Delhi Policy Group

Advancing India's Rise as a Leading Power

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The U.S.-China Technology Cold War and Its Lessons for India

Author

Deependra Singh Hooda

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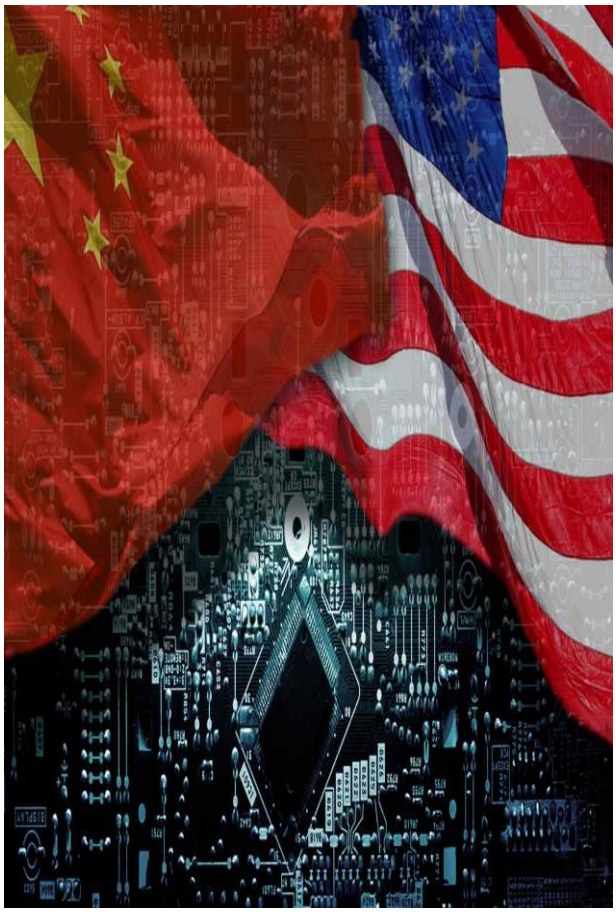

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Core 5A, 1st Floor, India Habitat Centre, Lodhi Road, New Delhi- 110003

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Author

Lt. Gen. Deependra Singh Hooda (Retd.),PVSM, UYSM, AVSM, VSM & Bar, Senior Fellow for Military Strategy, Delhi Policy Group

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The US China Technology Cold War. Source: Nikkei Asia

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Introduction

On October 4, 1957, the Soviet Union launched the first artificial satellite, named Sputnik, into the Earth's orbit. This event triggered panic among the American establishment, with historian Roger Launius terming it as having "a 'Pearl Harbour' effect on American public opinion."[1] Spurred into action, the Eisenhower administration created the National Aeronautics and Space Administration (NASA), and the Advanced Research Projects Agency (ARPA), now called DARPA. At its peak, NASA's budget was almost 5% of the U.S. federal budget.[2] Funding also poured in for scientific education, with the Congress passing the National Defense Education Act. These efforts eventually turned the U.S. into a technology powerhouse, which it remains to the day.

The U.S. has enjoyed a long period of technology domination in education, research and development (R&D), innovation, cutting-edge products, information technology, and military technology. However, this domination is now increasingly being challenged by China. It is often said that China's 'Sputnik moment' came in May 2017, when the Google-built AlphaGo, an Artificial Intelligence (AI) agent, beat the teenaged Chinese prodigy, Ke Jie, in a highly publicised match of the ancient game Go.[3] The result came as a deep shock to the Chinese establishment.

Perhaps a mere coincidence, but less than two months after the game, the Chinese central government issued A New Generation Artificial Intelligence Development Plan. It projected that by 2030, China would become "the world's primary AI innovation centre, achieving visible results in intelligent economy and intelligent society applications, and laying an important foundation for becoming a leading innovation-style nation and an economic power."[4] While

1 Launius, Roger. "Sputnik and the Origins of the Space Age." Accessed October 5, 2021. https://history.nasa.gov/sputnik/sputorig.html.

