India as the ‘global-go-to’ for semiconductor-fabrication

If there is any country that is brimming with potential, it is India. Whether this be in technology research, design, development, manufacturing, services or delivery.

Quiet silently, in the background, India has been building advanced technology solutions for the biggest players in the global market, since decades. Unfortunately, India simply hasn’t marketed these strengths in the right manner, adequately.

Even in the semiconductor fabrication market, India was an early entrant. As early as the 1960s, BEL set up one the first semiconductor fabs in India. Although the initiative did not take off as envisioned and India lost many early bird advantages, it is still a noteworthy achievement that in one way or the other, almost every chip design company in the world bears an Indian fingerprint.

This is thanks to India’s unbeatable chip designing capabilities.

Indian labs have IPs in designing several firsts – including the world’s first software defined radio chips. What is more, India is constantly upgrading its competence in actualizing Moore’s law of Less is More, by designing chips that integrate and package smaller components, to make more powerful chips.

As the global need for more sophisticated semiconductors is increasing, India is already well conversant in new technologies that are throwing open countless growth opportunities for the semiconductor industry. These include technologies and platforms such as cloud, 5G, IoT, AI, ADAS, AR/VR and many others.

Given India’s inherent strengths in terms of decades of relevant tech know-how, and delivery capabilities, the time has now come for India to come out from the shadows, to leverage its strengths and claim its rightful place in the sun.

Having said this, the vision of becoming a global hub for semiconductor fabrication is one that needs serious and sustainable intent, investment, know-how, skill-development, real estate, infrastructure and supply chains to be

completely aligned. Only then can we make in India, make for India and make for the world.

But here's the catch - The world of semiconductor fabrication is an extremely complex, multistep, multi-geography, multi-dependencies process. From start to finish, the process of creating a silicon wafer with working chips consists of thousands of steps. What is more, each microchip goes through these processes hundreds of times before they become part of a device assembly. This means it can take more than three months from design to production.

The challenge lies in the fact that the main components of this ecosystem – i.e. R & D; blueprint; prototyping; slicing; deposition; photoresist; lithography; etch; stripping; ionization; cleaning; measurement and inspection, electroplating; testing and packaging seldom come together in a single geography. Almost always, these inter-dependent steps are actualised in different locations, spanning several different countries.

In the past, a globally networked model worked, but factors like Covid 19, military tensions in several parts of the world, drought, natural disasters and other supply chain challenges have pushed countries to depend less on external suppliers and develop solutions locally.

USA, Europe, China, Israel, India and Singapore are some of the countries whose governments are drawing up a blueprint for building clean rooms within their domestic geographies.

Although India imports 100% of its chips from Taiwan, Singapore, Hong Kong, Thailand, and Vietnam, the Indian Government is now making it attractive for foreign companies and startups to set up semiconductor manufacturing units in India.

India is also finalizing plans to mass-produce semiconductor chips under the Make in India initiative. A Rs 76,000-crore package for the development of India's semiconductor and display manufacturing ecosystem, including Rs 2.3 lakh crore in incentives positions India as a global hub for electronics manufacturing, with semiconductors being seen as the foundational building block. In December 2021, the Indian government announced Rs 2,30,000 crore funding for companies engaged in silicon semiconductor fabrication, display fabrication, compound semiconductors, semiconductor packaging and design.

With semiconductors emerging as the basic building blocks of all modern technologies, semiconductor fabrication is obviously an enormous business

opportunity. India must cash in on its unique advantages – none of the East Asian countries have the kind of talent that India has; we can offer investors quality electricity, water, better roads, real estate and infrastructure.

What we need now, to realise our potential, is some quick action and a few high-octane partnerships between academia, government and private sector players.

The ball is in MeitY's court. Indian industry is eagerly waiting for the game winning point!

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