India Capital
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From Design Hub to Chip Contender: India's Semiconductor Moment

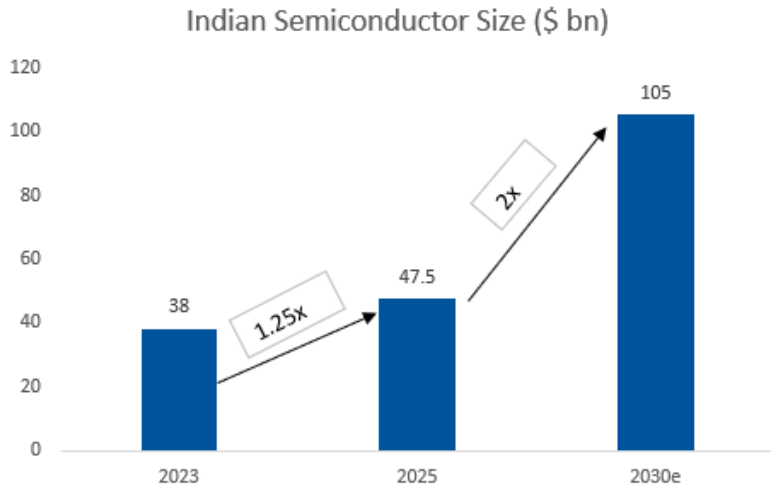
If data is the new oil, semiconductors are the refineries of the digital age, powering everything from smartphones to automobiles. As the world emerged from Covid-19 lockdowns, most countries were victims of semiconductor shortages. India was no exception. Consumer electronics became 15-30% more expensive, and the 5G rollout was delayed by a couple of years. It was a sharp wake-up call for Indian policymakers to pursue Aatmanirbhar Bharat (Self-reliant India) in one of the world's most strategic and critical sectors: semiconductors.

However, India's previous attempts had failed. Despite being an early entrant, as evident with the establishment of Semiconductor Complex Limited (SCL) by Government of India in 1984 even before TSMC was founded, Foreign Direct Investment restrictions in 1970-80s and a fire at SCL facilities in 1989 led to neglect of this sector.

This Time It's Different

Building on the success of India's Production Linked Incentives (PLI) schemes by the Government, particularly in electronics manufacturing, India's re-entry into the semiconductor space formally began with the setting up of India Semiconductor Mission (ISM) in December 2021. ISM aims to position India as the global hub for Electronic System Design and Manufacturing.

This rationale is clear. India's growing needs in the physical and digital world are to be powered by chips. India's semiconductor market is projected to double from ~$47.5 billion (range of $45-50bn) in 2025 to ~$105 billion (range: $100-110bn) in 2030.



Source: Press Information Bureau, Government of India

As a part of India Semiconductor Mission (ISM) 1.0, incentives worth $10 billion were announced. Over ninety percent of the incentives were approved within the first three years.

