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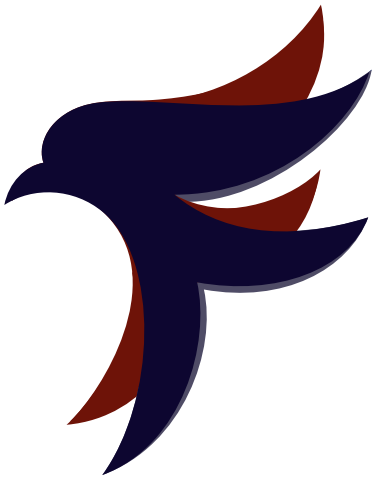

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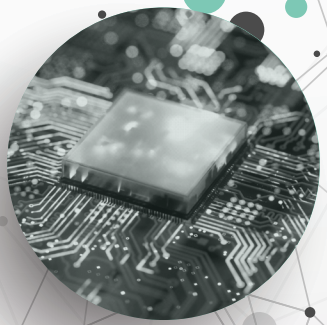
ABSTRACT

The People's Republic of China's rise as a global innovation power is rooted in the development of a sovereign innovation infrastructure, one that allows China to compete in high-technology races with the United States. This process is complemented by an intensifying science and technology partnership with the Russian Federation. **By decoupling from China and Russia, the United States and its allies are pushing China and Russia closer to each other.** The paper discusses recent examples of Sino-Russian biotechnology cooperation projects, offering an early account of the emerging integration of two distinct but complementary innovation infrastructures.

INTRODUCTION

The People's Republic of China's emergence as a global power is rooted in the rapid development of a sovereign innovation infrastructure, one that allows China to compete in high-technology races with the United States. China's build-up of its innovation infrastructure is complemented by another process: an intensifying cooperation with the Russian Federation in security, trade, energy supplies, artificial intelligence, 5G, space research, and biotechnology. Moscow and Beijing have a complicated history of interactions. Previously, China and the Soviet Union were isolated from the world market of technology, and after the Sino-Soviet relationship worsened, they were also isolated from each other. However, today, in light of deteriorating relations with the United States, strategic alignment emerges. The U.S. and the European Union's decoupling from business with China and imposing economic sanctions on Russia push the two countries to examine the potential of their strategic cooperation more closely.[1]



INNOVATION INFRASTRUCTURE

China and Russia are very different in terms of their innovation performance. China has an ascending trajectory and has already advanced to self-sufficient manufacturing of "sophisticated intermediate goods."[2] It is well integrated into global innovation networks, while Russia is not. Since the break-up of the Soviet Union, Russia has been sliding down a descending trajectory.[3] It became a natural resource exporter heavily dependent on imports of foreign technology.

Regardless of these differences, Beijing and Moscow are actively developing a joint innovation infrastructure. The two countries declared 2020 and 2021 the "Cross Years of Russian and Chinese scientific, technical, and innovation cooperation."[4] China demonstrated its ability in launching and managing large-scale projects and leads in Sino-Russian partnerships. Most of the infrastructure projects take place under the auspices of the Belt and Road Initiative.[5] For example, one of its institutes is Russia-China Investment Fund, a private equity fund established jointly by the Russian Direct Investment Fund and China Investment Corporation, which equally committed USD 2 billion.[6]

The purpose of building this type of infrastructure is to accelerate Sino-Russian partnerships in science and technology and facilitate technology transfer. In 2020, the two countries announced the construction of the first Sino-Russian Innovation Complex, a joint venture of Tus-Holdings, Russian Direct Investment Fund, Tsinghua University, and Lomonosov Moscow State University. The purpose of this Innovation Complex is to prepare for future joint research and development centers, university labs for basic research, and science parks. This project followed the establishment in 2016 of the first Sino-Russian university founded by Beijing Institute of Technology, Shenzhen Municipal People's Government, and Lomonosov Moscow State University.[7] The new university's mission is to "to nurture talents for the Belt and Road Initiative."[8] Few joint research centers, for instance, in computational mathematics and cybernetics, were launched, and there are plans to open other centers in chemistry and materials, biology, and space science.[9]

