India’s push for semiconductors

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Why is in news? The Union Government has disbursed around ?1,645 crore in performance-linked incentives (PLI) for electronics manufacturers so far, as part of its efforts to bring in more of the electronics supply chain to India

Government encouraging semiconductor manufacturing

Semiconductor fabrication units, or fabs, turn raw elements such as silicon into integrated circuits that are fit to be a part of practically all electronic hardware in the world.

Fabs are highly capital-intensive undertakings, costing billions of dollars for large facilities.

Semiconductor fabs of today may still be building circuits, but they require highly reliable and high-quality supply of water, electricity, and insulation from the elements, reflecting the high degree of precision, cost and capital needed to make the sophisticated circuits.

Countries have spotted strategic value in cornering segments of the value chain for fabs, even as the sophistication and capital needed to run them have climbed to historic highs.

China pulled ahead of Taiwan last year, in terms of share of global sales from fabs, according to a report by the Semiconductor Industry Association (SIA).

It’s not just India that is wary of this dominance. The U.S. passed the CHIPS Act last August, providing upwards of $280 billion in subsidies and investments to manufacturers opening fabs and making semiconductors in the U.S. This has been combined with restrictions and sanctions on the Chinese semiconductor industry.

The government’s Invest India agency estimates that electronics manufacturing as a whole will be worth $300 billion by the financial year 2025–26.

While facilities for assembling finished products have been growing in number steadily, fabs for making chipsets and displays, which are crucial parts of the manufacturing process for many electronics, are rarer.

Minister of Electronics and Information Technology Ashwini Vaishnaw said that the first semiconductor manufacturing fab would be announced in the coming weeks.

Can semiconductors and finished products both be made in India?

The SIA, which represents the bulk of semiconductor manufacturers in the U.S. and elsewhere, said in a report with APCO Worldwide in February that India should lean on its strength in the electronics manufacturing value chain.

So-called “foundry companies”, which turn silicon into semiconductors, require investments upwards of 35% of revenues, the SIA warned, and entry costs run into billions of dollars. But companies that specialise in Outsourced Semiconductor Assembly and Test (OSAT) are less expensive to set up, and generate better margins

The OSAT set-ups take care of the less capital-intensive parts of chipmaking, such as assembling the precise components that have already been manufactured, and running specialised tests to approve them.

A problem with many chip facilities in the traditional sense is that they tend to be captive units of large companies.

While Foxconn's assembly facilities are being touted as creating several jobs and inviting investment into India, some of its most valuable facilities globally are dedicated to building Apple devices, which account for a fraction of handsets sold in India.

Other advantages that India have:

A large part of semiconductor manufacturing involves design and intellectual labour.

India has an advantage here, as a large portion of semiconductor design engineers globally are either Indian or Indian-origin; chipmaking firms such as Intel and NVIDIA have large facilities in India that are already flush with Indian talent working on design problems.

This is an advantage that China is losing control over in the face of sanctions and an ageing population.

Without a sustainable pipeline of high calibre talent, China's goals for the semiconductor sector, especially in terms of further indigenising the industry, will be not achievable

Limitations of India's semiconductor ambition

The opening of display and semiconductor fabs is one of the strategic and economic goals of India's electronics manufacturing incentive programmes, and breaking new ground on ambitious plans connected to popular brands such as Apple is something that the Union government and States are equally eager to accomplish.

Overall, the government appears to be developing the parts of the ecosystem that have promise for sustainable growth and fiscal feasibility.

Minister of State for Electronics and Information Technology Rajeev Chandrasekhar said at the Raisina Dialogue earlier this month that the electronics value chain would have to be an international undertaking among nations with common values to be effective.