China’s Pursuit of Overseas Brains: The 1,000 Talents Policy

Summary

Human Capital is regarded by China’s leaders as one of the pillars of the country’s transformation towards a more innovative nation. A central part of this is the 1,000 talents policy, the most important tool for attracting highly talented, innovative Chinese back to China from abroad. About 90% of the awardees are researchers, and among them even a few heavyweight foreigners with no Chinese background. The national government offers a direct net award up to 1 million RMB (140,000 Euro), access to research funding up to 5 million RMB (680,000 Euro), and various benefits related to housing, schooling, healthcare and legal status. Next to this, the province or the university often offers more money that could more than double this amount. This means local and central governments have invested at least 2-8 billion Euro in the policy for awards alone. With this policy China manages to attract top notch researchers from the United States and in a lesser extent Europe, an analysis using scientific publications data reveals. The Netherlands has become one of the top source countries in Europe. Dutch universities and research institutes could turn this development to their advantages by leveraging these people to promote Sino-Dutch research collaboration.

Full message

Policy Goals

Over the years, millions of Chinese students have gone overseas to pursue a degree on a foreign university. Traditionally, many of these students did not return to China. National Bureau of Statistics of China data suggests that in 1995, more than half of the post-graduate students did not return after studying\(^1\). To counter this ‘brain drain’, China’s first major returnee policies were implemented in the nineties. They were mostly focused on researchers. See figure 1 for an overview.

The ‘100 talents’ program introduced by the Chinese Academy of Sciences (CAS) in 1994 is a prime example of this, but also the Natural Science Foundation of China’s (NSFC) ‘Distinguished Young Scholars’ program and the ‘Cheung Kong Scholar Award’ come to mind. These policies are still in effect today.

<table>
<thead>
<tr>
<th>100 Talents Program (百人计划)</th>
<th>Distinguished Young Scholars (国家杰出青年科学)</th>
<th>Cheung Kong Scholars (长江学者奖励计划)</th>
<th>1,000 Talents Program (千人计划)</th>
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</thead>
<tbody>
<tr>
<td>• Since 1994</td>
<td>• Since 1994</td>
<td>• Since 1998</td>
<td>• Since 2008</td>
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<td>• Chinese Academy of Sciences</td>
<td>• Natural Science Foundation of China</td>
<td>• Li Ka-Shing Foundation Ministry of Education</td>
<td>• Organizational Department CPC</td>
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<td>• 2 Million RMB (0.3 M Euro)</td>
<td>• 2 Million RMB (0.3 M Euro)</td>
<td>• 1 Million RMB (0.1 M Euro)</td>
<td>• Max 6 million RMB(^2) (0.8 M Euro)</td>
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Figure 1: Most important overseas targeted policies, year of installation, supervising unit and monetary reward (next to help with housing, schooling, healthcare etc. which is often also included)

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\(^1\) Data from 2015 Statistical Yearbook China. Data provided are number of overseas students and number of returning students, in a ratio of about 4:1. Assuming a mean study duration of less than two years, this suggests most students were not returning. In 2015 this ratio was 1.25:1, with a sharp increase since 2008.

‘Het IA-Netwerk verbindt in opdracht van het ministerie van Economische Zaken kennis over internationale innovatieve ontwikkelingen en daaraan gerelateerde trends aan Nederlandse bedrijven, kennisinstituten en overheden.’
What does the award offer?

South China University of Technology states the following benefits for awardees:

- A world-wide competitive starting salary
- A living subsidy of 2.75 million RMB for “1000 Young Talents” and 4.5 million RMB for “1000 Talents” over 3-5 years
- A start-up research fund of up to 10 million RMB
- PI system and tenure-track system
- Housing accommodation in an on-campus apartment of 100-150 m²
- Health and welfare insurance

University of Science and Technology of China notes that subsidies for housing, food, moving, family visit, children’s education, etc. may be deductible before personal income tax. Furthermore, they offer help with finding work for the spouse and access to the best public preschool in Anhui province.

The Global Times of China states that senior and full-time foreign awardees receive 1 million RMB subsidy from the central Chinese government and can apply for 3-5 million RMB research funding. Part-time and youth awardees receive a subsidy of 0.5 million RMB, plus access to 1-3 million RMB research funding. Any further benefits are thus supplied by the province and/or university.