In addition, the Russia-China Investment Fund, in partnership with Tus-Holdings, supports the construction of the Sino-Russian High-Tech Innovation Park at the Skolkovo Innovation Centre. According to the press release, "Tus-Holdings is considering the possibility to create a network of innovation facilities in Russia by building new technology parks in other areas of the country."[10] Another science and technology park within Lomonosov Moscow State University is anticipated and is expected to "become a platform for innovative cooperation between scientific and technological workers and scientific and technological enterprises of the two countries."[11]

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These projects are recent, and at the moment, it is unclear whether they would be successful in spurring actual innovation in the near future. What is clear, though, is that their proliferation in the last few years signals the commitment to closer and long-term integration of the Russian and Chinese innovation systems. Such integration is incremental and might take decades. In the words of Tus-Holdings Chairman Jiwu Wang, the company's vision is "*an ecosystem* of innovative cooperation in science and technology between China and Russia . . . and deepening economic *integration* between the two countries" [emphasis added].[12]

Lomonosov Moscow State University (left) and Tsinghua University Campus (right). (Adobe Stock)

BIOTECHNOLOGY

Chinese-Russian technological alignment has been particularly apparent in the sector of biotechnology. Broadly, biotechnology refers to the manipulation of living organisms or their compounds to produce new products or services. Biotechnology is perceived to be "a key strategic technology for industrial growth" and is distinguished from other technological sectors for its capacity to alter the means of production across a variety of industrial sectors.[13] Examples of the sectors include pharmaceuticals, agriculture, and food processing, and extend to dual-use technologies.

Biotechnology is a strategic sector for China. The Made in China 2025 Initiative sets the goal of manufacturing high-tech products, including innovative medicines.[14] The plan introduced targets for Chinese pharmaceutical firms to advance in biotechnology innovation and increase exports.[15] About half of all industrial parks in China focus on the development of pharmaceuticals.[16] By 2018, China established 111 biotechnology science parks.[17] Although China still lags behind the U.S. in biotechnology innovation, analysts concede that it is rapidly progressing and closing this gap.[18] So far, China's efforts have concentrated on creating the necessary infrastructure for biotechnology development.

In turn, Russia has rich natural resources, but over 80% of biotech products are imported, and Russia's share in the global market of biotech products is below 0.1%.[19] Russian biotech is a sector that experienced massive brain drain after the break-up of the Soviet Union, with many scientists leaving for Western countries and Israel.[20] The persistent challenge for the Russian biotechnology industry, including the biopharmaceutical industry, is its critical dependency on imports. Between 1992 and 2014, the production of substances (active pharmaceutical ingredients) decreased by a factor of 20.[21] According to the Ministry of Industrial Policy of Russia, in 2015, the country imported 95% of active pharmaceutical ingredients required to produce finished pharmaceuticals.[22] In 2018, the share of foreign medicines on the Russian market constituted 70.2% by value and 39.4% by volume. In 2019, foreign medicines generated USD 19.6 billion in income, which was about 70% of the Russian pharmaceutical market.[23] By some accounts, this sum is larger than what Russia earns from its arms export.[24] Pharmaceutical imports exceed exports by 14 times.[25] By all formal indicators in life-science research and biotechnology, such as gross domestic product (GDP) expenditure on R&D, patents, and journal publications, Russia lags behind the United States, China, France, South Korea, Japan, Germany, and India.[26]

Yet, Russia sees biotechnology as a priority area for its future.[27] The first post-Soviet strategic document in this area was enacted in 2012 and entitled the State Coordination Program for the Development of Biotechnology in the Russian Federation until 2020 (BIO 2020). Around USD 18 million was invested in the development of biotechnology, with 22% directed to biomedicine and biopharmaceuticals research.[28] The results of the program are considered limited, except for some improvement in vaccine and monoclonal antibodies research.[29] The state programs in the pharmaceutical industry appear to be more specific and thus more practical.

