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Where China stands in the global race for talent

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About MERICS

About MERICS

The Mercator Institute for China Studies (MERICS) was founded in 2013 by the German Stiftung Mercator to strengthen knowledge and debate about China in Germany and Europe. With international researchers from Europe, the United States and Australia, MERICS is currently the largest European research institute focusing solely on the analysis of contemporary China and its relations with Europe and the wider world. Our specialists have a wide range of expertise on China, scientific qualifications and methodological skills. With its main premises in Berlin, MERICS also operates an office in Brussels.

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Introduction

Top researchers of Chinese descent currently living and working in the West may yet decide to move to China, if their working environment – primarily policies perceived as targeted against ethnic Chinese – in their current host countries deteriorates.

"Talent" is becoming as important a core goal of central planning to Beijing as "workers" were under Mao.

Beijing's fixation on industrial upgrading, science, and technology is underscored in the 2024 Government Work Report (GWR), an annual compendium of the cabinet's priorities, This year's report prioritizes progress in these areas over improving people's livelihoods.[1]

Attracting foreign talent is part of these plans, the GWR said. President Xi Jinping in a speech in September 2021 called for China to become the global center of civilization and technological progress, publicly aiming to supplant that mantle in the same way Italy, England, France, Germany, and the US had at various junctures taken that role since 1500.[2] To this end, China's state plan called for China's attractiveness for the world's top scientific human talent to be significantly improved by 2030. By 2035, it said, China should be at the global forefront in attracting top talent in strategic scientific and technological capabilities and improving high-quality talent pools it already has at its disposal.

To assess China's attractiveness for top talent, we analyzed decades of data from ORCID, an abbreviation for Open Researcher and Contributor ID, a widely used global independent non-profit database where people who participate in scientific research, scholarship, and innovation list their education, contributions, and affiliations via unique identifiers (see methodology for more details). We also compared ORCID data against datasets on international students released by the United Nations Educational, Scientific and Cultural Organization (UNESCO).

By 2035, China aims to lead globally in attracting top talent in strategic scientific and technological fields, while enhancing its existing high-quality talent pools.

These datasets show that:

- China is becoming more successful at attracting foreign talent but is still far from competing effectively with other global talent hubs, especially the US.

- China has not been very successful in attracting high-quality talent who didn't already have an established link to China. This comports with prior research which showed that China has been more successful in enticing ethnic Chinese or Chinese nationals studying overseas to return to the mainland.

- Our detailed sectoral investigation also shows that China's success in attracting such talent wanes in an inverse relationship to the quality of scientific expertise and the more advanced levels of tertiary education.

- As China continues to age demographically, Beijing will need to find new ways to tap foreign talent who do not have a prior connection to China. As the West increasingly ratchets up tech denial policies against China, other Asian economies and less developed countries are increasingly likely sources of talent imports to China, especially if China manages to offer attractive graduate and employment programs. ORCID data reveals that China currently attracts more tertiary-educated students from other Asian countries than its higher-education institutions do for employees from other Asian countries

- However, China's scorecard so far on science, technology, engineering, and mathematics (STEM) talent should not lull Western competitors into policy complacency. Beijing is aggressively stepping up efforts to attract talent including by focusing on those in its neighboring regions and less developed countries. Top researchers of Chinese descent currently living and working in the West may yet decide to move to China, if their working environment – primarily policies perceived as targeted against ethnic Chinese – in their current host countries deteriorates.

The reorientation of China's aggressive push in the global STEM talent race is an overhaul of Communist orthodoxy that at the same time borrows from Maoist policy. The GWR called for the galvanization of "new quality production forces" (新质生产力), which like so many of Beijing's recent policy concepts —"modern industrial base" (现代化产业体系) and "new-style whole of nation system" (新型举国体制) — deliberately reference Communist and Maoist orthodoxy. These terms communicate that, in Beijing's world view, China is facing a similar challenge to its national survival as it did during the 1950s and 1960s, requiring a comparable degree of collectivism and "grand steerage" – a term coined by Sinologist Barry Naughton to mean China's use of massive public resources to drive a market-based economy toward centrally planned outcomes. What makes the current response "new", "modern", and "high-quality" is, in the eyes of Beijing, the use of market mechanisms and competition to accomplish these goals. All these make patriotic researcher-entrepreneurs and high-skilled engineers the vanguard of modern Chinese socialism.[3]

However, China already faces a shortage of first-line technicians, meaning workers who are the first point of contact for customers on technical issues, a point raised by Human Resources and Social Security (MoHRSS) Minister Wang Xiaoping, citing nurses and construction workers.[4] Developing "new quality production forces" – a far larger task –requires highly skilled workers in the strategic emerging

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industries and future industries such artificial intelligence, smart manufacturing, semiconductors, and biotechnology, added Wang.