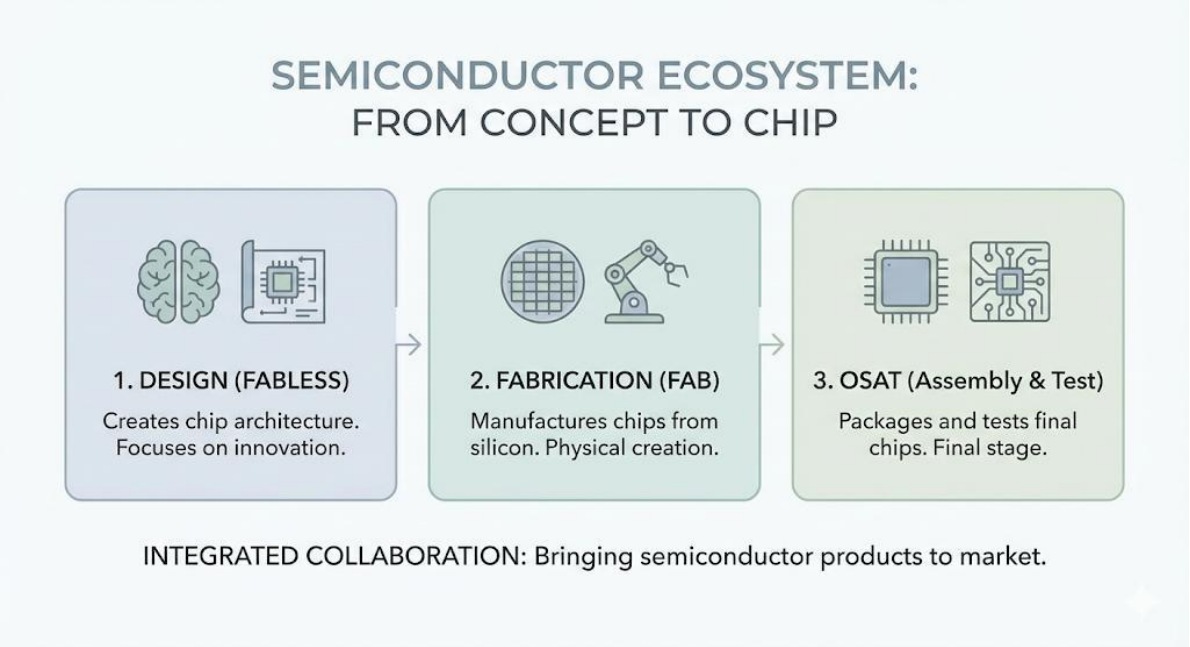
Semiconductor Value Chain

The Semiconductor value chain is highly complex, and no single company does everything. Instead, it relies on collaboration among specialized players. There are three core parts of the value chain - the three legs of the semiconductor stool. They are:

A) Design – High complexity, high value

B) Fabrication- Very high complexity, high value

C) Outsourced Semiconductor Assembly & Testing (OSAT)- moderate complexity, moderate value



India Inc laps up the golden opportunity

The first round of approvals has attracted major Indian conglomerates such as Tata (Tata Electronics) and Murugappa Group (CG Power) as well as global leaders like Micron Technology of the US. Micron, CG Power (in partnership with Renesas, Japan & Stars, Thailand) and Kaynes Tech (in partnership with US Tech, AOI & Mitsui, Japan and Globetronics, Malaysia) have secured approval for OSAT. Tata Electronics (in partnership with Powerchip Semiconductor Manufacturing Corporations, Taiwan) has received approval for both fabrication and OSAT.

These partnerships are essential. India Inc. lacks prior large-scale fabrication and OSAT knowhow so leveraging global partners' operational expertise and customer networks de-risks execution. Semiconductor design involves high risks given innovation and is intellectual property (IP) heavy but asset light whereas, Chip fabrication is capex heavy, and OSAT sits in the middle with moderate capex and lowest risk but also has lowest value addition.

Denomination: 100 Million Pounds = Rs 1200 Crore

Notably, design has the highest profit pool potential globally, with leading companies enjoying EBITDA margins ranging from 20-40%. This is evident from Nvidia, now the world's largest company by market capitalization, which is a good example of semiconductor design company. **Approximately 20% of the world's chip design engineers are based in India**. Global giants such as Qualcomm, Nvidia, Broadcom, AMD, Intel, Texas Instruments, MediaTek, and NXP operate substantial R&D and design centers in India. To build on this advantage, and create home grown

IP, Indian conglomerates such as Larsen & Toubro and CG Power, as well as a growing number of startups, are focusing aggressively on semiconductor design. The Indian government is further supporting this nascent ecosystem with Design Linked Incentive Scheme that provides financial incentives along with design infrastructure support to startups. Twenty-four startups are already designing chips.

Given the complexities and heavy investments required for fabrication and OSAT, both the central government and state governments are giving capital subsidies of up to 70-75%. As a result, India Inc has shown great interest, and many projects have been approved. These efforts are beginning to bear fruit. Four plants - CG Power, Tata Electronics, Micron and Kaynes Technology are set to start commercial production in 2026. Tata Electronics has onboarded Intel and ROHM Semiconductor, Japan as OSAT customers, CG Power is in preliminary discussions with Apple for iPhone chips for OSAT.

Marathon not Sprint

It is remarkable how rapidly the momentum has accelerated, but it is a long climb to the top. Of the ten approved projects, only two are fabrication plants. The Semiconductor supply chain is a complex system which depends on a sophisticated system of chemicals, gases and infrastructure. Still OSAT is a good entry point for Indian semiconductor ecosystem. It will help India leverage its young labor force build critical skills and expertise while serving the needs of global customers.

It is still early days, and the ecosystem is still developing. From an investor's perspective, Indian markets provide limited opportunities. Today, there are only two listed companies, CG Power and Kaynes Technology, and even they are not pure play semiconductor companies. Another company, Polymatech is slated for IPO this year. India Semiconductor Mission 2.0 is expected to be announced soon.

Ashwini Vaishnaw, Union Minister for Electronics & IT has outlined a clear roadmap. Initially India will focus on mature nodes, 28 nanometre (nm) to 90 nanometre (nm) range, which covers major applications from mobile phones to EVs. This expertise will be applied to go from 28nm to 7nm. By 2030 India should be at 7nm and then by 2032 it should be at 3nm. The vision is clearly laid out.

While the India Semiconductor Mission's ~$15 billion commitment is a transformative leap for a single nation, it remains an entry-point in the global context, where the U.S. CHIPS Act ($53B) and China's Big Fund III ($47B) are deploying significantly larger pools of capital to defend their respective lead.

As the industry evolves, we shall keep tracking and learning its nuances to identify the eventual winners in this potentially huge value creation opportunity. From an investor's lens, the next two to three years of execution at these initial plants will determine whether India can establish itself as a credible semiconductor nation.