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(sputnikvaccine.com)

For example, the State Program for the Development of the Pharmaceutical and Medical Industry until 2020 (PHARMA 2020), published in 2014, attempted to reduce Russia's dependency on foreign medical technologies. Sanctions put added pressure on import substitution in this area.[30] As a result of this program, 50 new industrial sites were built, 130 new medicines entered the market (9 of which were classified as innovative), and 8 scientific-research centers of pre-clinical development were built or reconstructed.[31] In addition, PHARMA 2020 launched several biopharmaceutical projects, including those of Biocad and Generium,[32] some of the largest producers of the Sputnik V vaccine.[33]

Moscow approved PHARMA 2030 in December 2021. The main difference between PHARMA 2020 and PHARMA 2030 is a call for an upgrade from import substitution to an innovative model of production. In nine years, Russia aims to double the production of local medicines and medical equipment and increase their export. The program foresees investment in infrastructure to allow for deepening cooperation between production, science, and education.[34]

Notwithstanding the respective limitations of national biotech industries, Russia and China's cooperation has recently intensified and involved the use of the joint innovation infrastructure projects.

According to data from the Eurasian Economic Commission, Russia's innovative companies include few active players: Generium, ChemRar, Biocad, and Pharmapark.[35] ChemRar, a high-tech center in the Moscow region, hosts a handful companies benefiting from its infrastructure and scientific-research institute. One of the objectives of the center is conducting R&D for its partners especially around innovative antibiotics. In 2020, ChemRar, with the help of the Russian Direct Investment Fund (RDIF), developed a specific medicine for anti-coronavirus treatment, Avifavir, which is currently supplied to 15 countries.[36] Avifavir is based on a known substance Favipiravir, originally developed in Japan to treat influenza, but ChemRar conducted clinical trials to confirm its effectiveness in treating COVID-19 specifically. Pharmapark, another Moscow-based company, is Russia's top producer of the active pharmaceutical ingredient interferon alfa-2b and covers 80% of local demand of Russian producers of finished pharmaceuticals. Some of these companies are becoming instrumental in Sino-Russian biotech partnership.

When it comes to breakthroughs, what is notable about the Russian biopharma industry is the persistent Soviet legacy of production being subordinated to research institutes. By estimates, about 30 universities, mostly in Moscow and Saint Petersburg, have programs in biotechnology, and about 50 institutes of the Russian Academy of Science conduct biology research.[37] Consider the Russian COVID-19 vaccines as an example. The Sputnik V vaccine came out from the Gamaleya Institute, a state-owned research institute, not from industry. The Novosibirsk-based state-owned scientific center, Vektor State Research Center of Virology and Biotechnology, developed the EpiVacCorona vaccine.[38] Similarly, state-owned Chumakov Scientific Center for Research and Development of Immune-and-Biological Products of Russian Academy of Sciences developed the KoviVac vaccine.[39]

Arguably, Russia's weak point is not in the development of biopharmaceutical innovation but in scaling-up of production. In the biotechnology sector, innovative projects are financially supported through Russian development institutes, such as Skolkovo, Russian Venture Company, and Rusnano.[40] Often, their resources only suffice for the development stage but not for substantially increasing production. For the latter, the Russian Foreign Direct Investment Fund plays a bigger role, but it would be limited without help from its international partners. This is where China's resources find a good application.