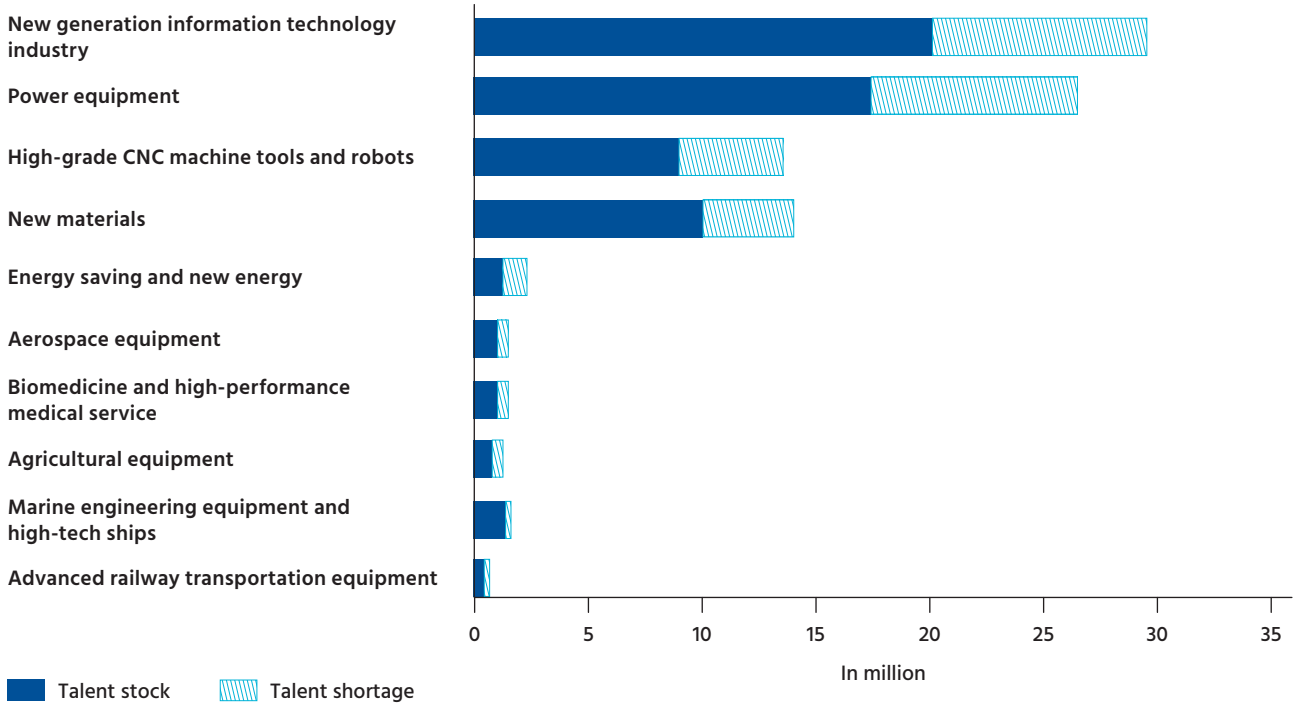
These shortages proliferate across key STEM-related sectors.[5] Huang Shouhong, director of China's cabinet-level State Council Research Office and a co-author of the GWR, said that 30 million people are still needed to meet China's manufacturing employment shortfall. This figure is an official estimate from 2016 across the 10 sectors named in the Made in China 2025 strategy for industrial upgrading.

Estimated stock and shortfall data were provided in 2020, though no authoritative review of these 2020 estimates has been published, nor did Beijing release new projections. However, the demographic shift that underlies these projected shortfalls has intensified. China's working-age population (16 to 59 years) started shrinking in 2024, as the overall population starts to age and decline.[6]

Beijing's primary response has been on improving education and prioritizing strategic sectors. Wang and the GWR underlined calls to create "talent highlands" to raise the quality of the labor force, publicly referring Xi's remarks on the subject in September 2021. China's talent policy, Xi told the Central Conference on Talent Work at the time, should primarily generate key and core technology, reduce reliance on foreign tech, and support socialist modernization.

The requirement for supporting socialist modernization, couched as "adherence to the Chinese Communist Party's overall leadership of talents", was placed at the top of the guiding principles agreed by the conference.