With over 6,000 awardees to date, and about an equal share of youth and senior awardees, we estimate that there has been 2-8 billion Euro spent on national awardees by local and central governments. The lowest figure assuming all awards only offer the minimum and there is practically no top-up, the highest figure assuming all awards are maximum and all amounts are matched by a local government. Any incentive subsidies to attract awardees are not taken into account.

Reviews of the effectiveness of these policies were mixed. The same National Bureau of Statistics data actually shows an increase in stay ratio in 2005 compared to 1995. Furthermore a report shows that Chinese Science and Engineering doctorates in the United States had the highest percentage of stay of all foreign nationalities in 2007, with 92%³. After a decade with these policies in effect, there was more and more call for a bigger effort to attract valuable human capital to China. For the most highly talented overseas Chinese, this took shape in the form of the 1,000 Talents Policy.

Li Yuanchao, nowadays Vice-President of China, and then head of the Organizational Department of the Communist Party of China (CPC), installed the 1,000 Talents Policy in late 2008. The goal on the official website of the policy is formulated as follows⁴: “To attract and support high-level talents from overseas, in 5 to 10 years’ time, to innovate and form companies around national key innovation projects, key disciplines and key laboratories, central enterprises and financial institutions, high-tech industrial development zones etc., in line with the national development goals.”

The policy was thus installed directly by the Organizational Department of the CPC, through the Central Coordinating Group on Talent (CCGT), created in 2003 for these kind of policies. This direct involvement of the CPC is a clear indication of the importance that China’s leaders attach to the success of the program. It also provides the clout necessary to change rules across many ministries (concerning housing, healthcare, scientific funding etc.). Awardees are approved by the Working Group for the Introduction of Overseas High-level Talents. This group is organized by the Organizational Department of the CPC, Ministry of Human Resources and Social Security, Ministry of Science, CAS, NSFC, People’s Bank of China, and many other units.

The policy was continued after a five year evaluation in 2013. In total, the policy has attracted more than 6,000 awardees in an eight year time span. Recently, Chinese universities are climbing up in the rankings. It is hard to say how much of the increase in scientific quality in China can be

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³ Data from US Energy Department Oak Ridge Institute of Science and Education (See Zweig, D. and Wang, H.Y. (2011))

⁴ [www.1000plan.org](http://www.1000plan.org) (Chinese)

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attributed to 1,000 talent returnees. However, with the steady increase of living standards in China and economic stagnation in the West, it has likely become easier to attract the most highly talented individuals. After all, Chinese post-graduate students are also returning in much greater numbers.

**Policy Content**

Originally, there were only two versions of the program: innovative and entrepreneurial, as still highlighted in the goal of the policy. Those in the innovative category mostly work in universities or research institutes, although of the first few batches 9% worked in a company. The innovative category was the largest group with over 80% of all awardees in the publicly available batches. Later, the category was split in a full-time and part-time version. The latter requires the awardee to work in China for no less than two months per year, for three consecutive years. Studies suggest more than half of awardees returned part-time initially.

In 2011, a youth version of the innovative program was launched, with lower benefits and at least the same number of awardees as the original version. This program was fully focused on researchers. For all batches where this information was available, the mean awardee graduated as a PhD a bit more than five years before receiving the award.

Next to this program, a foreign experts version of the program was installed, targeting foreigners with no former ties with China whatsoever. The age limit of this program is 65, 10 years higher than the original program. Older is even possible if circumstances require so. This version of the program is run by the State Administration of Foreign Experts (SAFEA) on behalf of the CPC Organizational Department.

Furthermore, municipal governments have added their own version of the program, such that there are now also ‘Beijing Overseas Talents’ and ‘Hubei 1,000 Talents’, next to ‘National 1,000 Talents’. Provinces, municipalities and universities often add their own living subsidies and research funding to the national award to make it more attractive. **In the best case the total package could amount to over 15 million RMB (2 million Euro) for a period of three to five years, next to free housing and other benefits.** See the side panel on the previous page for an example of such a package. Allegedly there are also incentive packages available for universities that attract 1,000 talents, and scientists that nominate them. Furthermore it is a measure that is used to judge a university’s performance.