Notwithstanding the respective limitations of national biotech industries, Russia and China's cooperation has recently intensified and involved the use of the joint innovation infrastructure projects mentioned above. For example, Russian company Biocad,[41] together with Chinese manufacturer Shanghai Pharmaceuticals Holding (SPH), created a joint venture, SPH Biocad,


(sputnikvaccine.com)

based in China. SPH Biocad will commercialize Biocad's portfolio of medicines (e.g., oncology and autoimmune treatment) in the Chinese market.[42] The joint venture received USD 400 million in funding, in which SPH holds 50.1% and Biocad 49.9%.[43] The long-term plan is to turn the joint venture from a generic producer into an innovative player.[44]

Another example of the use of the joint innovation infrastructure to advance biopharmaceutical cooperation is the Russia-China Investment Fund. In 2020, it invested in the creation of the Russian pharmaceutical holding Binnopharm Group.[45] In the same year, Binnopharm Group joined a group of companies involved in the production of the Sputnik V vaccine. With consolidated assets, Binnopharm Group became one of the top three largest pharmaceutical manufacturers in Russia and now owns the portfolio of over 450 registered medicines, the most among Russian companies.[46] Binnopharm Group plans to establish a new R&D center in Krasnogorsk (Moscow region) by integrating R&D centers of the enterprises that were merged and invest USD 33 million in the development of 100 new medicines by 2025.[47] The impact on biopharmaceutical innovation of this merger is yet to be seen. Evidently though, China has been behind the major projects aiming to help Russia create and improve the necessary infrastructure for the development of biopharmaceuticals industry. Infrastructure for innovation-based industries, such as biotechnology, is a key pillar, and China's kind of investment in Russia is aimed to develop and upgrade the necessary innovation capabilities.

In addition to joint investments, China and Russia have launched bilateral research projects. The countries agreed to establish a joint laboratory for research on COVID-19. The National Fund of Natural Sciences of China and the Russian Fund of Fundamental Research will supervise the project.[48] In a similar vein, the Russian Vektor State Research Centre of Virology and Biotechnology have cooperated with the Ministry of Science and Technology of China on projects related to the human avian influenza (bird flu).[49] The exchange of vaccine technology and declarations to combine efforts in coronavirus research accelerated the formation of the institutional links between the Chinese and Russian innovation systems, especially in the biotechnology sector. It signals the countries' commitment to an enduring innovation partnership.[50]

CONCLUSION

The processes addressed in this paper have been unfolding before the war in Ukraine. Western decoupling from China and Russia has been pushing the two countries towards deepening their cooperation. The accelerating Sino-Russian innovation cooperation projects confirm this assumption. While it can be premature to assess the levels of joint biopharmaceutical innovation, the implications of China's engagement with the Russian biotech are not trivial. The nature of this engagement goes beyond investment projects, aiming to strengthen the institutional links between research organizations, manufacturers, and sovereign funds of the two nations. After February 24, 2022, Western sanctions and companies fleeing Russia will force Moscow to seek deeper cooperation with China in high-tech sectors. Russian biotech is not a self-sufficient industry and requires international partnerships to develop. But Russia is now limited in who it can partner with. Given the past trajectory of joint innovation partnership, naturally, China is now Russia's ultimate bet when it comes to biotechnology development. Russian biotech future is in China's hands. There are not currently signs that China will change its favorable position towards Russia; hence, Sino-Russian innovation partnerships will likely intensify.