Figure 1 – Estimated shortfall for talent in 10 key manufacturing sectors



Source: Ministry of Education, MoHRSS, and Ministry of Industry and Information Technology, 2016[7]

Methodology

The Open Researcher and Contributor ID (ORCID) is a unique code to identify authors and contributors to academic publications. ORCID was established in 2012 to "resolve the author ambiguity problem in scholarly communication".[8]

ORCID provides self-reported data on researchers' education, employment, and published works, mainly focused on those within academia. Academics can choose what data should appear in their public data.

For this analysis, we studied the public data file from 2023 by first filtering it down to those that cite either an education or employment link to China, a total of 236,879 researchers.

ORCID adoption is highest in high-income and upper-middle-income countries, and the US, China, and Japan have relatively low adoption rates. Europe has comparatively higher adoption rates, also due to many European funding schemes that require an ORCID ID.[9] China, up to 2019, had low ORCID adoption rates, but a sharply higher uptake since, suggesting more widespread adoption through 2023, our data cutoff for this analysis.

Instances of incomplete data may occur where researchers choose to make some or all their ORCID data private. Adoption of ORCID is higher for those studying or working on STEM subjects.[10] ORCID adoption is higher for funded research, suggesting more successful academics are more likely to be represented. The data provides a strong basis for analyzing China's top talent, defined by those holding or working toward a PhD in different disciplines.

In addition, people tend to sign up for ORCID no earlier than their first publication. Since undergraduate students are unlikely to sign up, this limits ORCID's capacity to signal trends for current students. Therefore, we have cross-referenced ORCID data with UNESCO Student Flow data.

Using ORCID data also does not allow us to infer much about China's private job market, as researchers who switch to the private sector usually do not keep up their ORCID profiles.

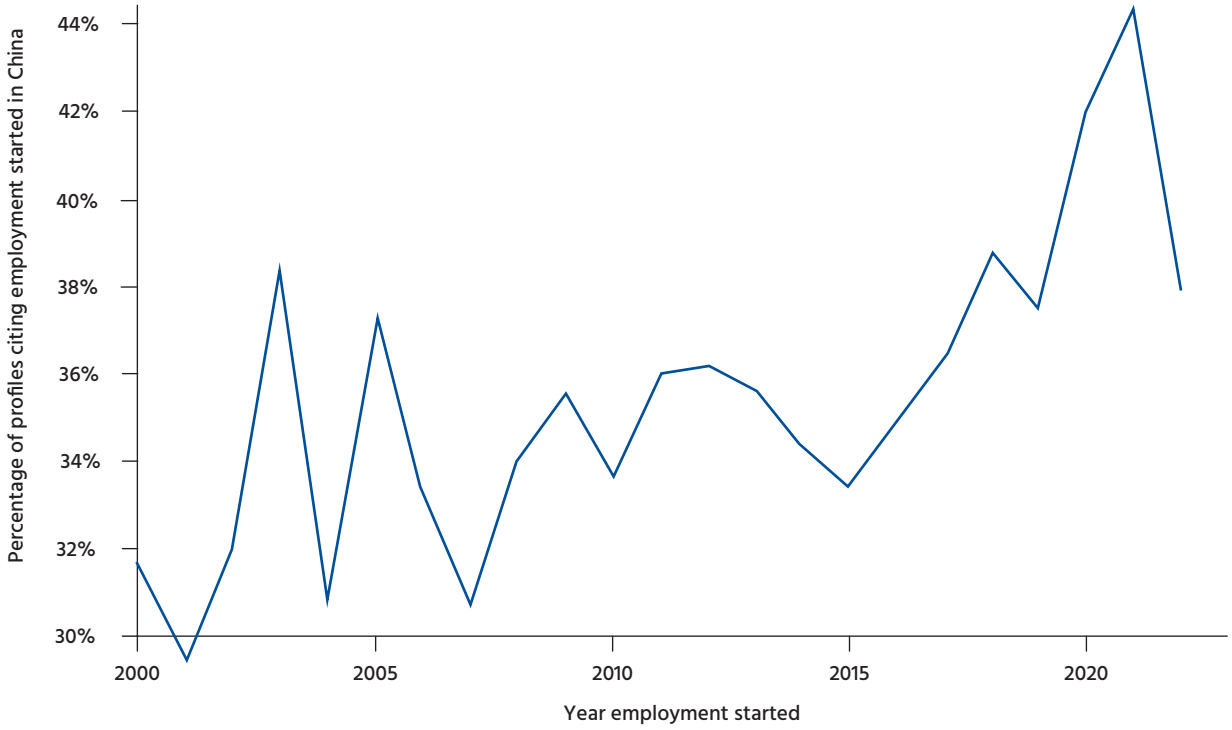
More Chinese students are returning, but not its top talent

Students from China make up 16% of tertiary-educated students worldwide who are not currently resident in their home countries.[11] Overseas students across nationalities tend to be academically stronger and bring a culturally diverse mindset that could enrich their home economies, studies show. Bringing all these students back would be the most obvious way for China to expand its talent pool, given its challenges in attracting immigration.