Nowadays, the 1,000 Talents Policy has taken over the role of the NSFC's Outstanding Young Scholar Award and in a lesser extent CAS’s 100 Talents Program as a tool to attract Chinese from abroad. The NSFC award is now an important career step for scientists in China. Worth mentioning is also the 10,000 Talents Program, which can be considered an equivalent of the 1,000 Talents Program for Chinese who have not left the country. It was installed after critique that the policy gave unfair advantage to overseas Chinese.

Information on the awardees can be hard to find. There are lists circulating on the internet, but the official site only includes a database with a small subset of the earliest awardees. Most findable lists are of youth program awardees, the latest from 2016. The last public list of senior innovative awardees is from 2011, but application pages on Chinese university websites suggest that that version of the program still exists.

There can be a few reasons for this secrecy. For awardees and the Chinese government alike, it might not be beneficial for some awards to become public knowledge. This is especially true for those who come from a company abroad. Scientific researchers bring public knowledge, but for others accusations of state-backed gathering of foreign intellectual property are more easily made. For example, in 2009, Chang’an car manufacturing company employed five 1,000 talents all coming from Ford. In general, the 1,000 Talents Program can be considered to be Vice-President Li Yuanchao’s pet project. Perhaps he wants to control what information comes out about the project so that it maintains a positive image.

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The first time professor Qiqiang Wang heard about the 1,000 talents policy, was when a previous colleague of his at the University of Texas at Austin was selected for the second batch in 2011. After his second postdoc he wanted to return to China and contacted the institute where he had done his PhD. The institute nominated him for a 1,000 talent award, and in 2015 he could return as a youth 1,000 talent.

Qiqiang had a couple of reasons to want to return to China. In essence it was the place that he felt most at home. The living conditions had improved since he had left the country in 2008, and he felt he could contribute to further improvement. It was also a more thrilling option. In his words: “If you get a position in the United States you can more or less foresee what your life is going to be like in 20 years. Here the horizon is much shorter, I like that sense of adventure.”

He is now a full professor at the Institute of Chemistry of the Chinese Academy of Sciences, supervising his own group. This is a prestigious institute, part of what’s sometimes called ‘the golden triangle of chemistry’ in Beijing, relating to world class Tsinghua University and Peking University, both within walking distance. The return to China has brought some more pressure than before. Nowadays he works six days a week from 8:30 to 11. Before most pressure was concentrated on finishing his postdoc quick and well enough to be able to receive a 1,000 talent award. Now, for a scientist with ambition in China, the next step is the NSFC’s Excellent Young Scholar Award before age 38 (40 for women), and especially the Outstanding Young Scholar Award before age 45. This award more or less ensures a comfortable and prestigious research position, but it is hard to achieve.

He still maintains warm contacts with his former colleagues and supervisors. They meet at conferences, and Qiqiang foresees there will be joint publications and projects in the future. Before it was too early for that, after all he only returned less than two years ago and needed some time to set-up his research group. Even though he said he thoroughly enjoyed his time in the Netherlands, he does not feel the need to go abroad again.

Qiqiang works at the Key Laboratory of Molecular Recognition and Function, where he focuses on Supramolecular Catalysis. This field has applications in many areas, such as CO₂ conversion, and green and sustainable chemistry.

More information:
Institute of Chemistry CAS: http://english.ic.cas.cn/
Policy Analysis – Identifying Awardees

Perhaps because of the prestige of the project, there are also little publicly findable evaluations of the program. Beihang University, NSFC, and the State Council published a Chinese language evaluation of the first 6 batches of the youth version in 2015 using the Science Citation Index Expanded (SCIE) to measure performance of the researchers. A similar exercise but with a different focus and including senior innovative awardees has been performed here. The Thomson-Reuters scientific publications database Web of Science (WoS) was used to gather the data.

