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China's Technology Resilience with 'Strategic' Partners is Getting Fruition

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Western capital and technology are the bedrock of China's economic growth trajectory. High-tech companies from the west set up joint ventures with Chinese firms to cater to both the Chinese as well as international markets. China also imports key components, such as advanced semiconductor chips, from the West and uses them for mass production. Further, Western scientists regularly collaborate with their Chinese counterparts in research and development (R&D). This helped China become the second-largest spender on R&D in the world with 2.79 trillion yuan in 2021.[1] Even though this figure is half of what the US spends on R&D, the gap is narrowing. Similarly, R&D expenditure by China's corporate sector is also the second largest in the world.[2] In strategic technologies, China wants to be the leader, putting the US behind it.

Today, China is a major aerospace power and the first country ever to develop a hypersonic weapon system. China's technological innovation has greatly helped its defence sector in leapfrogging critical aerial systems that China desperately wanted in order to create a strong air force. Within two decades, it has transformed from a country focusing on reverse engineering Soviet-era fighter jets to developing 5th generation stealth aircraft matching the US' most advanced F-35 fighter aircraft.

When the Cold War ended, the US found no peer competitor in the foreseeable future. This instigated it to reduced or wound up its expenditure on the developmental programs of new technologies. On the other hand, China took off from where the US paused and focused on the next-generation technologies of the 21st century. This included artificial intelligence (AI), robotics, semiconductors, biotechnology, and 5G/6G telecommunications. For instance, the US, Britain, and Japan enthusiastically promoted AI during the 1970s and 80s with lots of funding, but by 1993 the

US DARPA (Defense Advanced Research Projects Agency) stopped funding for AI, citing that AI "would not be" the next wave of technologies, and redirected its funds to projects more likely to provide quick results.[3]

The Chinese government's military-civil fusion policy has been one of the key drivers of its advancements in semiconductors, robotics, and its military modernisation program. In its annual report for 2019, the US-China Economic and Security Review Commission, a Congressional advisory body, wrote that the military-civil fusion has "spurred innovation and economic growth through an array of policies and other government-supported mechanisms, including venture capital funds while leveraging the fruits of civilian innovation for China's defence sector."[4] China is a leading power in 5G technology and has made the first breakthrough in 6G, which has large civilian applications but was developed for military purposes.[5] The defence sector is a major beneficiary of China's technological revolution, and leading tech firms closely work with the People's Liberation Army (PLA). However, China is heavily dependent on the West for advanced semiconductor chips, from 2 to 80 per cent, and runs a trade deficit. In 2022, it imported over US $300 billion worth of chips in 2020, the country's largest imported item, while domestic supply for the entire semiconductor industry was just 30 per cent.[6]

Xi's 'China Dream' and tech-self-sufficiency project

In 2015, China launched the 'Made in China 2025' campaign to comprehensively upgrade the Chinese industry and raise the domestic content of core components and materials in strategic sectors to 40 per cent by 2020 and 70 per cent by 2025.[7] This is in pursuance of President Xi's 'China Dream,' which aims to make China technologically self-sufficient by 2035, and has identified ten high-tech industries including "game-changing areas like blockchain, quantum computing, and AI."[8] The goal is to stay China ahead in semiconductors, artificial intelligence, and other advanced sectors that are expected to define the economy and military of the future.

Cutting-edge chips are the main ingredient of semiconductors, but only a few western companies, such as Lam Research, Applied Materials, and KLA Corporation from the US; ASML Holding from the Netherlands; Samsung from South Korea; and Taiwan Semiconductor Manufacturing Company Ltd. (TSMC) are leading chip equipment suppliers. China's leading semiconductor manufacturer, Semiconductor Manufacturing International Corporation (SMIC), uses these companies' chips to make advanced products; these advanced chips are imperative to

the defence industry and technologies of the future. SMIC's latest chip is a 15nm, a decade-old technology that has wider applications in the consumer goods industry, like smartphones and electric cars, while TSMC and Samsung are developing 2nm chips. In hypersonic weapon systems and autonomous vehicles 7 nm chips are being used, and last year China successfully created 7nm chip but reportedly a 'close copy' of TSMC's 7nm chip.[9] To set up a fabrication unit of 7nm chip will take 5-7 years, and machinery will come from Japan, Germany, and the US.[10] The US alleges that whatever advancements China has made in the chip-making industry, popularly known as 'fabs' (fabrication units), have been through espionage and copyright violations since many western technology experts and multinationals are working with the Chinese industry and R&D institutions.