China has been relatively successful at attracting overseas Chinese students back. In the ORCID data, 43% of students who indicate receiving an education in China as their first mention in their ORCID profile and went on to further education outside China ultimately ended up working in China. This ORCID dataset does not consistently include types of degrees disclosed by profiles, only showing how their education is sequentially cited.

Analyzing when academics who did their first degree in China and then went abroad started positions where shows that the percentage of taken positions that are Chinese rose between 2019 and 2022 from around 37% to more than 43%, as a wave of Chinese students returned home to take on post-doc or faculty positions in China, possibly the result of rising scrutiny of Chinese researchers in

Figure 2 – China's overseas students are coming home - and might be leaving again



Source: MERICS analysis of ORCID data

While China is becoming more successful at educating its students in AI at the undergraduate level, the country is only slowly becoming better represented in AI education at the graduate level, and even less so at the employment level.

West as well as the lifting of Covid restrictions. This is especially noteworthy as the percentage was always below 40 pre-Covid.

The percentage fell in 2022 back to around 37%, likely as more students began venturing back to Western countries as regulatory scrutiny of the ethnically Chinese academic community ratcheted down. The ORCID dataset may also have fewer disclosures filed in 2023, limiting a fuller reflection of the trend for that year.

The trend of more students returning to China has also been confirmed using a larger dataset, the UNESCO Student Flow.[12]

In addition to attracting Chinese returnees, China could also try to attract more foreign students. Beijing has a bigger problem here. Of the roughly 240,000 students who cite tertiary educational history in China, some 220,000 cite first-mentioned education location as being in China.

This suggests that international students make up roughly 10% of Chinese graduate students. This trend is confirmed when looking at the UNESCO data: In 2022, China attracted roughly 210,000 foreign students to China, while more than 1 million Chinese students were studying abroad in 2021, the last year for which this data is available.[13]

UNESCO does not publish the countries of origin for overseas students studying in China.

For ORCID profiles that list an education or employment history in China, the US and other Western countries top the list among the locations for both their employment and tertiary education. However, restricting the dataset to look only at students who listed non-Chinese education as a first mention before listing an education in China, the countries these students – who may also include Chinese nationals with undergraduate degrees obtained abroad – cite most often as their first instance of tertiary education are other Asian countries such as Japan, Pakistan, South Korea, and India. This loosely follows current trade relations. Moreover, this trend is likely to increase, given China's increasing trade orientation toward Asian and non-Western countries, and the reluctance among students in Western countries toward attending university in China.

Since ORCID reflects mostly students and faculty with an international history, the 10% of international students as a portion of China's graduate population is likely an over-estimate. If students and faculty without an international history – and therefore not in ORCID – are taken into account, the portion of international students in China's graduate population is likely to be far smaller. This suggests China struggles with both attracting foreign students and foreign high-skilled employees in academia.

Career trajectories of people who submitted papers to top conferences on artificial intelligence (AI) – a proxy for top-tier AI graduates – also reveal that while China is becoming more successful at educating its students in AI at the undergraduate level, the country is only slowly becoming better represented in AI education at the graduate level, and even less so at the employment level, according to the Macro Polo AI Talent Tracker, a database which includes tracking of AI-related undergraduate degrees.[14]

In the world of AI education, the more elite, the lower China's share. Top talent in AI still overwhelmingly works in the US (57% in 2022), with China a distant second place with 12%. In 2022, the UK came in third with 8%, and Germany and France are tied for fourth at 4%.

However, China has been closing the gap. In 2019, the US accounted for 65% of top AI talent's home base. Canada came in second with 10%, France third at 8%, Britain fourth with 6%, and the Netherlands fifth with 3%. China in 2019 was nowhere in the top five countries, its statistic jumbled up in the dozens of other countries grouped as "others" which together accounted for the remaining 8%.