The first thing that is striking when looking at the list of awardees, is the dominance of the United States as source country. See figure 2 for an overview of origin countries. This while in 2015 the country only accounted for 29% of returning PhDs in general, and 35% of China’s international science. The USA have lost a bit of importance in later batches, but less than 10%. Obviously, the United States are an important focus of the program, with most universities in the top of the big university rankings, and perhaps because there overseas Chinese need more incentive to return than in other countries. Within the EU-27, Germany is the biggest supplier of 1,000 talents, followed by France and then the Netherlands, which has become more important of late. The last two batches of youth talents contained 18 returnees from the Netherlands, and even more who have done part of their studies in the Netherlands. The Netherlands has surpassed France as second continental European supplier of 1,000 talents.

Another observation that is sometimes mentioned as a point of critique of the policy is the lack of women that get awarded. For the group considered, they consistently make up around 10% of all youth awardees, even though the majority of students going overseas are female. There is no information on this available for senior awardees.

Only a part of the awardees were selected for further analyses. For the senior awardees, the first three batches were used, awarded between 2009 and 2010. For the youth awardees the first two groups, awarded in 2011, were used. For convenience, only awardees labeled as Life & Health Sciences, Physical Sciences, Chemistry, and Engineering were included. This leaves out Energy & Natural Resources, Information Science, High-Tech and the Entrepreneurial version of the program. In the end, this left 233 of the 622 senior and 248 of the 360 junior awardees findable in the scientific database. Affiliation and citation

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7 Web of Science contains almost exclusively English language publications. The Chinese language side of research is therefore not investigated here. However, it is to be expected that researchers with at least 5 year post doctorate overseas experience, will be used to publishing in English.
8 See the 2015 ‘China Blue Book of Returned Overseas Students’ by the Ministry of Education of China for students data. (2015 年中国留学回国就业蓝皮书). See IA China reports about Sino-Dutch research for other info.
9 Making up 59%, see http://www.chinanews.com/m/gn/2016/03-25/7811670.shtml (Chinese)
10 The much smaller group of foreign experts was included in this group.

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information of publications of these awardees were gathered and a selection procedure applied to make sure the publications really belonged to the person in question.\textsuperscript{11}

**Policy Analysis – Evaluating Awardees**

At the beginning of the program, concerns were raised about a large number of returnees returning only part time, and ‘fake’ awardees, who were already in China but still received an award to help the universities reach their targets. Figure 2 gives an overview of this situation in terms of affiliations on publications, as found in WoS.

![Figure 2: Mean percentage of affiliations in China of awardees and co-authors on publications that awardee participates on. The grey area is the period in which the awards were publicized.](image)

As can be seen, in terms of attracting researchers back to China, the policy clearly works. It is most clear for the full-time youth awardees. But also the partly part-time senior awardees have an increase of 35% in affiliations in China, especially if we take into account that awardees are perhaps informed of their award earlier than the official date.\textsuperscript{12} The 20% of own affiliations in China before awarding seems evidence for some ‘fake’ awardees, but it has to be noted that Hong Kong and Macau are included in mainland China for the database, while the policy also allows for returnees from those

\textsuperscript{11} Selection of papers was made difficult by the fact that there are many researchers in China with the same name. Therefore only full name papers were selected (no Wang, P., but Wang, Peng). Furthermore, only direct affiliations with the known foreign and Chinese university were allowed, and other affiliation only if they appeared in tandem with the known ones. Papers with more than 20 authors were excluded as there the individual contribution could be very small. This meant some papers were thrown away that might belong to the author in question. To compensate, the numbers were artificially boosted using the percentage of papers in WoS that lived up to these standards. A manual check of 30 authors revealed that this method indeed selected very few false positives.

\textsuperscript{12} Data from before 2008 does not meet the criteria of full names in WoS and was therefore excluded. Therefore it was impossible to include a better baseline for senior awardees.

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areas. Furthermore, we can see that the number of Chinese co-authors rises, evidence for a spill-over effect. Both groups retain a healthy connection of 25% with the international community.

Another concern raised, is the caliber of the awardees: are they actually high-level talents, or are concessions sometimes made to meet the quota? In terms of academic fraud, there were only six retracted articles found among all papers of senior and junior awardees. Another measure, though in itself incomplete to judge researchers on, is the amount of publications published. The time evolution of this is shown in figure 3. To compare with a standard in China, 200 random state key lab scientists have been included that published in 2008. State key labs are research labs located at universities or research institutes in research areas that are labeled as extra important to China’s development. They are expected to house the better half of Chinese scientists.