US-China trade war

The Trump administration launched a trade war with China with high tariffs on Chinese goods to constrain China's economic growth, which fuels China's military modernisation program. Besides, President Trump launched a campaign against Chinese tech companies, especially Huawei and ZTE. This included restricting their access to US-controlled critical technologies like semiconductors because they allegedly share critical technologies with the PLA. When Joe Biden took office in 2021, he continued the previous administration's practices and passed a series of legislations such as the 'Chips Act' to halt US companies from supplying advanced chips to China, as well as pressurised US allies to stop sharing critical components to China. The 'Chip Act' bars US companies from setting up leading-edge or advanced technology facilities in China for a period of 10 years and prevents sharing less than 15 manometer chips with China.[11] Furthermore, to further isolate China in the high-tech sector, President Biden launched an initiative on trade and supply chain[12] and closely worked with Japan, South Korea, and Taiwan under a 'techno-alliance' to counter the rapid rise of China as a technology superpower.[13]

China's Response Strategies

Dual Circulation

In May 2020, China announced a 'dual circulation' strategy to make China more self-reliant in technology. The 'dual circulation' comprises external and internal circulations; the former will remain in contact with the rest of the world. The latter will cultivate domestic demand, capital, and

ideas and will overshadow the former later.[14] Under this strategy, China aims to reduce its dependence on foreign tech firms and will gradually become a major exporter of high technology.

'China-Plus One' Strategy

To reduce the impact of US-China' decoupling,' Beijing has adopted a 'China-Plus One' strategy to maintain its hold in the global supply value chain. Under this strategy, Chinese companies retained their production facilities inside China, which will cater to the domestic demands of the international market; these firms then will set up production centres in Southeast Asian countries, including Thailand, Malaysia, and Vietnam.[15] As a result, Southeast Asia has become China's largest trading partner in 2021, and China will be the largest foreign direct investor in Southeast Asia too. Due to these strong China-Southeast Asia interactions, US Indo-Pacific Economic Framework (IPEF) has not been warmly welcomed in the region.[16]

Offshoring R&D

To overcome the impact of US-China decoupling, China now plans to offshore some of its R&D to strategic partners, and Saudi Arabia has become a eligible partner in this drive.[17] During President Xi's visit to the Arab Kingdom this month, both countries signed 35 agreements. A significant aspect of the China-Saudi strategic partnership is Huawei Technologies' memorandum of understanding to build huge complexes in Saudi Arabia, which will be focusing on cloud computing, one of the ten critical areas of China's technology push.[18] In October, Saudi Arabia unveiled a megacity project called Neom and expects US $500 billion in investment from various fields.[19] Setting up R&D centres as well as production facilities in Saudi Arabia would immensely benefit Beijing, as it could attract western technocrats, circumvent US sanctions, and leapfrog in critical technologies.

Implications for India

Collaboration with western companies is critical to China's tech revolution. Its ambitious self-reliance project will take longer than expected as China requires high talent and technology, both of which are highly deficient domestically. Its strategic partnership with Saudi Arabia will help Chinese tech companies partner with western counterparts, which would propel China into a major power in critical technologies.

In this regard, India needs to exploit 'US-China decoupling' and focus on enhancing defence technology cooperation with the western countries, which includes participating in the UK-Japan-Italy 6th generation fighter aircraft program, developing 7nm chips under the IPEF/Techno Alliance framework, and creating a vibrant civil-military ecosystem on critical technologies domestically in collaboration with western counterparts.

(Disclaimer: The views and opinions expressed in this article are those of the author and do not necessarily reflect the position of the Centre for Air Power Studies [CAPS])

Notes:

1. Yu Xiang, "How China plans to rise to its economic challenges on the path to modernisation", *South China Morning Post*, October 28, 2022, https://www.scmp.com/comment/opinion/article/3197317/how-china-plans-rise-its-economic-challenges-path-modernisation, accessed on December 10, 2022.
2. "China's R&D spending intensity builds up in 2021: statistics", *Xinhua*, September 1, 2022, https://english.news.cn/20220901/23f4faf049044f88ae1e25dff4332e50/c.html#:~:text=In%202021%2C%20China%20invested%202.8,in%202021%20released%20on%20Wednesday, accessed on December 10, 2022.
3. Keith D. Foote, " A Brief History of Artificial Intelligence", *Dataverity*, January 17, 2022, https://www.dataversity.net/brief-history-artificial-intelligence/#, accessed on December 1, 2022.
4. US-China Economic and Security Review Commission, "2019 Annual Report to Congress", November 2019, https://www.uscc.gov/sites/default/files/2019-11/2019%20Annual%20Report%20to%20Congress.pdf, accessed on December 12, 2022.
5. Brandon J. Weichert, "China beating the US in military technology", *Sunday Guardian*, February 19, 2022, https://www.sundayguardianlive.com/opinion/china-beating-us-military-technology, accessed on December 13, 2022.
6. Wei Sheng, "China spends more importing semiconductors than oil", *Technode*, April 29, 2021, https://technode.com/2021/04/29/china-spends-more-importing-semiconductors-than-oil/, accessed on June 20, 2022
7. Scott Kennedy, "Made in China 2025", *CSIS Brief*, June 1, 2015, https://www.csis.org/analysis/made-china-2025, accessed on December 14, 2022.
8. Shawn Kim, "China Standards 2035: How China plans to win the future with its own international tech standards", *South China Morning Post*, May 21, 2021, https://www.scmp.com/comment/opinion/article/3134216/china-standards-2035-how-china-plans-win-future-its-own, accessed on December 10, 2022.
9. Adrian Wong, "Did China Make 7nm Chips In Spite Of US Sanctions?!", *Techarp*, July 25, 2022, https://www.techarp.com/computer/china-7nm-chips-us-sanctions/ , accessed on December 15, 2022
10. Reuters, "Taiwan chip industry emerges as battlefront in U.S.-China showdown", *Japan Times*, December 30, 2021, https://www.japantimes.co.jp/news/2021/12/30/asia-pacific/taiwan-chips-us-china/, accessed on December 15, 2022.

11. Kinling Lo, "US Chips Act bars American companies in China from building 'advanced tech' factories for 10 years", *South China Morning Post*, September 7, 2022, https://www.scmp.com/news/china/article/3191596/us-chips-act-bars-american-companies-china-building-advanced-tech?module=inline&pgtype=article, accessed on December 14, 2022

12. 'FACT SHEET: In Asia, President Biden and a Dozen Indo-Pacific Partners Launch the Indo-Pacific Economic Framework for Prosperity", *The White House*, May 23, 2022, https://www.whitehouse.gov/briefing-room/statements-releases/2022/05/23/fact-sheet-in-asia-president-biden-and-a-dozen-indo-pacific-partners-launch-the-indo-pacific-economic-framework-for-prosperity/, accessed on December 15, 2022.

13. CUHK-Shenzhen Tian He, Biden looks to techno-alliances to chip in on Semiconductors", *East Asia Forum*, July 28, 2021, https://www.eastasiaforum.org/2021/07/28/biden-looks-to-techno-alliances-to-chip-in-on-semiconductors/, accessed on December 16, 2022.

14. Yu Yongding, "Decoding China's "Dual Circulation" Strategy", *Project Syndicate*, September 29, 2020, https://www.project-syndicate.org/commentary/china-dual-circulation-economic-model-by-yu-yongding-2020-09?barrier=accesspaylog, accessed on December 14, 2022.

15. Sara Hsu, "Which Asian Nations Can Benefit From the 'China Plus One' Strategy?", *The Diplomat*, June 11, 2021, https://thediplomat.com/2021/06/which-asian-nations-can-benefit-from-the-china-plus-one-strategy/, accessed on December 13, 2022.

16. Gabriel Dominguez, "Southeast Asia the battleground for geo-economic competition between China and the U.S.", *Japan Times*, January 1, 2022, https://www.japantimes.co.jp/opinion/2022/01/01/commentary/world-commentary/us-china-asean/, accessed on December 11, 2022.

17. N Janardhan, "Technology propels China's Gulf strategy forward", *East Asia Forum*, November 30, 2022, https://www.eastasiaforum.org/2022/11/30/technology-propels-chinas-gulf-strategy-forward/?utm_source=subscribe2&utm_medium=email&utm_campaign=postnotify&utm_id=1391124&utm_title=Technology%20propels%20China, accessed on December 10, 2022.

18. Aziz El Yaakoubi, and Eduardo Baptista, "Saudi Arabia signs Huawei deal, deepening China ties on Xi visit", *Reuters*, December 9, 2022, https://www.reuters.com/world/saudi-lays-lavish-welcome-chinas-xi-heralds-new-era-relations-2022-12-08/, accessed on December 13, 2022.

19. Rowan Moore, "Saudi's 100-mile mega-city is meant to blow our minds – so we forget the crimes of its rulers", *The Guardian*, October 23, 2022, https://www.theguardian.com/commentisfree/2022/oct/23/saudi-mega-city-meant-to-blow-our-forget-crimes-of-its-rulers, accessed on December 1, 2022.