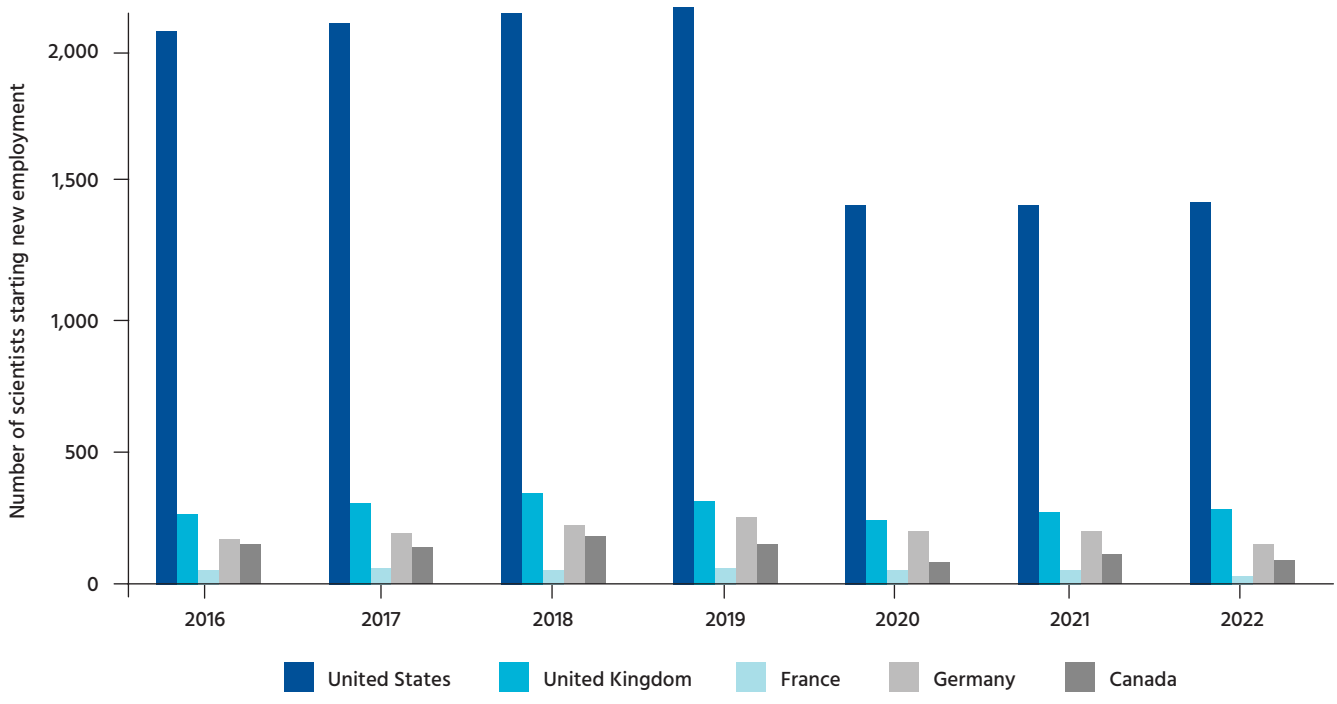
China's swift leap from nowhere to second place in a matter of three years is notable. So too is its ramping up of attracting doctorate-level returnees. In 2019, only 4% of those who completed their PhD in the US went to China. In 2022, the figure was 8%.

Also notable is the fact that there are more people who originated from China that are now working in AI-focused institutions in the US than there are people from America. The Macro Polo data indicates some 48% of top-tier AI researchers in 2022 got their undergraduate degree in China.

Two factors are at play here: the push and the pull.

One aspect that makes China an attractive place to do research is abundant research and government funding, especially in critical technology areas. This

Figure 3 – Chinese-educated scientists fled the US in 2020 - and stayed away



Source: MERICS analysis of ORCID data

The US really stands out here, with Chinese-educated scientists taking on far fewer positions in the US in 2020 than in the 2016-2019 period.

drove a large part of the success of returnees as part of the Young Thousand Talents (YTT) program, the youth branch of China's Thousand Talents Program to recruit elite scientists overseas to return to China. Success in this case was measured by productivity levels post-return, including research output and career mobility, according to a 2023 study published in the research-focused platform Science.[15]

That said, the YTT Program was found to be less effective at recruiting top talent, though it succeeded at attracting above-average scientists, the Science study found.

The key push factor occurred in the US. With Sino-American rivalry taken to new heights after President Donald Trump's election, the US Department of Justice initiated the "China Initiative" in 2018, with the aim of "identifying and prosecuting those engaged in trade secret theft, hacking, and economic espionage".[16] Ethnic Chinese scientific researchers and academics as well as those affiliated with China were the main target, with the bulk of accusations and media attention occurring from 2019 to 2021.[17] The China Initiative ultimately yielded no convictions or even formal espionage charges. The Justice Department shut down the China Initiative in February 2022.

