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PM Modi's Trailblazing USA Semiconductor Investments

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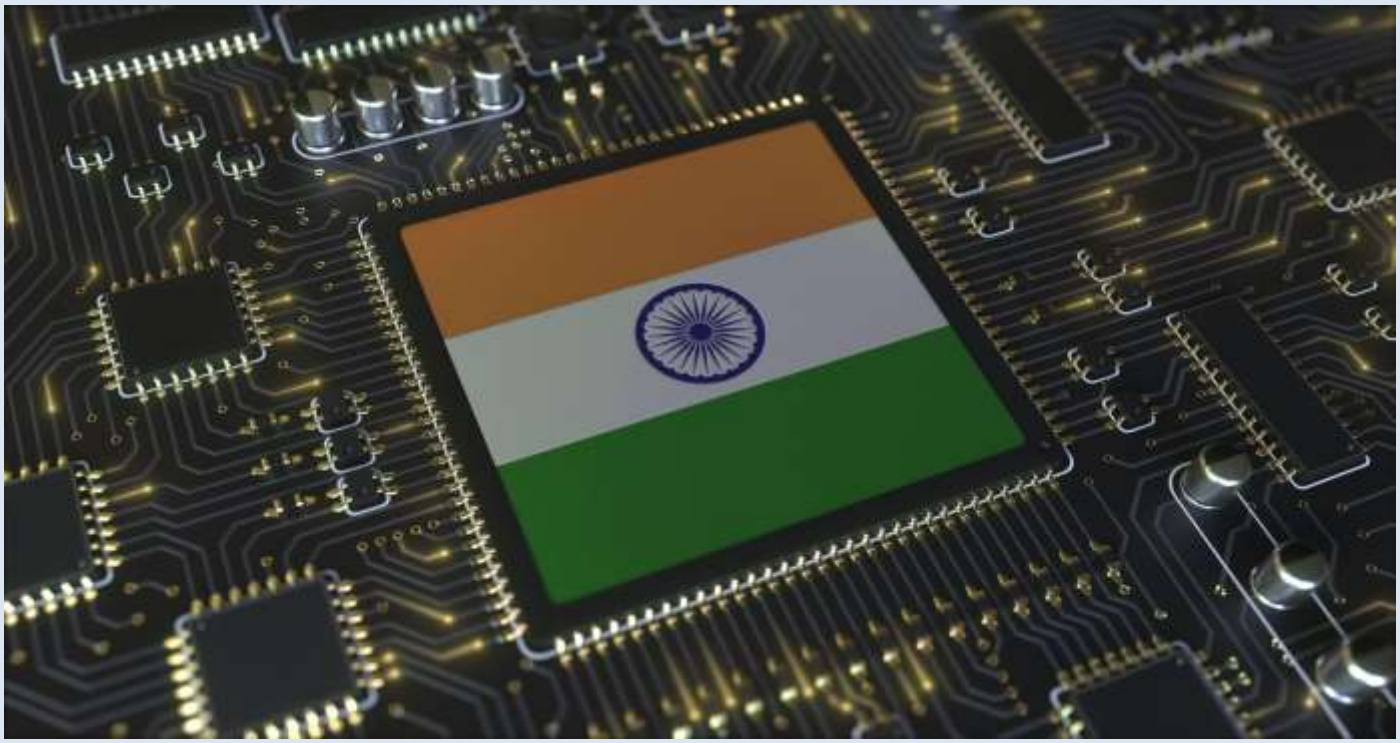

Source: South China Morning Post

The recent state visit of Prime Minister Narendra Modi to Washington DC is novel for multiple reasons. This visit serves to fortify the previous declaration made in January 2023 by the Initiative on Critical and Emerging Technology (iCET) regarding semiconductors as a designated domain of collaboration. The recent exchanges of high technology in India-USA relations are an important means to fulfil the economic and geopolitical ambitions of both countries. The iCET has mechanisms to facilitate an open, accessible, and secure technology ecosystem. The critical technologies that are part of the iCET initiative are artificial intelligence (AI), quantum technologies, advanced wireless, high-performance computing, space technologies, biotech, and next-generation telecommunications. It should also be noted that iCET is backed by policy support from the topmost political leadership, academia, and industry stakeholders in both the USA and India.[1]

Semiconductors can be accredited as an indispensable ingredient in the transformation of the critical technologies mentioned above. The convoluted nature of the global semiconductor supply chain and the joint agenda to counter China both economically and geopolitically are the foundations of recent advancements in the India-US partnership. PM Modi and President Biden signed an MoU on the semiconductor supply chain and innovation partnership as a reaffirming development in the global semiconductor supply chain. The chain of semiconductor-related investments is anticipated to generate employment and numerous specialised roles for high-end engineers.

