhang, C. (2020). Targeting defense technologies. In W. C Hannas & D. K. Tatlow (Eds.), *China's Quest for Foreign Technology: Beyond Espionage* (pp. 92-110). Routledge.

Rezaei, S., & Mouritzen, M. R. (2021). Talent flowscapes and circular mobility in a Belt and Road (BRI) perspective-Global talent flows revisited. *Asian Journal of Social Science*,*49*(4), 188-197. https://doi.org/10.1016/j.ajss.2021.09.005

Shen, W., & Jiang, J. (2021). Institutional prestige, academic supervision and research productivity of international PhD students: Evidence from Chinese returnees. *Journal of Sociology*, 1-28. https://doi.org/10.1177/14407833211055225

Spears, A. (2020). Serve the motherland while working overseas. In W. C Hannas & D. K. Tatlow (Eds.), *China's quest for foreign technology: Beyond espionage* (pp. 21-37). Routledge.

Stoff, J. (2020). Sino-foreign research collaboration. In W. C Hannas & D. K. Tatlow (Eds.), *China's quest for foreign technology: Beyond espionage* (pp. 169-185). Routledge.

Sun, Y., & Cao, C. (2021). Planning for science: China's "grand experiment" and global implications. *Humanities and Social Sciences Communications*, *8*(1), 1-9. https://doi.org/10.1057/s41599-021-00895-7

Tatlow, D. K., Feldwisch-Drentrup, H., & Fedasiuk, R. (2020). Europe: A technology transfer mosaic. In W. C Hannas & D. K. Tatlow (Eds.), *China's quest for foreign technology: Beyond espionage* (pp. 113-129). Routledge.

Tollefson, J. (2019). Chinese American scientists uneasy amid crackdown on foreign influence. *Nature*, *570*(7759), 13-15.

Tian, M., Y. Su, and X. Ru. 2016. Perish or publish in China: Pressures on young Chinese scholars to publish in internationally indexed journals. *Publications.* *4*(2), 9. https://doi.org/10.3390/publications4020009

Tillman, B. T. (2020). Red Scare or red herring: How the "China Initiative" strategy for non-traditional collectors is stifling innovation in the United States. *Seattle Journal of Technology, Environmental & Innovation Law (SJTEIL), 11*(1), 133-170.

United States Department of Justice. (2021a, December, 21). *Harvard university professor convicted of making false statements and tax offenses.* Office of Public Affairs. United States Department of Justice. https://www.justice.gov/opa/pr/harvard-university-professor-convicted-making-false-statements-and-tax-offenses

United States Department of Justice. (2021b, November 19). *Information About the Department of Justice's China Initiative and a Compilation of China-Related Prosecutions Since 2018.* United States Department of Justice. https://www.justice.gov/archives/nsd/information-about-department-justice-s-china-initiative-and-compilation-china-related

United States Senate (2019, November 18). Threats to the U.S. research enterprise: China's talent recruitment plans. *Committee on Homeland Security and Governmental Affairs, United States Senate.* https://www.hsgac.senate.gov/imo/media/doc/2019-11-18%20PSI%20Staff%20Report%20-%20China's%20Talent%20Recruitment%20Plans%20Updated2.pdf

XinhuaNet (2021, September 9). *Xíjìnpíng chūxí zhōngyāng réncái gōngzuò huìyì bìng fābiǎo zhòngyào jiǎnghuà [Xi Jinping attended the Central Talent Work Conference and delivered an important speech]*. Xinhua Net. http://www.gov.cn/xinwen/2021-09/28/content_5639868.htm

Yang, R. (2020). China's higher education during the COVID-19 pandemic: Some preliminary observations. *Higher Education Research & Development*, *39*(7), 1317-1321. https://doi.org/10.1080/07294360.2020.1824212

Zhu, J. (2019). The composition and evolution of China's high-level talent programs in higher education. *ECNU Review of Education*, *2*(1), 104-110. https://doi.org/10.1177/2096531119840869

Zweig, D., & Wang, H. (2013). Can China bring back the best? The Communist Party organizes China's search for talent. *The China Quarterly*, *215*, 590-615. https://doi.org/10.1017/S0305741013000751

Zweig, D., & Kang, S. (2020, Month Date). *America challenges China's national talent programs.* Center for Strategic & International Studies. https://www.csis.org/analysis/america-challenges-chinas-national-talent-programs

Zweig, D., Kang, S., & Wang, H. (2020). 'The best are yet to come:' State programs, domestic resistance and reverse migration of high-level talent to China. *Journal of Contemporary China*, 29 (125), 776-791. https://doi.org/10.1080/10670564.2019.1705003

Ryan M. Allen, PhD, is an Assistant Professor of Comparative and International Education and Leadership at the Graduate School of Soka University of America, USA. His research centers on

internationalization of higher education, EdTech, intersections between education and urbanism, and the East Asian region.

Email: ryallen@soka.edu

Yang Li Allen, is a PhD candidate from the Department of Politics, The New School for Social Research, USA. Her academic interests relate to the China's governance, public goods provisions, and urban-rural comparisons. Her dissertation explores the political meaning of China's public toilets as a public good.

Email: alley578@newschool.edu