2 Rathi, Akshat. "The Soviets Taught the Americans How to Use Science for Propaganda." Quartz. Accessed October 5, 2021. https://qz.com/1094919/sputnik-1-woke-the-us-to-the-value-of-using-science-for-propaganda/.

3 Asia Society. "China's 'Sputnik Moment 'and the Sino-American Battle for AI Supremacy." Accessed October 14, 2021. https://asiasociety.org/blog/asia/chinas-sputnik-moment-and-sino-american-battle-ai-supremacy.

4 New America. "China's 'New Generation Artificial Intelligence Development Plan '(2017)." Accessed October 14, 2021. http://newamerica.org/cybersecurity-

the U.S. still holds an edge in AI, China is catching up fast. Together, U.S.-based and Chinese start-ups represented over 80% of the monetary value of VC investments in AI start-ups in 2020.[5]

Leaders of the U.S. and China understand the importance of technology in their rivalry for global power and dominance. In his first speech to Congress, President Biden stated that America is "in competition with China" to "win the 21st Century." Many commentaries in China suggest that surpassing the U.S. in high technology would end its era of global leadership, replacing it with China.[6]

In this high-stake competition, the U.S. and China are engaged in a technology cold war with major geopolitical implications. The technology decoupling that is taking place between the two countries could have a significant impact on the global economy. A recent International Monetary Fund report highlights that technological fragmentation can lead to losses in the order of 5 percent of GDP for many economies.[7] More importantly, if countries like India are forced to pick sides, it could lead to greater tensions with one side or the other.

This policy brief will look at the efforts of both China and the U.S. as they strive to achieve technological supremacy in the era of what has been described as the 'Fourth Industrial Revolution'. The brief will also analyse the lessons of this technology cold war for India.

China's Technology Push

The last four decades have seen a spectacular rise in the Chinese economy, driven mainly by manufacturing. Accompanying this was always a desire to acquire high technology, but it was achieved primarily through reverse engineering, disregard for intellectual property rights, and liberal government support for technology investment in China. While some elements of this

initiative/digichina/blog/full-translation-chinas-new-generation-artificial-intelligence-development-plan-2017/.

5 Tricot, Roland. "Venture Capital Investments in Artificial Intelligence: Analysing Trends in VC in AI Companies from 2012 through 2020." Paris: OECD, September 30, 2021. https://doi.org/10.1787/f97beae7-en.

6 Doshi, Rush. "The United States, China, and the Contest for the Fourth Industrial Revolution." Brookings (blog), July 31, 2020. https://www.brookings.edu/testimonies/the-united-states-china-and-the-contest-for-the-fourth-industrial-revolution/.

7 IMF. "Sizing Up the Effects of Technological Decoupling." Accessed October 14, 2021. https://www.imf.org/en/Publications/WP/Issues/2021/03/12/Sizing-Up-the-Effects-of-Technological-Decoupling-50125.

strategy remain, there has also been a very concerted push towards achieving self-reliance.

The first big step in the quest for technology domination came with the launch in 2015 of "Made in China (MIC) 2025". The plan aims to transform China into a leading manufacturing power by developing ten high-tech industries. These include new information technology, high-end numerically controlled machine tools and robots, aerospace equipment, and new materials, such as polymers.[8]

As outlined in a Congressional Research Services paper, China's implementation of MIC 2025 takes the following approach:[9]

- Tax, trade, and investment measures to incentivise foreign firms to shift production and R&D to China.
- Forced joint ventures and partnerships through formal regulations and by leveraging its role as a major purchaser.
- China has set up government guidance funds (GGFs) to support Chinese companies in domestic R&D and overseas acquisitions that build Chinese capabilities through control of foreign corporate expertise.
- Foreign technology and equipment to fill key gaps in China's current capabilities.
- Talent recruitment. China encourages the return of Chinese expatriates and the hiring and exchange of foreign talent through R&D centres abroad.

