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FROM THE HAGUE TO DHOLERA: HOW THE INDIA-NETHERLANDS STRATEGIC PARTNERSHIP IS RESHAPING INDIA'S SEMICONDUCTOR AND DEFENCE-INDUSTRIAL LANDSCAPE

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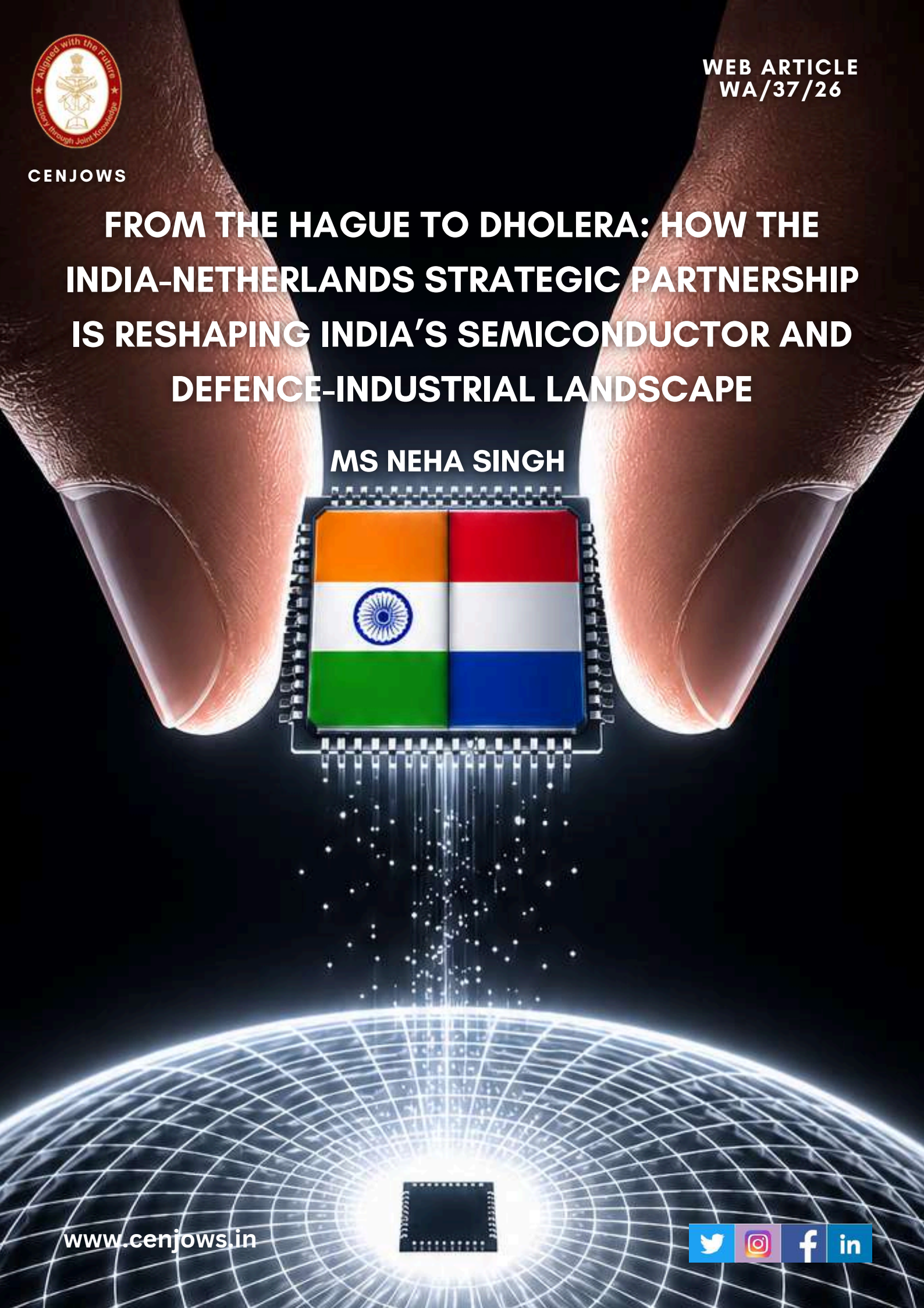

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From the Hague to Dholera: How the India-Netherlands Strategic Partnership is Reshaping India's Semiconductor and Defence-Industrial Landscape

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Introduction

If an adversary can stop India's weapons production without firing a single shot by simply cutting off the supply of chips that fuel every radar, every missile and every unmanned system in its armoury, would India have an answer? Until now, the honest answer was no.