ENDNOTES

1 Samuel Bendett and Elsa Kania, 'A New Sino-Russian High-Tech Partnership', Australian Strategic Policy Institute, October 2019, https://www.aspi.org.au/report/new-sino-russian-high-tech-partnership.
2 Richard E. Baldwin, The Great Convergence: Information Technology and the New Globalization (Cambridge, Massachusetts: The Belknap Press of Harvard University Press, 2016), p. 294.
3 For more details, see, Svitlana Lebedenko, 'Russian Innovation in the Era of Patent Globalization', IIC - International Review of Intellectual Property and Competition Law 53, no. 2 (2022): pp. 173-193.
4 Desheng Cao, 'China, Russia Enhance Links in Sci-Tech Innovation', China Daily, November 2021, https://www.chinadaily.com.cn/a/202111/27/WS61a16e3ea310cdd39bc77dbd.html.
5 A long-term project announced by the General Secretary Xi Jinping in 2013 and envisioned to be completed by 2049.
6 Russia-China Investment Fund, http://rcif.com/. See also: Belt and Road Initiative, 'BRI Institutions', https://www.beltroad-initiative.com/institutions-and-mechanisms/.
7 'About the University: Brief', Shenzhen MSU-BIT University, https://en.smbu.edu.cn/About_the_University/Brief.htm.
8 Ibid.
9 'Development Plan', Shenzhen MSU-BIT University, https://en.smbu.edu.cn/info/1035/1258.htm.
10 Russian Direct Investment Fund, 'RCIF and Tus-Holdings expand comprehensive cooperation in the technology & innovation sector', September 11, 2018, https://rdif.ru/Eng_fullNews/3412/.
11 'RDIF, RCIF and Tus-Holdings agree to jointly establish innovation center at Lomonosov Moscow State University', April 26, 2019, https://rdif.ru/Eng_fullNews/4050/.
12 Ibid.
13 Susan Bartholomew, 'National Systems of Biotechnology Innovation: Complex Interdependence in the Global System', in Systems of Innovation: Growth, Competitiveness and Employment, ed. Charles Edquist and Maureen McKelvey, I (Cheltenham, UK; Northampton, MA, USA: Edward Elgar Publishing Limited, 2000), pp. 444-445.
14 Rolf Schmid and Xin Xiong, Biotech in China Innovation, Politics, and Economics (Singapore: Jenny Stanford Publishing, 2021), p. 285.
15 Adolfo Arranz, '"Made in China 2025": Beijing Bets on Biotech', South China Morning Post, October 2018, https://multimedia.scmp.com/news/china/article/2167415/china-2025-biotech/index.html?src=social.
16 'China's Biotech Parks – Leveraging the Ecosystem for Success' (Deloitte, May 2021), p. 2, https://www2.deloitte.com/cn/en/pages/life-sciences-and-healthcare/articles/pr-china-biotech-parks-leveraging-the-ecosystem-for-success.html.
17 Ibid.
18 For indicators and comparative statistics, see, Robert D. Atkinson, 'China's Biopharmaceutical Strategy: Challenge or Complement to U.S. Industry Competitiveness?' (Information Technology and Innovation Foundation, August 2019), https://itif.org/publications/2019/08/12/chinas-biopharmaceutical-strategy-challenge-or-complement-us-industry.
19 Anna Grebenyuk and Nikolai Ravin, 'The Long-Term Development of Russian Biotech Sector', Foresight 19, no. 5 (September 2017): pp. 491, 498.
20 Gigi Kwik Gronvall and Brittany Bland, 'Life-Science Research and Biosecurity Concerns in the Russian Federation', The Nonproliferation Review, February 2021, pp. 3-4.
21 Vladimir V. Moiseev, State Policy of Economic Development of Modern Russia (2000-2016) (translation by author) (Moscow: Direkt-Media, 2017), p. 297.
22 'Information on the Results of Analysis of the State and Development of the Biotechnology Industry of Member States of the Eurasian Economic Union - Working Materials (Translation by Author)', (Moscow: Eurasian Economic Commission, Department of Industrial Policy, 2015), p. 27.
23 Balakin, Ayginin, and Ivashenko, 'Russian Pharmaceutical Industry until 2030: Analytic Overview (Translation by Author)', p. 38.
24 Ibid.