In 2014, China's Military-Civil Fusion (MCF) plan was elevated to a national strategy. MCF seeks to deepen the interaction between China's civil research and commercial sectors and the military. MCF aims to fulfil three strategic objectives:[10]

- Facilitate transfers between the defence and civilian sectors to improve the sophistication of China's military technology.

8" Implementation Stressed for Manufacturing Vision." Accessed October 14, 2021. http://english.www.gov.cn/policies/latest_releases/2015/05/19/content_281475110703534.htm.

9 Sutter, Karen M. '"Made in China 2025 'Industrial Policies: Issues for Congress." https://sgp.fas.org/crs/row/IF10964.pdf

10" 2019 Annual Report to Congress | U.S.- CHINA | ECONOMIC and SECURITY REVIEW COMMISSION." Accessed February 21, 2022. https://www.uscc.gov/annual-report/2019-annual-report-congress.

- Create cohesion in Chinese industry and academia working with and in support of military objectives.
- Drive technological innovation and economic growth.

A stated aim of the Chinese Communist Party is to develop the PLA into a "world-class military" by 2049. To this end, the MCF strategy is to target key technologies like quantum computing, big data, semiconductors, 5G, advanced nuclear technology, aerospace technology, and AI.[11]

Many of these technologies are dual-use, and there are genuine concerns that acquisitions made in the name of civil use are being diverted for military purposes. One example of this is German-produced engines, which were exported to China for commercial use, but are powering PLA Navy submarines and frigates.[12] There is also sufficient evidence to indicate that China has used both licit and illicit means to obtain high-end technology.

China tested a nuclear-capable hypersonic missile in August, 2021.
Source: Indian Express

Supporting the MCF strategy are initiatives like the Thousand Talents Program that aim to bring Chinese scientists living abroad and foreign researchers to

11 United States Department of State. "The Chinese Communist Party's Military-Civil Fusion Policy." Accessed October 17, 2021. https://2017-2021.state.gov/military-civil-fusion/.

12 The Soufan Center. "IntelBrief: China's Military-Civil Fusion Strategy," August 13, 2020. https://thesoufancenter.org/intelbrief-chinas-military-civil-fusion-strategy/.

China.[13] Chinese firms obtain dual-use technologies through overseas acquisitions supported by government funding. For example, the state-owned company, Aviation Industry Corporation of China, which produces military aircraft like the J-20 stealth fighter, has spent more than $3.25 billion to acquire aerospace, automotive, and engineering firms in the U.S. and Europe.[14]

Huawei, the world leader in 5G networks, is an excellent example of how the Chinese government supports technology companies. A report by the Center for American Progress lists out three aspects of Beijing's playbook:[15]

- China provides direct and indirect subsidies that reduce Huawei's operational costs, speed time to market for Huawei's products, and allow it to price its products well below prices set by its competitors.
- Chinese state banks provide generous financing to Huawei's customers on terms most commercial banks cannot match, making Huawei equipment cheaper to deploy at any price.
- Chinese officials interfere in the standardisation process at the International Telecommunication Union (ITU) to increase Huawei's share of the emerging global 5G standard.

In October 2021, the Pentagon's former chief software officer, Nicolas Chaillan, who resigned in protest at the slow pace of technological transformation in the U.S. military, said that the U.S. has already lost to China in the AI race.[16] Chaillan's claim may be a little exaggerated, but it reflects the strong focus being given by China in the field of AI.