On May 16, in The Hague, the CEOs of Tata Electronics and ASML (Advanced Semiconductor Materials Lithography) signed a Memorandum of Understanding in the presence of Prime Minister Modi and Dutch Prime Minister Rob Jetten[1]. The event was understated in ceremony but consequential in implications. India had successfully granted itself access to the only machines in the world without which modern semiconductors and modern warfare cannot be waged.

The ability to conduct 21st-century warfare increasingly depends on access to semiconductors. Every precision-guided missile, radar array, electronic warfare suite and Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR) node relies on chips. The Russia-Ukraine conflict made it even clearer: In the months after Western sanctions, Russian arms production came to a halt, with the country cannibalising its microcontrollers from household appliances to keep its cruise missiles operational. This is not a distant lesson for India, which

remains dependent on foreign Original Equipment Manufacturers (OEMs) for critical defence propulsion and high-end subsystems. It is a real vulnerability.

The Tata PSMC (Taiwan's Powerchip Semiconductor Manufacturing Corporation) Dholera fab, which is 50% complete, the newly launched Micron Sanand plant; and the Tata ASML MoU signify the end of India's proof-of-concept phase.[2] Through 17 agreements, ranging from semiconductors to critical minerals and defence co-production, the elevation of India-Netherlands ties to a Strategic Partnership (2026–2030) has placed New Delhi rigidly in the Western technology security architecture. India Semiconductor Mission (ISM) 2.0's ₹8,000 crore budget, the highest single-year semiconductor spends since the program launch, and the India-EU FTA that has been signed have further sealed this path.[3]

However, the main risk is not external. India's reliance on China for Gallium, Germanium, and Antimony, which support over 90% of advanced chip manufacturing, is yet to be addressed. A 'Made in India 'chip based on key minerals is merely symbolic of India's sovereignty.

This paper reflects the Indian trajectory in the semiconductor space in the context of India's national security, evaluates the India-Netherlands strategic partnership and provides policy recommendations for building long-term defence-industrial sovereignty in India.

The Geopolitical Semiconductor War and India's Strategic Opportunity

The global semiconductor architecture is fracturing along geopolitical lines. Strict US export restrictions, combined with the Netherlands regaining control of ASML's Deep Ultraviolet (DUV) immersion lithography tools in September 2024, have largely cut off China's access to advanced chip production.[4] The exclusion of China has created a huge revenue gap for ASML, which has an absolute monopoly on Extreme Ultraviolet (EUV) lithography and is a dominant vendor for DUV tools that India requires. India, as a politically insulated and high-volume alternative market, is uniquely positioned to fill this gap.

The consequences of this are extremely profound. The foundation of precision-guided munitions, Active Electronically Scanned Array (AESA) radars, electronic warfare

systems, unmanned platforms and all the C4ISR supporting infrastructure is the chip. The Russia-Ukraine conflict has shown the chip denial consequences, and the message is clear. For India, this vulnerability is dual. Externally, China is the world leader in the production of critical minerals needed to make chips. And it already has a track record of weaponising its dominance, as it has shown by banning its exports in 2024.[5] Internally, India's defence chip procurement process is opaque and relies on third-country intermediaries, which could lead to backdoor insertion in its weapon systems.