Before awarding, youth awardees published similar or slightly more amounts of papers than state key lab scientists. There is an inherent increase; researchers in China publish more in English journals, and/or the database has become more complete. After awarding there is however a clear increase for the youth awardees. The age of awardees suggests they get their own research group and appear on those papers. There might also be more pressure to publish. In terms of output, the return is a positive development for the awardee.

The senior awardees already have impressive amounts of publications per year. However, also their output accelerates after awarding, mostly by more papers affiliated in China with Chinese co-authors. It takes both types of awardees one to two years to settle before their output takes off.

As important as amounts of papers is the impact of science in those papers. Impact is related to quality of research but also a goal in itself. It is often measured using citation parameters. This is done in figure 4.

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Figure 4: Citation impact per paper of youth and senior awardees, compared to a mock group of 200 state key lab authors. The measure used is papers among the 10% most cited in that year and area of science, a measure also often used in university rankings. A score of 1.00 means world average (10% among 10% most cited). World class university MIT scored 2.5 across all sciences according to the CWTS Leiden Ranking.14

Judging by this measure, both types of awardees were stellar researchers to begin with, and keep it up after returning. The impact for both types is much higher than average for state key labs. There does seem to be a drop in impact per paper for youth awardees, but this is to be expected with a large increase in output. The absolute number of top publications still increased. Youth awardees have the most impact per paper, but keeping in mind that they publish much less, senior awardees still have most high impact papers, even though the difference is not large. Note the area of Physical Sciences, which has both low citation scores compared to the other areas, and an output which lags behind.

14 Only journal based top level field normalization was used, and not for specific subject niche areas like in the CWTS Leiden Ranking. This was done for convenience even though citation habits can vary significantly within a large field of science. The expectation is that these effects will level out over 30 to 80 authors, and furthermore, the relative relationship with state key lab scientists is less affected by this. The comparison with MIT however is meant more as an indicator of scale than a hard comparison.

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Example: Dutch Foreign Expert
Prof. Aart Kleijn
HIMS (Director), DIFFER, LIC
University of Amsterdam, FOM, University of Leiden

Center of Interface Dynamics for Sustainability (Director),
Chengdu Development Center for Science and Technology,
China Academy of Engineering Physics

Professor Aart Kleijn was nearing retirement age when he received an unexpected offer from China in 2013. He was asked to participate in the founding of a brand new research institute in Chengdu focusing on energy issues, not just as a scientist, but as the director. This position was backed by a Foreign Expert 1,000 Talent Award.

Aart says his contact with Chinese scientists before that had been limited, although he had supervised a few Chinese PhDs. One of those former PhDs was in fact the one who nominated him for the award. Aart gladly accepted the offer. Although he had some options in the Netherlands that he was happy with, he regarded this opportunity as much more exciting. “It was an enormous adventure to me, and it still is. China is a beautiful country, and everything is so different from the Netherlands.” Aart explains.

Three years in, he has much more experience with the Chinese science system. He is still happy that he accepted the offer. “Especially for senior researchers, when you know the right channels, there can be little competition for a lot of research funding in China.” Aart says. “Some researchers I have worked with here are really of an internationally competitive level. Not world top, but close.” He further notes. He also mentions some drawbacks. In general the quality of the science is still significantly worse than the Netherlands. In an earlier interview, Aart especially noted a lack of transparency and planning as major problems. There has been little change in that over the course of three years, but Aart says he manages to cope with it by maintaining a very Dutch working style and looking far ahead. He has noticed most Chinese universities can be more flexible in this respect.

He still visits the Netherlands about three times per year for work. The center has initiated a project with Aart’s previous lab at the University of Amsterdam, jointly funded by NWO from the Netherlands and NSFC from China. Furthermore, members of his staff regularly visit the Netherlands, and the center hosted a student from the University of Amsterdam for half a year. He expects collaboration to increase even more.

The Center of Interface Dynamics for Sustainability works on solving problems with nuclear fusion reactors, and recycling CO₂ to fuels and chemicals using plasmas. China has its own working experimental fusion reactor since 2006, the Experimental Advanced Superconducting Tokamak (EAST), in Hefei.