China's AI push has certain advantages. Its large population enables the country to generate and utilise big data, and its effort in promoting technology and engineering gives it an abundance of high-quality computer scientists and

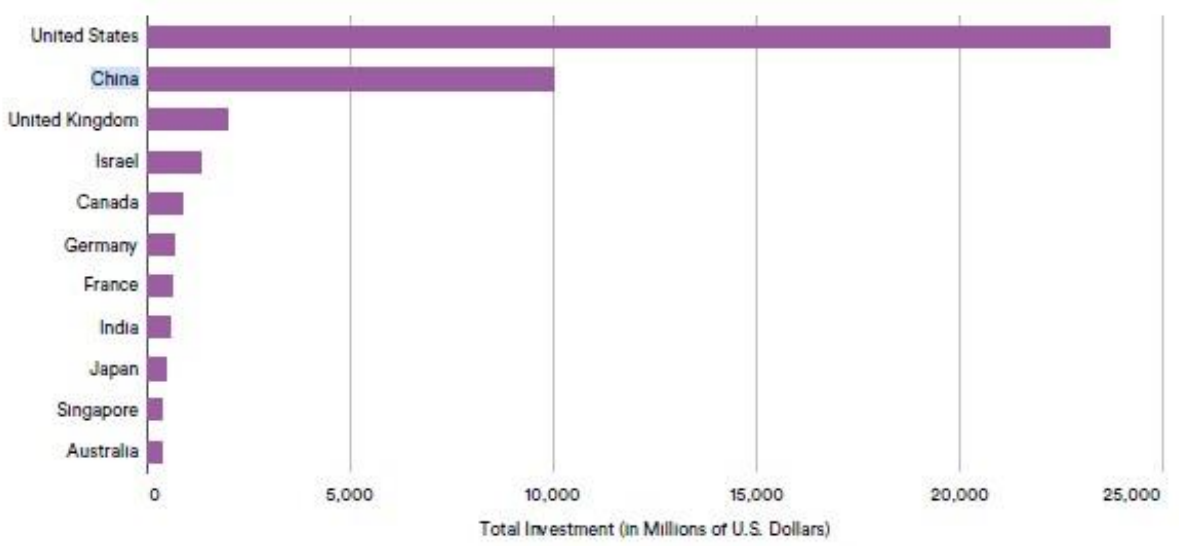
13 Jia, Hepeng. "WHAT IS CHINA'S THOUSAND TALENTS PLAN?," https://media.nature.com/original/magazine-assets/d41586-018-00538-z/d41586-018-00538-z.pdf

14 Greg Levesque and Mark Stokes, "Blurred Lines: Military-Civil Fusion and the 'Going Out 'of China's Defense Industry," Pointe Bello, December 2016. https://toinformistoinfluence.files.wordpress.com/2017/07/2613c-062017_pointebello_militarycivilfusionreport.pdf

15 Center for American Progress. "There Is a Solution to the Huawei Challenge." Accessed March 3, 2022. https://www.americanprogress.org/article/solution-huawei-challenge/.

16" China Has Won AI Battle with U.S., Pentagon's Ex-Software Chief Says | Reuters." Accessed February 23, 2022. https://www.reuters.com/technology/united-states-has-lost-ai-battle-china-pentagons-ex-software-chief-says-2021-10-11/.

engineers.[17] China also has loose privacy regulations, which have enabled the creation of a large AI market in areas like visual and facial recognition.



Private Investment in AI by Country, 2020.
Source: Artificial Intelligence Index Report 2021, Stanford University

China's global share of research papers in AI has vaulted from 4.26% (1,086) in 1997 to 27.68% in 2017 (37,343), surpassing any other country in the world, including the U.S. China also consistently files more AI patents than any other country.[18] According to an annual global AI industry map published by the China Academy of Information and Communications Technology, China had about one-quarter of the global AI corporations in 2020, second only to the U.S.[19]

Despite the impressive gains in technology, China still remains dependent on foreign technologies and market access, especially in certain foundational technologies such as semiconductors, lidar systems for self-driving cars, engine housings for commercial aircraft, and reagents for gene editing kits.20 In 2021, China imported $432 billion worth of semiconductors, while its own

17 Li, Daitian, Tony W. Tong, and Yangao Xiao. "Is China Emerging as the Global Leader in AI?" Harvard Business Review, February 18, 2021. https://hbr.org/2021/02/is-china-emerging-as-the-global-leader-in-ai.

