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Issue Brief

China's Push for Science and Technology Collaboration with BRI Countries

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S*ummary*

China is aiming to make science and technology (S&T) cooperation a significant component of the Belt and Road Initiative (BRI). There are however complaints on Chinese approach of sharing data and protection of intellectual property. Maintaining accountability and transparency is vital for progress and can ensure win-win cooperation with member countries of BRI. A key fundamental is to uphold the principle of 'open science', making scientific process more transparent, inclusive and democratic.

China is aiming to make science and technology (S&T) cooperation a significant component of the Belt and Road Initiative (BRI). It has taken a number of steps domestically to increase S&T development and innovation. At the National People’s Congress and the Chinese People’s Political Consultative Conference in Beijing in March 2023, the role of ‘science’ in the national agenda was elevated. As a result, the Ministry of Science and Technology was reconstituted and a new permanent body called the Central Science and Technology Commission was established, to oversee China’s S&T efforts.¹

Moreover, at the second annual meeting of the Forum on High Quality Development of the BRI in Beijing in February 2023, the Chinese scientific community emphasized robust cooperation in S&T sector to offer solutions to shared issues such as climate change, environmental protection, public health, the digital economy, technology transfer and professional training.² This Brief evaluates the implementation of S&T component in BRI by the Chinese government, how far it has been successful and also underlines issues of concerns while executing S&T along the BRI.

Guidelines for S&T collaboration

The Chinese government over the years has issued several guidelines to foster cooperation in the field of S&T with BRI countries. The National Development and Reform Commission, the Ministry of Foreign Affairs and the Ministry of Commerce jointly issued a guideline in March 2015 on the ‘Vision and Actions on Jointly Building the Silk Road Economic Belt and 21st Century Maritime Silk Road’.³ These called for increasing cooperation in S&T through joint labs (research centers), international technology transfer centres and maritime cooperation centres, promotion of sci-tech personal exchanges, tackling key sci-tech problems and improving sci-tech innovation capability. The guideline also emphasized expanding cooperation on vocational skill development to help solve youth unemployment in the BRI countries.

In July 2016, the Ministry of Education issued another guideline titled, ‘Education Action Plan for the Belt and Road Initiative’,⁴ where several aspects for deeper integration in higher education with the BRI member states were underscored, including deepening people-to-people exchanges. It also called for simplification of

¹ [“The Central Committee of the Communist Party of China and the State Council issued the “Party and state Institutional Reform Plan.”](#) *Xinhuanet*, 16 March 2023.

² [“Sci-tech cooperation key for BRI partners”](#), *Qiushi Journal*, 28 February 2023.

³ [“Vision and actions on jointly building silk road economic belt and 21st Maritime Silk Road”](#), 30 March 2015, Belt and Road Portal

⁴ [“Education Action Plan for the Belt and Road Initiative”](#), July 2016, Belt and Road Portal.

visa application procedures to hasten academic exchanges for collaborative research projects in BRI countries.

Moreover, at the Belt and Road Forum on 14 May 2017, President Xi Jinping encouraged ‘innovation-driven development’ in the BRI and intensification of cooperation, particularly in the areas of the digital economy, artificial intelligence, nanotechnology and quantum computing. In addition, China announced the launch of the ‘Belt and Road Science, Technology and Innovation Cooperation Action Plan’.⁵

S&T Initiatives

Cooperation in S&T among the BRI member states runs on several parallel tracks, where the Chinese Academy of Sciences (CAS), the largest scientific organization in China, plays a decisive role in framing scientific programmes. According to the President of the CAS, Bai Chunli, “Science, technology and innovation are the core driving force for BRI development” to overcome many developmental obstacles, including climate change, water and food security, public health, and ecological challenges that BRI participant countries face.⁶

CAS has established five centres of excellence in China to train research scientists from BRI countries. In addition, CAS has established nine overseas institutions - in Africa, South America, Central Asia, South and East Asia countries. For instance, the centre in Sri Lanka focuses on water management; the centre in Sao Paulo, Brazil emphasizes research on weather and space and the centre in Tashkent focuses on the research and development of natural product drugs with regional characteristics of Central Asia.⁷

The Digital Belt and Road (DBAR), established in May 2016, is another track of fostering cooperation in S&T. Due to the lack of remote sensing data for resource surveys and environment monitoring, several BRI countries are at risk of severe environmental change and global warming. According to Huadong Guo, the chief architect of DBAR, cooperation is based on seven themes – studying environmental change, coastal zones, world heritage protection, natural disaster mitigation and prevention, agriculture and food security, water resources, urbanization, and cold region environment.⁸

⁵ [“Full text of President Xi’s speech at opening of Belt and Road forum”](#), *Xinhuanet*, 14 May 2017.