However, the impact of the Initiative can be seen in ORCID data. The US really stands out here, with Chinese-educated scientists taking on far fewer positions in the US in 2020 than in the 2016-2019 period. While Covid is likely to also have played a role, a comparison with Britain, Germany, and Canada shows that the decline in the number of Chinese-educated scientists taking on new positions was much more pronounced in the US in 2020 than in any of these other Western countries.

Despite these push factors, the US is still the main country of employment, outside China, for those educated in China.

In AI, the US leads with 57% of top talent, while China follows at 12%. China's swift leap from nowhere to second place in a matter of three years is notable.

Above average in quantum, a strategic technology

Quantum computing is a strategic multidisciplinary field of technology that combines physics, computer science, and mathematics. Significant advancements in quantum are still happening mainly at the university level instead of in multinational corporations. This makes talent a key bottleneck.

China has only about 1,000 quantum computing experts while IBM alone has 2,000, said Zhao Xuejiao, deputy director of the Anhui Provincial Quantum Computing Engineering Research Center at a conference in December 2023.[18] He and others advocate for new university programs and support for quantum research groups.[19]

Quantum technology is a special case in China, as Jianwei Pan, a Chinese quantum physicist widely labeled the "Father of Quantum", is at the forefront of most developments there. Pan was educated at the University of Science and Technology of China in the eastern city of Hefei, where he obtained his bachelor's and master's degrees. He went on to receive his PhD in Austria, and then went to Germany for post-doctoral studies, where he built up a quantum communications group. When he decided to go back to China, he took many overseas Chinese PhD students and much of his equipment back with him to Hefei's University of Science and Technology (USTC), where he is now based as administrator and professor.

This may account for the relative success China has had in attracting global talent in quantum. The ORCID dataset shows that China has been more successful at educating students at the graduate level in quantum – which consists largely of PhD level studies – than in AI. In ORCID's quantum dataset, some 12% of researchers indicated that they obtained their first degree outside China and their last degree within China, compared to 7% across all disciplines.

However, people working in quantum tend to be more mobile than average. In ORCID's dataset, Germany and Japan were found to attract a disproportionately higher share of quantum talent, compared with the total dataset of all disciplines.

China struggles to attract top global talent that is not Chinese

Most Western researchers who do not speak Chinese are poorly integrated into Chinese academia. Their main challenge is collective disempowerment through institutional power dynamics.

"China needs further policy reform in order to catch up in the global competition for talent, particularly when it comes to policies aimed at settling non-Chinese passport holders in the country," the Beijing-based think tank Center for China and Globalization (CCG) said in a 2017 report published by the International Labour Organization, a United Nations agency.[20]

Despite China's overall progress in science and technology, its national talent attraction programs, and local support packages, it only has become marginally better at attracting foreign talent over the past five years. Between 2017 and 2023, China rose from 48th to 40th in the Global Talent Competitiveness Index that the business school INSEAD compiles every year.[21] China scores particularly low on migrant stock, the index's measure of international migrants based largely on census data — where it ranks last among the 134 countries surveyed. It ranked 103rd out of 134 in the number of international students per capita, a group which overlaps with "migrant stock".

The paltry rise over a six-year period could be due to China's zero-Covid policy, which brought mobility to a standstill and triggered an exodus of foreign research and corporate talent.[22]

ORCID data confirms that Beijing is struggling to attract people without a pre-existing link with China. Of the 116,645 people in ORCID's database who have an employment history in China, only 13,042, or about 11%, do not have an education history in China. This 11% would include Chinese citizens who did all their schooling abroad.

Despite China's advancements in technology, national talent attraction programs and support packages, there is only marginal improvemnt in attracting foreign talent in the past five years.

In 2020, Beijng's efforts to make it easier for foreign talent to obtain permanent residency met with such a strong anti-immigrant and nationalist response that the government withdrew its proposals indefinitely.

To caveat the findings, many academics do not share the start and end dates of their employment, so this is not a conclusive snapshot of those currently employed in China. Some 800 to 1,000 European researchers were working full-time in China in 2020, according to an estimate by EURAXESS, a European Union-funded organization promoting research internationalization including in China.[23]

This is still a significant number of Western and West-aligned researchers in China.[24] For instance, Greek national Nikos K. Logothetis and part of his research team at the Max Planck Institute for Biological Cybernetics moved from Germany to the International Center for Primate Brain Research in Shanghai in 2020. Hiromu Kameoka is another example: a top Japanese researcher who became team leader at the Center for Excellence in Molecular Plant Sciences of the Chinese Academy of Sciences (CAS) in Shanghai in 2022.[25]

Nevertheless, these still are exceptions.