18 Ibid

19" Number of AI Corporations in China Stands 2nd in 2020 Globally: Industry Report - Global Times." Accessed February 26, 2022. https://www.globaltimes.cn/page/202104/1221530.shtml?id=11.

20 Weinstein, Ryan Fedasiuk, Emily. "Beijing's Strategic Blueprint Is Changing as Tensions Grow." Foreign Policy (blog). Accessed February 26, 2022. https://foreignpolicy.com/2021/12/03/china-strategic-blueprint-technology/.

indigenous chip industry is relatively small, accounting for only 7.6% of total global semiconductor sales.[21]

Beijing has planned to spend $150 billion from 2014 through 2030 to develop its chip industry to achieve self-reliance.[22] However, China still remains three or four generations behind what is considered leading edge. And recent U.S. efforts are aimed at ensuring that China cannot easily bridge this gap.

U.S. Strategy for Technology Superiority

U.S. does not wish to lose its technology edge and appears to be following a two-pronged strategy. The first is to put restrictions on the easy availability of high technology to China. This is most evident in the Information and Communication Technology sector, which has national security implications. The steps taken by the U.S. government include investment restrictions, export controls, and tariffs.[23]

The Commerce Department's Bureau of Industry and Security (BIS) has issued a series of China-related Entity List designations and export control reforms to restrict exports to China in the fields of AI, quantum computing, biotechnology, and drones.[24] On December 16, 2021, the Department of Treasury identified eight Chinese technology firms with whom U.S. persons are prohibited from purchasing or selling certain publicly traded securities.[25] According to Chinese media, a total of 260 entities in mainland China have been blacklisted by the U.S. government.[26]

21 Ravi, Sarah. "Taking Stock of China's Semiconductor Industry." Semiconductor Industry Association, July 13, 2021. https://www.semiconductors.org/taking-stock-of-chinas-semiconductor-industry/.

22 AP NEWS. "China Pursues Tech 'self-Reliance,' Fueling Global Unease," December 28, 2021. https://apnews.com/article/technology-business-europe-china-beijing-2987b725a845e36b2a9735d9294bfb90.

23 S&P Global. "A New Great Game--China, The U.S., And Technology." https://www.spglobal.com/_division_assets/images/special-editorial/a-new-great-game-china-the-u.s.-and-technology/2019_05_csag_uschina.pdf

24" United States Adopts Wide-Ranging China Restrictions." Accessed March 3, 2022. https://www.wilmerhale.com/en/insights/client-alerts/20211229-united-states-adopts-wide-ranging-china-restrictions.

25 U.S. Department of the Treasury. "Treasury Identifies Eight Chinese Tech Firms as Part of The Chinese Military-Industrial Complex." Accessed March 3, 2022. https://home.treasury.gov/news/press-releases/jy0538.

26 sina_mobile. "美再将11家中企列入实体清单 专家：被'拉黑'后基本不可能'变白,'" July 21, 2020. https://news.sina.cn/2020-07-21/detail-iivhvpwx6697428.d.html.

In September 2020, the U.S. government placed sanctions on China's largest chipmaker, Semiconductor Manufacturing International Corporation (SMIC), citing military end use in China. Even though it produces less sophisticated semiconductors, SMIC relies on software and machines from American companies. As a result, SMIC could struggle if these companies cannot service and upgrade the company's manufacturing equipment.27 In December 2021, it was reported that further restrictions were being considered to close regulatory loopholes that have allowed Chinese chipmaker SMIC to continue to purchase critical technology of U.S. origin.[28]