⁶ Bai Chunli, [“Road to Innovation”](#), *Bulletin of the Chinese Academy of Sciences*, 32(3), 2018, pp. 130-131.

⁷ [“Belt of Science Road for Cooperation”](#) Special Report 2016, Chinese Academy of Science, Beijing.

⁸ Guo Huadong, [“Steps to the digital silk road”](#), *Nature* 554, 2018, pp. 25-27.

The Alliance of International Science Organisation (ANSO) established in November 2018 by CAS in collaboration with UNESCO and the Third World Academy of Science (TWAS) is yet another track of fostering S&T cooperation among the BRI states. Based on the principle of ‘joint consultation, joint effort and joint sharing’, ANSO undertakes collaborative scientific research projects on the themes of climate change adaptation, natural disasters, water security, air pollution, human health, ecosystem and biodiversity, sustainable development and Big Data, to advance the UN Sustainable Development Goals. Under this track, as shown in Table 1, although the budget plan for research projects is down to 23 per cent in 2022 from 30 per cent in 2021, the budget for scholarships increased from 42 per cent in 2021 to 56 per cent in the 2022 budget plan.

Table 1: ANSO Financial Report

Sectors		Annual Expenditure in 2021(in percent) (CNY 91 million)	Budget Plan for 2022 (in percent) (CNY 147 million)
1	Secretariat daily operation	8	6
2	Training & Fellowship	7	9
3	Research projects	30	23
4	Network development	4	3
5	Strategic advisory	9	3
6	Scholarships	42	56

Source: [ANSO Annual Reports](#), ANSO Secretariat, Beijing

Along with CAS, several universities in China promote S&T cooperation. The University Alliance of the Silk Road (UASR) was launched in 2015 by Xian Jiaotong University, with more than 150 universities from BRI countries joining the initiative.

Assessment

Preliminary assessments indicate that the Chinese decision to include S&T collaboration has achieved some success. According to the latest available data from the Chinese Ministry of Education, 492,185 international students were pursuing

higher education in China in 2018, of which substantial numbers were from BRI countries as shown in Table 2.⁹

Table 2. Number of international students by country origin in China

Rank	Country	Number
1	South Korea	50,600
2	Thailand	28,608
3	Pakistan	28,023
4	India	23,198
5	United States	20,996
6	Russia	19,239
7	Indonesia	15,050
8	Laos	14,645
9	Japan	14,230
10	Kazakhstan	11,784

Source: [Statistical report on international students in China for 2018](#), Ministry of Education, PRC, Beijing

With the backdrop of growing collaboration, members of the BRI countries have their own perceptions. Robert-Jan Smits, former Director General of Research and Innovation, European Commission underlined that as long as there are clear and transparent ‘rules of the game’, scientific cooperation with China is beneficial.¹⁰ The Central and Eastern European countries appreciate S&T collaboration with China as a ‘respectful partner.’¹¹ In Africa, collaboration is concentrated in three main sectors: information technology, agriculture and education.¹²

Nonetheless, some issues of concern include low co-authored scientific publications between China and BRI members, accounting for only 18 per cent of the total of papers published by China with international partners.¹³ Bai Chunli, President of CAS also points out major obstacles for science cooperation with BRI countries to

⁹ [“Statistical report on international students in China for 2018”](#), 18 April 2019, Ministry of Education, The People Republic of China, Beijing.

¹⁰ Antoaneta Roussi, [“China charts a path into European science”](#), *Nature*, 569, 2019, pp. 174-176.

¹¹ Ibid.

¹² Antoaneta Roussi, [“Chinese investment fuel growth in African Science”](#), *Nature*, 2019, 569, pp. 325-326.

¹³ Hepeng Jia, [“Scientific collaboration shine on Belt and Road”](#), *National Science Review*, 4(4), 2017, pp. 652-657.

include conflicts, social and economic gap among BRI nations and a lack of professionals and funding.¹⁴

While the influence of Chinese S&T in BRI countries is widespread, it is not without criticism. The harshest criticism comes from Western countries, especially the United States, specifically on the implementation of DBAR, which has fueled the ‘technology war’ between the United States and China.¹⁵ It warned that signing up to DBAR has the potential of giving the Chinese government surveillance opportunities and giving away the keys to untold amounts of economically valuable and sensitive information, including such diverse topics as oceanic current readings to biological samples to next generation communications systems.¹⁶

On the growing trend of a Sino-American technology war, former director of White House Science and Technology Policy, John P. Holdren, has stated that although there is major concern about the perception of Chinese stealing the defence and industrial secrets, “a bigger concern is that if the United States does not make adequate investments, in 10 to 15 years we won’t have any secrets that the Chinese find it worthwhile to steal.”¹⁷ With the backdrop of the growing Sino-American technology war, countries in Africa, the Middle East and parts of Eastern Europe, Latin American and South East Asia are being forced to choose sides, especially for the adoption of technology.