There are several reasons China's foreign talent programs have not been as successful among non-Chinese passport holders. Most Western researchers who do not speak Chinese are poorly integrated into Chinese academia. Their main challenge is collective disempowerment through institutional power dynamics, Oxford University professor Xin Xu and her co-authors said in a study based on five years of surveys and interviews with over 400 full-time international faculty at Chinese universities.[26] Other challenges include professional isolation, glass ceilings (despite the phenomenon in some cases of "white privilege"), and restrictions and biases against Westerners in applying for Chinese research funding.

More generally, much-needed revisions to China's immigration law remain stuck. In 2020, Beijng's efforts to make it easier for foreign talent to obtain permanent residency met with such a strong anti-immigrant and nationalist response that the government withdrew its proposals indefinitely.[27]

This hints at the growing role of patriotism and nationalism in China's scientific and technological policy endeavor, and how it puts a brake on global talent migration. It is not just coming from online nationalists. President Xi's insistence that scientists should serve the nation and deliver tech self-reliance challenges the idea of a global scientific community where scientists freely meet, share ideas, and travel throughout the world and cross academic careers.

The clearest example of how this tension disrupts talent flows is the fate of the Thousand Talents Program (TTP), China's flagship talent program that also includes the YTT program.[28] When the TTP was launched in 2008, it aimed to lure leading esearchers to China back to take up full-time positions in China, but this soon proved to be too ambitious, especially for top talents.

In response, the program provided a part-time option in 2010, which was appealing for researchers because it gave them access to additional, Chinese funding and facilities without giving up tenure at Western universities.[29] However, as geopolitical tensions between China and the US increased, the US took measures to close what Washington viewed as a loophole. Rather than regular, two-way international scientific collaboration, the US saw the TTP as a state-sponsored program to transfer knowledge from the US to China.[30] Since 2020, China's official statements have mostly stopped mentioning the TTP, though the program may be continuing under a different name.

Doing more with fewer people

Given long-term demographic trends, the current shortage of top talent and the relatively limited capacity for talent immigration to ease these shortages, Beijing's primary response is to do more with fewer resources. China is prioritizing strategic areas across education and various types of talent support programs.

Though this approach is clear and consistent in a general sense, it is not straightforward which areas are of strategic importance, and which are not. Public awareness and debate are limited by Beijing's growing secretiveness about its priorities. This is obvious for China's science and technology priorities, where key policies have not been made public. Similarly, the 14th Five Year Plan for Talent Development was never issued, despite the Politburo approving it in April 2022.[31] Piecing together publicly available policies, this subsection outlines how Beijing conceptualizes its priorities in human resource development.

The overarching framework is a multi-tiered hierarchy that Xi introduced at the Central Talent Conference in 2021.[32] Right at the top are "strategic scientists" (战略科学家), which Xi described by associating them with an ancient Chinese idiom that "wars are won by majorities, and majorities are created by generals" – alluding to the leadership role that such "strategic scientists" should play.[33] "Strategic scientists", said Xi, are geniuses born from long-term struggle at the global front lines of scientific research. The party-state should support this through science and technology (S&T) megaprojects, he said. While no dedicated policy has been issued since then, the 14th Five Year Plan for Talent Development mentions the term.

Given the shortage of top talent and limited capacity of talent immigration, China is strategic areas across education and various types of talent support programs.

Several localities have issued lists of urgently needed foreign talent, including the megacities of Shenzhen, Guangzhou, Hangzhou, Shanghai, and Chongqing.

Secondly, the state blueprint calls for a contingent of S&T leaders (科技领军人) and innovation teams to focus on key and core technologies aimed at breaking reliance on foreign technology. This was specified by a ministerial action plan on high-skilled leading talent (高技能领军人才) in February 2024 as advanced manufacturing, strategic emerging industries, and digital capabilities.[34] The action plan called for adding a total of 15,000 such "leaders" in the three years to 2027 through domestic training, support, and selection. International exchange was only briefly mentioned, highlighting South-South collaboration.