The restrictions on technology exports are not solely restricted to U.S. companies. In May 2020, the U.S. issued a new rule to block companies around the world from using American-made machinery and software to design or produce chips for Huawei or its entities.[29] This rule led to the Taiwan Semiconductor Manufacturing Corporation (TSMC), a leading manufacturer producing the most advanced chips in the world, severing its ties with Huawei.[30]

The impact of U.S. restrictions has been significant on certain Chinese companies. After sanctions were imposed on Huawei, in May 2019, Google cut off Huawei from its suite of digital products. This meant that Huawei would no longer have access to the very fundamentals of Android smartphones like Gmail, YouTube, Google Drive, and the Google Play Store.[31] After Google made its announcement, other U.S.-based companies like Qualcomm, Intel, Arm, and Microsoft followed suit.

With international sales badly hit, in November 2020, Huawei sold off Honor, its budget smartphone brand, attributing the sale to the "tremendous pressure"

27 Swanson, Ana, and Raymond Zhong. "U.S. Places Restrictions on China's Leading Chip Maker." The New York Times, September 26, 2020, sec. Technology. https://www.nytimes.com/2020/09/26/technology/trump-china-smic-blacklist.html.

28" US Seeks to Close Loophole Allowing SMIC Access to American Chipmaking Tech," December 10, 2021. https://eandt.theiet.org/content/articles/2021/12/us-seeks-to-close-loophole-allowing-smic-access-to-american-chipmaking-tech/.

29 Swanson, Ana. "U.S. Delivers Another Blow to Huawei With New Tech Restrictions." The New York Times, May 15, 2020, sec. Business. https://www.nytimes.com/2020/05/15/business/economy/commerce-department-huawei.html.

30 "Semiconductors and the U.S.-China Innovation Race." Foreign Policy (blog). Accessed March 4, 2022. https://foreignpolicy.com/2021/02/16/semiconductors-us-china-taiwan-technology-innovation-competition/.

31 Android Authority. "The Huawei Ban Explained: A Complete Timeline and Everything You Need to Know," December 25, 2021. https://www.androidauthority.com/huawei-google-android-ban-988382/.

from the U.S. government.32 Weighed down by sanctions, Huawei's market share in smartphones fell from 23% in 2020 to 7% in 2021, and revenue fell by 29% year-on-year to $99.5 billion.[33]

The second prong of the U.S. strategy is to adopt a more offensive approach towards giving a boost to the country in research and manufacturing. Two important bills have been passed in the U.S. Senate and House of Representatives in the past year. In June 2021, the Senate passed the $250 billion Innovation and Competition Act. The bill includes billions in extra funding for research and development in the areas of artificial intelligence, quantum computing, robotics, and 5G. The centrepiece of the bill is $50 billion in emergency funding for the Commerce Department to boost domestic semiconductor production.[34]

In February 2022, the House of Representatives passed its response to the Senate bill – The America Competes Act. Although there are some differences between the two bills on the creation of an entirely new technology division at the National Science Foundation, there is a common purpose in funding research and development and enhancing semiconductor manufacturing. The House and the Senate now have to craft a final bill to send to the President.[35]

The U.S. Congress is also studying the CHIPS Act, a law that would provide chipmakers with $52 billion in subsidies to advance semiconductor manufacturing. Intel plans to spend $100 billion to build new chip fabrication facilities, though the pace at which these come up will depend on the subsidies.[36]

32 Ibid

33 France-Presse, Agence. "Sanction-Hit Huawei Says Revenues down 29% This Year." The Guardian, December 31, 2021, sec. Technology. https://www.theguardian.com/technology/2021/dec/31/sanction-hit-huawei-says-revenues-down-29-this-year.

34 Basu, Zachary. "Senate Passes Sweeping China Competition Bill in Rare Bipartisan Vote." Axios, June 8, 2021. https://www.axios.com/senate-china-competition-bipartisan-e2fa3f88-16d4-4d79-bab0-1b9c6a4f2774.html.