The MoU, signed between Tata and ASML on May 16, 2026, directly addresses this issue. ASML shifts from equipment vendor to infrastructure support partner, committing to workforce training, supply chain development and research collaboration in addition to tool supply in the Dholera fabrication. The Netherlands' 'Trusted Partner' classification guarantees that the chips that would be used to run India's defence and telecommunication networks are free from state-sponsored backdoors. With the India-EU FTA, this paves a viable route for India to be a certified supplier to defence electronics prime suppliers of NATO countries in the West rather than merely being a buyer.[6]

India's Funding Framework: Sovereign Capital as a Strategic Instrument

India's semiconductor funding architecture is based on a purposeful logic: the state assumes enough risks to make private investment viable before stepping back. Launched in December 2021, ISM 1.0 has been set up to offer fiscal support on a pari passu basis (equal footing) up to 50% for fabs and ATMP facilities.[7] The Government of India has given up half its share of the capital exposure, estimated at ₹45,000 crore, thereby becoming a co-owner of India's most important defence-sensitive manufacturing unit. This has translated into 12 approved projects in six states, with an investment of ₹1.64 lakh crore, reflecting growing private-sector investor confidence in the policy framework.[8]

Union Budget 2026-27 is a turning point for ISM 2.0 with an allocation of ₹8,000 crore, the highest ever for semiconductors in a single year since the launch of the programme.[9] The focus is on increasing ecosystem depth through domestic

equipment manufacture, speciality chemicals, full-stack Indian intellectual property (IP) and a roadmap to 2nm and 3nm nodes by 2032-2035.[10]

The ₹40,000 crore expansion of the Electronics Components Manufacturing Scheme (ECMS),[11] which is meant to promote printed circuit boards, substrates, chemical parks, etc, has a defence industrial value that needs to be explicitly pointed out. India's dependence on raw materials sourced by China creates a chokepoint for its defence production. The ECMS expenditure is a strategic policy insurance against that scenario.

India's Semiconductor Manufacturing Ecosystem: From Blueprint to Production

The first half of 2026 has marked a shift in India's semiconductor trajectory from policy aspiration to industrial execution. There have been three major delivered milestones:

- Micron's Sanand facility opened on 28th February 2026;[12]
- Dholera 50% construction completed in April 2026;[13]
- MoU signed by Tata and ASML on 16th May 2026.[14]

The Dholera fab remains the centrepiece of this effort. It will have an area of 66.2 hectares,[15] accommodate 300mm wafers[16], have a capacity of 50,000 starts per month and is aimed at the 28nm to 110nm mature nodes, which are the workhorses for automotive, defence electronics, telecom and industrial applications.[17] Commercial chip manufacturing in India's first semiconductor factories is set to begin in December 2026.[18] Union IT Minister Ashwini Vaishnaw revealed that four large semiconductor plants will be operating by the end of the year, furthering India's ambitions to become a vital technology hub. The node selection is deliberate to cover the bulk of chips used in the existing defence systems in India, including power management integrated circuits (ICs) for missile electronics, display drivers for cockpit avionics, microcontrollers for avionics in UAVs and Application Specific Integrated Circuits (ASICs) for radar signal processors. The domestic production removes the middleman dependency of third countries, which creates supply chain opacity and backdoor insertion risk, which is the key issue in India's defence procurement. Once fully operational, the plant will support around 800 vendor companies and Original

Equipment Manufacturer (OEM) suppliers and will have the potential to become a true semiconductor cluster of strategic depth.

In 900 days, Micron's Sanand facility in Gujarat, comprising 500,000 square feet of cleanroom space and one of the world's largest single-floor assembly lines, moved from MoU to commercial production, confirming India's claims of regulatory streamlining. Its first shipment of ‘Made-in-India ’memory modules went to Dell Technologies. Kaynes Semicon reached commercial production in March 2026, 14 months after breaking ground. CG Power, a leading Indian multinational engineering conglomerate, has its G1 Outsourced Semiconductor Assembly and Test (OSAT) line in operation, and its G2 can reach 14.5 million units per day.[19]

India is compressing it into a single decade what took Taiwan and South Korea generations to build by establishing the Dholera logic fab and numerous OSAT hubs and, for the first time, creating a realistic pathway to domestically supplying chips for its own weapon systems.