The policy affirmed that talent is replacing the concept of "model worker" central to the Communist proletariat ideology. China now defines "leading talent" as anyone awarded titles including National Model Worker, China Skill Award, National Skilled Worker, National Labor Day Medal, or officially recognized as a high-skilled talent by a Chinese national or provincial government agency. What used to be a Communist devotion to the cause of the "worker" has now been supplanted by a redirection of resources to a largely middle-class educated elite called "talent" (人才). Xi stipulated that S&T leaders should be supported by a large quantity of young S&T talent (青年科技人才). Researchers aged 25-45 should have to worry less about constant grant-writing and personal financial security, he said. An August 2023 policy followed up to call for at least half of publicly funded research projects to be led by researchers under 40. [35] This was reiterated in March 2024 by Yin Hejun, the Minister of Science and Technology.[36]

Xi in 2021 also called for "outstanding engineers" (卓越工程师). The State Council, China's cabinet, followed up in January 2024 by formally recognizing 81 "national outstanding engineers" and 50 "national outstanding engineering teams", including people and teams at universities, public research labs, state-owned enterprises, privately owned corporate giants dubbed "national champions", and military research organizations in areas from steel production and nuclear power to petrochemicals, robotics, biotechnology, and data centers.[37] This multi-tiered hierarchy interacts with the pre-existing notion of "urgently needed talent" (急需紧缺人才). China would regularly publish lists, the Mid to Long Term Talent Development Plan (2010-2020) stipulated as part of its required trend analysis.[38] However, only local governments publish these lists.

The process is supervised by the Talent Exchange Center of the Ministry of Industry and Information Technology (MIIT), which also issues related permits. The data it collects from local governments supports the projections of talent needs, for which MIIT launched a project in 2020-2022. The outcome of this effort has not been made public.[39] Such data has influenced reforms of university programs. The Ministry of Education in 2022 announced it would establish a catalog of urgently needed disciplines and specializations for universities, particularly post-graduate programs, though the contents of the catalog were never made public.[40] The catalog would take into consideration strategic priorities and national needs, and MoE planned to update it yearly.

Several localities have issued lists of urgently needed foreign talent, including the megacities of Shenzhen, Guangzhou, Hangzhou, Shanghai, and Chongqing. Shenzhen's list, which was issued by the Ministry of Science and Technology in December 2022, includes 114 technical descriptions of urgently needed skills in a broad range of engineering areas including quantum computing and materials.[41] It was issued alongside a list of criteria for high-skilled elite foreign talent (高精尖人才) , defining these as having won prestigious awards, past employment for Chinese or internationally leading universities, labs or tech firms, or graduation from an elite university in a STEM subject.

Conclusion

China is gradually improving its attractiveness for foreign talent. More overseas Chinese students are returning home. At the same time, our data shows that China is at this point still not able to compete realistically with the US and other global talent hubs for top talent, especially if that talent has no established link to China. Moreover, China's success decreases further at higher education and talent quality levels.

Though the data we examined does not cover all top researchers, it covers a much larger group of people than previous studies, such as the one published in Science of China's talent programs and their impact.[42]

China's poor track record should not prompt Western nations to become complacent. Beijing is likely to step up efforts in its geographic neighborhood and in less developed countries to attract talent. Top researchers of Chinese descent currently living and working in the West may yet decide to move to China if the working environment in their current home bases deteriorates further.[43]

Geopolitical competition over technology will continue to raise security concerns over the knowledge realm. Beijing is a major proponent of this trend. By putting the faith of the nation on the shoulders of highly skilled talent, China is raising barriers against its researchers to venture abroad and for non-Chinese researchers to fully participate in China's science and technology eco-system.

China's participation in the global market for talent is complicated by its pursuit of an integrated and self-reliant domestic market that only secondarily trades with the outside world, a Xi-driven economic ideology that the Chinese party-state calls the "dual circulation" strategy. For China, the drive for talent sometimes called "brain circulation" may ultimately be undone by Beijing's simultaneous policy desire for dual circulation.

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Jeroen Groenewegen-Lau is Head of Program of "Science, Technology and Innovation" at MERICS. Prior to that he worked at "China Policy", a Beijing-based research and advisory company. He set up the section education, science and innovation at China Policy in 2017, and led it until December 2020. Jeroen spent over ten years in China. He holds a master's degree Languages and Cultures of China from Leiden University and wrote about Chinese popular music in his PhD dissertation.

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Antonia Hmaidi works on the geopolitics of technology, China's pursuit of tech self-reliance (especially in areas like semiconductors, operating systems and internet infrastructure), China's cybersecurity and hacking campaigns. Hmaidi also develops modelling and big data analysis tools and leads MERICS' data task force. She gained experience as a project manager at the Bertelsmann Stiftung, worked at the German Corporation for International Cooperation (GIZ), as a journalist in Asia and at the German Institute for International and Security Affairs (SWP). Antonia holds a bachelor's degree in East Asian Politics and Economics from Ruhr University Bochum and Renmin University of China, and a master's degree in International Relations from the Graduate Institutes of International and Development Studies (IHEID) in Geneva and New Delhi.

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Endnotes

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