35 SearchCIO. "U.S. Awaits Bill Boosting Technology Competition with China." Accessed March 10, 2022. https://www.techtarget.com/searchcio/news/252514215/US-awaits-bill-boosting-technology-competition-with-China.

36 Shankland, Stephen. "Biden to Congress: Pass That Bill to Fund US Chip Manufacturing." CNET. Accessed March 10, 2022. https://www.cnet.com/news/biden-to-congress-pass-that-bill-to-fund-us-chip-manufacturing/.

Design concept for Texas Instruments' new 300-millimeter semiconductor wafer fabs in Sherman, Texas. Construction of the first and second fabs to begin in 2022, with potential for up to four fabs over time. Source: Texas Instruments

As expected, Beijing has stated that the bills passed in the U.S. are an attempt to deprive China of its "legitimate right to development through technology and economic decoupling." The National People's Congress foreign affairs committee has said: "The Bill shows that the paranoid delusion of egoism has distorted the original intention of innovation and competition."[37]

Lessons of the Technology Cold War for India

For decades, the idea of globalisation has been in vogue, and even when it is losing steam, there is still a feeling that technology decoupling would not be possible in this highly interconnected world. However, today, strategic competition between the U.S. and China is driving a technology cold war that could have global implications. How far this will go is uncertain, but there are three clear lessons for rising powers like India.

First, control over access to high technology, and in some cases, the outright denial of technology, has become an important tool of statecraft in the geopolitical contest between great powers. U.S. allies like Australia, New Zealand, Japan, Taiwan, and the U.K. have banned products by Huawei. Pressures are also being applied on smaller countries to shun Chinese

37 CNA. "China Accuses US of 'paranoid Delusion 'over Huge Innovation Bill." Accessed March 10, 2022. https://www.channelnewsasia.com/world/china-accuses-us-paranoid-delusion-over-huge-innovation-bill-1843376.

technologies. For example, Ecuador has negotiated a deal with the U.S. International Development Finance Corporation to help repay billions of dollars in loans to China in exchange for barring Huawei from its communications infrastructure.[38]

Second, there is a manifest need for trusted products in critical networks. Much is known about U.S. bans on Chinese equipment, but China has also taken a similar approach. In December 2019, Beijing ordered all government offices and public institutions to remove foreign computer equipment and software within three years.[39] This follows an earlier directive barring Cisco, Apple, Citrix Systems, and Intel's McAfee security business from any central government purchase.[40]

Third, with the pace of technology change, there is a tremendous first-mover advantage that can set international standards and alter the geopolitical balance. Huawei leads the patent market for 5G related technologies, with an estimated 18.3% share of the "global 5G patent families that have been granted and are active."[41] With a strong presence in Africa and Latin America, Huawei is poised to win the 5G market in these regions. With 460 million 5G subscribers in 2021 (70 percent of global subscribers), China has already taken the lead in the exploitation of 5G technology.

These three lessons must guide India's future approach towards the adoption of high technology. India has launched the Atmanirbhar Bharat (self-reliant India) campaign, and while this has met with some success, a much greater push needs to be given. India spends less than 0.7% of its GDP on R&D as compared to the global average of 2.2%.[42] High technology goods comprise only 11% of India's total technology exports worth $21.6 billion.[43] India is

38 Sevastopulo, Demetri, and Gideon Long. "US Development Bank Strikes Deal to Help Ecuador Pay China Loans." Financial Times, January 14, 2021. https://www.ft.com/content/affcc432-03c4-459d-a6b8-922ca8346c14.

39 Yang, Yuan, and Nian Liu. "Beijing Orders State Offices to Replace Foreign PCs and Software." Financial Times, December 8, 2019. https://www.ft.com/content/b55fc6ee-1787-11ea-8d73-6303645ac406.