The Trade Architecture: Leveraging Diplomatic Momentum for Industrial Advantage

The India-EU Free Trade Agreement, signed in January 2026, has transformed what was once a potential catalyst into a proven structural accelerator. Its impact on the semiconductor industry is twofold: first, lowering the cost of fabs and second, increasing the market for the fabs' output. In the past, equipment accounting for 60-70% of fab Capital Expenditure (CapEx) was subject to a maximum of 44% and 22% Indian tariffs for electrical equipment and chemicals, respectively.[20] The FTA will have the tariffs for EUR 16.3 billion worth of European goods from the field of machinery being phased out to zero, directly impacting the economics of ASML lithography scanner procurement.[21] The business case for Indian-packaged chips to become an alternative for Chinese legacy chips is stronger when it comes to export markets, as they can enter the EU electronics market, valued at $750 billion, with zero duty.

In this context, the Netherlands has a special strategic position. Home to ASML, it is the technology gateway for advanced lithography in India. It is India's most effective logistics gateway into the European single market, via the Port of Rotterdam. The Netherlands is already India's fourth-largest foreign investor, and the Strategic

Partnership (2026-2030) further expands this collaboration across five sectors – semiconductors, critical minerals, green hydrogen, defence co-production and quantum technologies.[22] Through the critical minerals cooperation agreement, it is a supply chain security pact and not a trade agreement, which opens a way to diversify away from dependence on Chinese gallium, germanium and antimony.

A sovereign R&D dimension is provided by the EUR 5 million GANANA initiative, a landmark India-EU joint research programme, which uses a High Performance Computing (HPC) corridor, which connects the European pre-exascale systems with the Centre for Development of Advanced Computing (C-DAC).[23] Through this interface, DRDO engineers can simulate chip designs specific to the defence industry, such as ruggedised processors, radiation-resistant chips, custom ASICs for electronic warfare and so on, without relying on foreign chip design houses. With the advancement of the nodes, it will be as critical as the physical fab for India.

Execution Risks: Where the Strategy Could Stumble

The financial and diplomatic framework has been established. It is an open question whether India can tame the factors that have historically plagued industrial dreams on the ground.

The Dholera Special Investment Region (SIR) is built on coastal land where the subsoil consists of widespread saline silty clay and has a Safe Bearing Capacity (SBC) of only 4–5 T/m², which is far too low for ASML's vibration-sensitive lithography scanners. Tata had to redesign all the foundations and hired Fugro[24] (a geo data specialist company) in conjunction with Indian specialists for a retrofit of jet grouting and stone columns. Construction has restarted and has been finished to 50%, but this is a reminder that, despite a diplomatic agreement, greenfield fabs in untested environments have risks that can only be addressed by the quality of construction.

Power and water infrastructure present equally critical constraints. A millisecond deviation can ruin the entire batch of wafers. The semi-arid nature of Dholera is dependent on a water facility of 50 MLD from the Narmada, a desalination plant, which is yet to be constructed.[25] Delays here pose a direct danger to the December 2026 production schedule. There is also an infrastructure gap in housing, healthcare and urban amenities, which adds a significant silent labour retention risk.

The most persistent is the talent deficit. Even though the country has world-class chip designers, it does not have any cleanroom fabrication experience. The Indo-Dutch talent collaboration over the next five years for 85,000 professionals is the correct move, although at a high cost, but in the near-term, Tata and Micron will still need to rely on high-priced professional engineers from Taiwan and Japan as the early yield economics become more precarious.

The most unresolved risk, however, is critical mineral dependency. A Dholera chip made from Chinese gallium and germanium does not represent semiconductor sovereignty; it shows a shift in dependency upstream. This continues to be the biggest unresolved strategic risk in India's semiconductor framework.