25 Aleksandr V. Evstratov, Main Tendencies and Ways of Development of the Pharmaceutical Market in the Russian Federation (translation by author) (Volgograd: VolgGTU, 2018), p. 18.
26 Gronvall and Bland, p. 8.
27 Ibid, p. 4.
28 Ibid.
29 Ibid.
30 Arthur Boyarov, Alina Osmakova, and Vladimir Popov, 'Bioeconomy in Russia: Today and Tomorrow', New Biotechnology 60 (January 2021), p. 36.
31 K.V. Balakin, A.A. Ayginin, and A.A. Ivashenko, 'Russian Pharmaceutical Industry until 2030: Analytic Overview (Translation by Author)' (Dolgoprudny: Biopharmaceutical Claster 'Severnyi', 2021), pp. 42-43.
32 Boyarov, Osmakova, and Popov, 'Bioeconomy in Russia', p. 37.
33 'Russian company plans to produce 5-6 mln doses of Sputnik V per month in June-July', Tass, April 6, 2021, https://tass.com/economy/1274415; and 'The Sputnik V Manufacturer Will Produce 20 Million Doses of Vaccine Per Month (translation by author)', Generium, June 5, 2016, https://www.generium.ru/about/press_center/Media_about_us/proizvoditel-sputnika-v-s-iyulya-nachnet-vypuskat-20-mln-doz-vaktsiny-v-mesyats/.
34 Balakin, Ayginin, and Ivashenko, p. 43.
35 'Information on the Results of Analysis of the State and Development of the Biotechnology Industry of Member States of the Eurasian Economic Union - Working Materials (Translation by Author)', pp. 28-30.
36 'Russia's Avifavir Coronavirus Drug Registered in Indonesia', Russian Direct Investment Fund, March 2021, https://rdif.ru/Eng_fullNews/6644/.
37 'Overview of the Biotechnology Market in Russia and of its Prospects of Development (translation by author)' (Frost & Sullivan, 2014), p. 21.
38 By December 2020, Vektor has also developed a vaccine against HIV and conducted the first phase of clinical trials. Balakin, Ayginin, and Ivashenko, 'Russian Pharmaceutical Industry until 2030: Analytic Overview (Translation by Author)', pp. 41-42.
39 'Pharmaceutical Market of Russia 2020 (Translation by Author)' (Moscow: DSM Group, 2020), p. 117.
40 'Overview of the Biotechnology Market in Russia and of its Prospects of Development (translation by author)', p. 17.
41 Biocad is a scientific-production company in the Moscow region with the focus on urology, gynecology, oncology, and neurology products.
42 Ben Hargreaves, 'China and Russia Collaborate to Create Biologics Joint Venture', Bio-Pharma Reporter, October 2, 2019, https://www.biopharma-reporter.com/Article/2019/10/02/China-and-Russia-collaborate-to-create-biologics-JV.
43 Ibid.
44 Ibid.
45 The Russian pharmaceutical company Alium was founded in 1994 on the basis of the Research Centre of Applied Microbiology. In 2019, it was acquired by JSC "AFK" Sistema. In 2020, all the pharmaceutical assets of the JSC "AFK" Sistema, including Alium, were merged in Binnopharm Group. See, Binnopharm Croup, https://binnopharmgroup.ru/.
46 'Morgan Lewis Advises the Russia-China Investment Fund (RCIF) on Creation of Pharmaceutical Holding', Chambers and Partners, February 2021, https://chambers.com/articles/morgan-lewis-advises-the-russia-china-investment-fund-rcif-on-creation-of-pharmaceutical-holding.
47 'Russia's Binnopharm Group Hopes to Launch up to 100 New Drugs in Comin', ThePharmaLetter, September 2021, https://www.thepharmaletter.com/article/russia-s-binnopharm-group-hopes-to-launch-up-to-100-new-drugs-in-coming-years.
48 Ibid.
49 'International Cooperation (Translation by Author)', Russian Centre for Virology and Biotechnology 'Vektor', http://www.vector.nsc.ru/mejdunarodnoe-sotrudnichestvo/.
50 See, for instance, a declaration of Xi Jinping on deepening the cooperation with Russia on vaccine development. 'Xi Eyes Deeper Vaccine Cooperation with Russia', Xinhuanet, August 2021, http://www.news.cn/english/2021-08/25/c_1310148390.htm.

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