40 Fortune. "Why China Is Making Life Miserable for Big U.S. Tech." Accessed March 19, 2022. https://fortune.com/2015/02/26/why-china-is-making-life-miserable-for-big-u-s-tech/.

41" Huawei's US Patent Jump Shows Gains in 5G," January 11, 2022. https://www.pymnts.com/news/international/2022/huaweis-us-patent-jump-shows-chinese-firms-further-gains-in-5g-connected-economy-ip/.

42" Science & Technology | Data." Accessed March 18, 2022. https://data.worldbank.org/topic/science-and-technology?locations=IN-CN-US.

43 Ibid

entirely dependent on imports for semiconductors, spending about $24 billion annually.[44]

India is looking to reduce its technology dependence on China, driven primarily by its security concerns. Of India's imports of manufactured products from China in 2019, high and medium technology products accounted for more than 67% of the total.[45] Almost 53 percent of state-owned BSNL's existing network comprises Chinese telecom equipment.[46]

In May 2021, the Indian government effectively banned Chinese companies like Huawei and ZTE from participating in 5G trials. While this is an important step, India must be careful not to fall entirely into the other camp of western suppliers. Technology dependence has a direct bearing on India's desire for strategic autonomy and to play a more influential role in global affairs. If India continues to rely on foreign technologies, it is putting itself at future risk in making independent foreign policy choices.

Even if we discount the possibility of foreign companies engaging in intelligence gathering for their countries, the holding of vast amounts of Indian data by them is a matter of concern. This data not only provides them an enormous advantage in developing future technologies, but also has the potential for manipulating individual and collective behaviour. This has major national security implications.

There is, therefore, a need to show greater faith in and provide incentives to Indian companies. The companies that have recently received 'trusted sources' approval from the National Cyber Security Coordinator include foreign vendors Samsung, Nokia, Ericsson, Cisco, and Mavenir, and only two Indian vendors, Tejas Networks and HFCL.[47] While it is understood that high

44 Vanamali, Krishna Veera. "Will India Be Able to Attract Global Chipmakers with $10 Bn Incentive?" Business Standard India, December 17, 2021. https://www.business-standard.com/podcast/current-affairs/will-india-be-able-to-attract-global-chipmakers-with-10-bn-incentive-121121700069_1.html.

45 The India Forum. "India's Economic Dependence on China," July 23, 2020. https://www.theindiaforum.in/article/india-s-dependence-china.

46 The Economic Times. "More than 44% of BSNL's Mobile Network Equipment Sourced from ZTE, 9% from Huawei," September 17, 2020. https://economictimes.indiatimes.com/industry/telecom/telecom-news/more-than-44-of-bsnls-mobile-network-equipment-sourced-from-zte-nine-percent-from-huawei/articleshow/78167537.cms?from=mdr.

47" Samsung Gets Trusted Source Approval from India's NCSC - ET Telecom." ETTelecom.com. Accessed March 19, 2022. https://telecom.economictimes.indiatimes.com/news/samsung-gets-trusted-source-approval-from-indias-ncsc/90260604.

technology products require years to develop, greater involvement of Indian companies in critical areas is the only way to get truly trusted products. There will be economic costs, but these will have to be met.

Conclusion

Technology has taken centre stage in the geopolitical competition between the U.S. and China. As the U.S. attempts to restrict the supply of high technology to China, the latter is making a concerted push to wean itself away from foreign technology dependence. In this technology cold war, nations are being forced to choose sides.

India's international relations are guided by its firm desire to retain strategic autonomy. It has therefore launched a drive for self-reliance in technology. In order to achieve this, India will have to significantly increase its investment in R&D and give a much greater push to Indian private sector companies. Replacing Chinese suppliers with other foreign vendors can be an important interim measure, but unless indigenous technologies are developed in critical areas, India could find its future options narrowing.

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Delhi Policy Group
Core 5A, 1st Floor,
India Habitat Centre, Lodhi Road
New Delhi - 110003
India

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