India's History of Semiconductor Development

India's efforts to develop a semiconductor ecosystem began as early as the 1960s, when Bharat Electronics Ltd., in partnership with the Ministry of Defense, developed silicon and germanium technology for acquiring semiconductor manufacturing capacity. Subsequently, in 1984, the Indian government established Semiconductor Complex Ltd. (SCL), a PSU that was the result of a trilateral licensing agreement between Hitachi, AMI, and Rockwell. Accessory developments, such as the invitation of bids to set up the National Silicon Facility, also took place. However, the conditions of the deal were not satisfactory for Mettur Chemical Plant, and the deal was dumped. The advent of globalisation further relegated the chances of developing domestic semiconductor facilities due to the influx of cheap semiconductor imports. In 2007, AMD and Intel expressed interest in setting up fabrication facilities after the declaration of India's first semiconductor policy.[2] However, any tangible industrial agreement or technological investment did not fructify. A pattern of failed agreements and thrashing deals can be observed. Failures within the Indian semiconductor industry can be ascribed to various factors, including the delayed implementation of the National Semiconductor Policy

(2007), bureaucratic inefficiency, and inadequate accessibility to essential resources like water and ports.

Ushering a New Era

The state visit of PM Modi to the USA ushers in new opportunities for the Indian semiconductor industry with the successful finalisation of three industrial deals: Micron Technology, an American multinational corporation, is willing to invest US $800 million to establish an assembly and test facility in India, Applied Materials resolves to construct a semiconductor centre for commercialisation and innovation in India, and Lam Research, a key player in the semiconductor equipment industry, is offering to train 6,000 Indian engineers through a programme called Semiverse Solution. The attractive proposition of the Semiverse Solution programme is that it aims to resolve the larger challenge of building domestic manufacturing capability.[3] Education and high-tech skill development of the Indian workforce are the anticipated takeaways from the agreement signed with Lam Research.

The Micron deal in joint cooperation with the Indian Semiconductor Mission must be observed in parallel with China's Cybersecurity Administration imposing a partial ban on Micron recently.[4] This assertive move undertaken by the Chinese establishment is in response to multiple moves made by the USA and its allies to deny China access to critical emerging technology used in chip manufacturing. It is to be noted that Micron's sales revenue is 20 per cent dependent on Chinese market demand for memory chips. The visibility of the US-China 'chip war' presents a unique window of opportunity for India, both economically and diplomatically. The Micron deal signed with the India Semiconductor Mission is focused on the establishment of a packaging facility for semiconductor chips in India. This facility can be further extended to cover the 20 per cent revenue loss Micron is likely to bear in terms of its sales of memory chips. India can introduce appropriate policy nudges in its already existing initiatives to generate demand for memory chips in ancillary industries such as electronic component manufacturing units.

A recurring observation in the analysis of the global semiconductor supply chain is that major players involved in this sector recognise the futility of seeking self-sufficiency in semiconductor production yet have significantly invested in developing their domestic mechanisms facilitating semiconductor production. It is to be noted that in order to enhance the resilience of the global semiconductor supply chain, the US, Taiwan, South Korea, and Japan have forged the 'Chip 4' Alliance. The alliance comprises prominent stakeholders representing various stages of the semiconductor supply chain.[5] The US stands as a frontrunner in multiple sectors, notably

semiconductor design, commanding over 40 per cent of the global integrated circuit (IC) design market. Furthermore, the US excels in the production and licensing of reusable design chips, which are sought after by companies that do not necessitate customised chips. Another member of this alliance, Taiwan, is renowned for its unparalleled fabrication capacity of semiconductor chips. South Korea also contributes significantly to the alliance as a host for Samsung, a company recognised for its proficiency in both the design and manufacturing aspects of semiconductors. Japan also plays a crucial role in the Semiconductor Manufacturing Equipment (SME) segment of the supply chain, further enhancing the collective capabilities of the alliance.[6] However, a substantial component of ensuring the resilience of the semiconductor supply chain, relevant for all stages of chip-making, is the presence of sufficient demand. Prior to the recent US semiconductor export controls imposed on China in October 2022, China offered a massive market for technologies used in fabrication facilities and for reusable design chips supplied by US firms. Prominent countries in the world and China's neighbours, including India, aspire to manage the consequences of China's rise. A pertinent strategy to manage China's rise is to mitigate its dominance within semiconductor value chains. It is to be noted that while the COVID pandemic induced numerous disruptions, it has accentuated the demand for consumer electronics in India. India can leverage this steep increase in demand by offering a massive market to the members of the Chip 4 alliance and filling the gap.

In conclusion, the intricate process of technology transfers will play a pivotal role in elevating India's status as a hub for indigenous semiconductor chip-making, ultimately reducing the nation's dependence on chip imports and bolstering the self-reliance of its electronic industry. Moreover, the India-USA Global Technological Partnership's significance extends beyond the bilateral exchanges; also holds the potential to fortify semiconductor supply chains' resilience on a global scale. The strategic leveraging of the aforementioned opportunities through prudent capitalisation can enable India to establish its presence as a potential participant in the global semiconductor supply chain.

NOTES:

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[2] Trisha Ray "Lessons from India's past for its semiconductor future" *ORF*, June 22, 2023, https://www.orfonline.org/expert-speak/lessons-from-indias-past-for-its-semiconductor-future/, accessed on July 3, 2023.

[3] "FACT SHEET: Republic of India Official State Visit to the United States", *The White House*, June 22, 2023, https://www.whitehouse.gov/briefing-room/statements-releases/2023/06/22/fact-sheet-republic-of-india-official-state-visit-to-the-united-states/, accessed on July 3, 2023.

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