Learning from the World: Why India's Model is Different

India's ISM architecture deliberately avoids the evolutionary path taken by other semiconductor countries over the years. Instead, it combines the best features from each without adopting their worst aspects. The Taiwan Semiconductor Manufacturing Company (TSMC) has grown through government-funded research and development. It has gradually moved from mature to advanced nodes. India cannot follow that same growth path in any relevant timeframe. Instead, it is buying access to the market by licensing an existing 28nm blueprint from PSMC in exchange for upfront funding. This approach makes sense as India needs to produce its own reliable chips for its defence platforms.[26]

The Chinese conundrum is more severe. With no alternative but comprehensive sanctions, Beijing is investing hundreds of billions of dollars in a more isolated approach to indigenous lithography, seeking to catch up with what ASML accomplished in over four decades. By partnering directly with ASML, India has bypassed the technology isolation that continues to constrain China's semiconductor ambitions.

Malaysia had 13% of the global back-end packaging market but had not progressed to fabrication and was stuck in the low-margin OSAT market for decades.[27] India has studied this failure and is creating jobs and revenues from OSAT business in Micron Sanand, Tata Assam and CG Power and also investing in the Dholera logic fab, working on the entire value chain concurrently.

Since the 1980s, Israel has been giving the capital needed to secure Intel fabs, which have built not only a commercial industry but also technological infrastructure to support the country's self-sufficiency in defence electronics, from the avionics of Israeli UAVs to the intercept processors of Iron Dome.[28] This is precisely the rationale that is consciously replicated in India's 50% CAPEX subsidy model. Dholera is not just an industrial park but the seed for India to be a self-reliant country in the field of defence electronics.

What distinguishes India’s moment from all predecessors is that the semiconductor supply chain has been openly weaponised. India is not just taking notes from the already existing playbooks but, for the first time, there is an opportunity for India to help write the next playbook.

Recommendations

Six recommendations follow this evaluation for decision-makers in the national security establishment of India:

First, a classified audit of dependence upon the chip should be carried out by the Ministry of Defence without any further delay, instead of procuring chips each time the chip is being used in different weapon systems, and the bill of materials requirement of each weapon system as per the use of semiconductors should be worked out. The next step should be to identify the domestic availability and then work out a procurement roadmap accordingly.

Second, the critical minerals risk must be treated as a matter of national security urgency. The establishment of the National Critical Minerals Stockpile with required reserve requirements for gallium, germanium and antimony must be done as soon as possible. The India-Netherlands Strategic Partnership on Critical Minerals needs to be implemented immediately.

Third, the Indo-Dutch Semiconductor Partnership for Talent has to change its current format of MoU to a properly funded programme with clear annual targets. Specialised clean room facilities are required in Indian universities for the target of 85000 professional trainees. Special expertise in Organic defence-related fabrication is

required and for that, DRDO along with the three services, should provide engineers to Dholera during the yield ramp phase.

Fourth, the Indian government should ensure that the fab strategic reserve capacity of fabs at Dholera be included in the Defence Production Policy (DPP), where one-third of the fab capacity will be dedicated to fulfilling defence chip requirements, while the other two-thirds of the capacity will be used for commercial fabrication, in line with the Taiwan Strategic Reserve (TSR) of TSMC.

Fifth, there is a requirement to expand the reach of the GANANA initiative to cover the DRDO design centres where ruggedised processors, rad-hard ICs and custom ASICs for electronic warfare can be tested.

Sixth, India must resist the temptation of declaring premature victory. The strategic fraternity needs to keep the industry under the same pressure of execution that any other organisation in the national security field is subjected to.

Conclusion

India stands at an unprecedented turning point in history today. The Silicon Silk Road from The Hague to Dholera is not an aspiration anymore but a reality. It has been 50% complete, backed by the most impactful technology collaboration India has ever built in this generation.

The Tata-ASML collaboration and the India-Netherlands Strategic Partnership, coupled with ISM 2.0, have given India a realistic roadmap to become a self-reliant chip producer within a decade.

Whether this opportunity converts into sustainable defence industrial autonomy hinges on India’s next move.

Declaration

I declare that this manuscript is being submitted exclusively to CENJOWS for publication consideration, is original, and has not been published or submitted elsewhere. I further certify that it contains no classified, restricted, or sensitive information and is based entirely on open-source material suitable for publication in the public domain.

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