More information:
Center of Interface Dynamics for Sustainability: http://cids.yinhe596.cn/

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Conclusion

With help of the 1,000 talents plan, China has succeeded in doing what earlier policies largely failed to do: drawing back highly talented researchers of Chinese origin from an internationally competitive environment. It even succeeded in catching some ‘true’ foreigners on the side. The economic crisis after 2008 that hit Western countries much harder than China has undoubtedly aided in this development, like the steady increase of living standards in the country. The award can offer up to 15 million RMB (2 million Euro) in research funding and benefits with the help of university and provincial backing.

A group of the first ~500 researchers awarded with the program in the areas of Life & Health Sciences, Physical Sciences, Chemistry, and Engineering was analyzed using the scientific publication database Web of Science. The analysis was split in awardees of the youth and senior program.

The suspicion that a lot of awardees only return part time seemed to be true for senior awardees, which have on average only 55% of their affiliations in China after returning. For youth awardees this is 80%. The 20% of affiliations in China before returning also make it likely that there are ‘fake’ awardees among both groups, although some of them are real awardees which have returned from Hong Kong. Despite this, the shift of the center of gravity to China is evident in both groups, both in own affiliations, and in the affiliations of co-authors.

Most importantly, these researchers seem to be top of the bill. Their research impact per paper is one to four times higher than the average state key lab researcher in China, which should include some of China’s brightest scientists. Returning has a positive influence on the awardees’ output, affecting impact per paper only slightly in a negative way. In total research impact, youth and senior awardees do not differ a lot, even though the latter are twice as expensive. However, senior awardees might offer benefits in other areas of science such as commercialization of research. Entrepreneurs older than 40 are more successful than younger entrepreneurs, and the high-tech aspect of university spin-offs makes it likely that more experience is an even bigger benefit\(^\text{15}\). It has to be mentioned that awardees in Physical Sciences perform worst of the four areas, even though they still outperform state key labs.

The United States have seen the biggest loss of talent from this development. We estimate that almost 4,000 highly talented researchers, entrepreneurs and professionals of Chinese origin have left the country through this policy. And we have to keep in mind that next to the 1,000 Talents Policy, there are also many other policies targeting overseas Chinese. Continental Europe is left relatively untouched, with perhaps 500 awardees across the EU-27. The Netherlands is however becoming more important as the second source country, with 18 awardees in 2015.

How should Dutch universities and research institutes react to this development? This is a difficult question. Even though directly speaking a returning awardee constitutes loss of valuable scientific talent, these scientists still keep 30% of their co-author affiliations abroad. Furthermore, going abroad is considered an important career step for a job in China. They might have already planned to go back and could be difficult to stop anyway. Earlier IA China research suggested Dutch research is losing ground in China compared to Anglo-Saxon countries which make up over 75% of the source of 1,000 talents awardees. At the same time quality of Chinese science is steadily rising towards the level of Western European countries, and 1,000 talents are at the forefront of this research.

Therefore, it does not seem worth the effort to try to persuade these researchers to stay, above what a university normally does to retain its researchers. On the contrary, universities could see these returnees as opportunities for expanding collaboration with the hot spots of science in China. Importantly, this is all under the premise that universities keep strong connections with the awardees. Perhaps it would not be a bad idea to put more effort into this than with other former employees. Chinese with ties to both worlds are likely most essential in establishing long term and successful collaborations between foreign and

\(^{15}\) See for example: https://techcrunch.com/2011/05/28/peak-age-entrepreneurship/

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Chinese universities\(^{16}\). China offers huge opportunities for future science collaboration, given the unparalleled growth of science in the country, and research which is still largely national. Dutch universities and research institutes could seize the opportunities that their 1,000 talents offer, to guide them to the right opportunities in the nontransparent and fast-changing Chinese academic landscape.

**Sources, Further Reading**

1. Sino-Dutch Joint Research: Overview and Opportunities (IA China)
5. Web of Science database: [www.webofscience.com](http://www.webofscience.com)

\(^{16}\) Preliminary analyses point this way. IA China is planning to write an article on this.