Another major criticism is that several BRI projects have been carried out without rigorous assessment of environmental risks. For instance, research into the health and ecological impacts of the BRI is almost nonexistent in Pakistan universities, mainly because the government of Pakistan doesn't want to embarrass China should the conclusions be anything other than an endorsement of BRI projects.¹⁸ In fact, Magdalena Skipper, the editor-in-chief of *Nature*, ‘environmental sciences’ will be an interesting area to watch as this discipline “has only emerged as a focus more recently in China” where the impact in this area “of research has key implications that extend well beyond China itself.”¹⁹

Critics have also pointed out that the Chinese science enterprise is ‘less international’ compared to Western scientific powers like the US, EU and the UK, where immigrants make up a significant proportion of the S&T workforce. Chinese S&T is overwhelmingly dominated by ethnic Chinese, with a very limited presence of foreign

¹⁴ [“Sci-tech cooperation key for BRI partners”](#), 27 February 2023, Chinese Academy of Science, Beijing.

¹⁵ Richard P. Suttmeier, [“Chinese Science policy at a Crossroads”](#), *Issues in Science and Technology*, 36(2), 2020, pp. 58-63.

¹⁶ Ehsan Masood, [“How China is redrawing the map of world science”](#), *Nature*, 569, 2020, pp. 20-23.

¹⁷ [“Interview with John Holdren: Trump has no science policy to speak of”](#), 23 May 2018, Harvard Kennedy School, Belfer Center for Science and International Affairs.

¹⁸ [“Build a Sustainable Belt and Road”](#), *Nature*, 1 May 2019, 569, p. 5.

¹⁹ [“China making “great strides” in improving research quality, says Nature Chief Editor”](#), 12 September 2019, Chinese Academy of Sciences, Beijing.

scholars.²⁰ In tandem, Chinese science and knowledge are intimately connected with the Communist party in order to fulfil the weave of the ‘China Dream’. This nationalistic agenda seems to be at odds with the Western notion of ‘autonomy’ and ‘curiosity’ as drivers of research, and experts have underlined that China is at risk of turning away those ‘techno-globalists’.²¹ For instance, the high profile Communist Party of China policy ‘Thousand Talents Program’ initiated in 2008, has yet to achieve its goal.²²

The implementation and the achievement of the SDGs is critically depends on science, technology and innovation.²³ For instance, the continued development of cleaner technologies is indispensable, along with the transfer of clean technologies, and accessibility to developing countries, in order to mitigate the climate crisis. Since launching of BRI in 2013, primary attention has been on ‘hard infrastructure’ though, mainly on the energy and transport sectors like railways, bridges and roads, with S&T being one of the minor components (at around 15 per cent in 2022).²⁴

Conclusion

In modern scientific research, collaboration is one of the most important aspects as it pools collective knowledge and thereby enhances better utilization of resources and improves innovations. The reality of ongoing global climate crises and the COVID-19 pandemic have only heightened the critical importance of science, technological innovation and collaboration to overcome global challenges. Successive Chinese leadership have taken steps to develop the country’s S&T infrastructure. China has overtaken the United States for the first time in terms of research articles published in the *Nature* index group. From January-December 2022, China’s share of research articles was 19,373, compared to 17, 610 for the United States.²⁵ In spite of the rapid growth of Chinese S&T, there are rising complaints on Chinese approach of sharing data and protection of intellectual property. Maintaining accountability and transparency is vital for progress and can ensure win-win cooperation with member countries of BRI. A key fundamental is to uphold the principle of ‘open science’, making scientific process more transparent, inclusive and democratic.

²⁰ Caroline S. Wagner et al., [“What do China’s scientific ambitions mean for Science- and the world?”](#) *Issues in Science and Technology*, 5 April 2021.

²¹ Cong Cao and Richard P. Suttmeier, [“Challenges of S&T system reform in China”](#), *Science*, 355(6329), 2017, pp. 1019-1021.

²² Dongbo Shi et al., [“Has China’s Young Thousand Talents program been successful in recruiting and nurturing top-caliber scientists?”](#) *Science*, 379(6627), 2023, pp. 62-65.

²³ [“The future is now: Science for achieving sustainable development, Global sustainable development report 2019”](#), United Nations Department of Economic and Social Affairs, New York.

²⁴ Christoph Nedopil, [“China Belt and Road Initiative \(BRI\) Investment Report 2022”](#), Green Finance & Development Center, FISF Fudan University, Shanghai, January 2023.

²⁵ [“China overtakes United States on contribution to research in Nature index”](#), 19 May 2023, *Nature*.

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