

# India's Semiconductor Industry Grows Rapidly, Aims to Become Global Hub

Over the past decade, India's semiconductor industry has witnessed significant growth and evolution, with a focus on design, testing, verification, and validation. In an interview with Vivek Prasad, Executive Director of Avalon Consulting, we explore the factors contributing to this growth, the impact on sectors like automotive, healthcare, and telecommunications, and the future prospects for India's semiconductor industry as it strives to become a global manufacturing hub. Additionally, we delve into government policies, investment opportunities, and the potential influence of global players like Micron in shaping India's semiconductor landscape.



**Vivek Prasad**  
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**TimesTech Buzz: How has India's semiconductor industry evolved over the past decade, and what factors have contributed to its growth?**

**Vivek Prasad:** India has a very fast-growing electronics system design manufacturing (ESDM) industry with over 120 entities operating in the space. According to the Department of Electronics and Information Technology (DeitY), nearly 2,000 chips are being designed every year in India and more than 20,000 engineers are working on various aspects of chip design and verification. Prominent semiconductor companies like Intel, MediaTek, TI, AMD, Infineon, Freescale, Interra, Mentor Graphics have a presence in India and undertake cutting edge development work at their Indian facilities mainly centred around NOIDA and Bangalore. Intel has been a major in the

semiconductor industry in India with over 14,000 employees and investments of about USD 8 billion. In 2012, Intel invested USD 1.5 billion in design capabilities which is their largest R&D facility outside the US.

Texas Instruments has grown its presence in India to 8 cities. In December 2010, TI set up Kilby Labs in Bangalore as their first international expansion outside the U.S. Kilby Labs, named in honour of Jack Kilby, a TI engineer who invented the first integrated circuit in 1958, is focused on innovation in energy efficiency, bioelectronics and life sciences.

Several factors have contributed to India's success in the EDSM space

1. Favourable central and state government policies which have improved ease of doing business in the country from a ranking of 142 in 2015 to 63 in 2020

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2. India's emergence as a preferred outsourcing destination due to its IT/ITES sector which has enabled the realisation of other outsourcing opportunities
3. A large engineering and IT talent pool accessible at relatively lower costs is a compelling proposition for many global players

Focused semiconductor industry training programs offered by academia-corporate partnerships

### **TimesTech Buzz: How are Indian government policies impacting the country's goal to become a global hub for semiconductors, and what advantages and challenges are involved?**

**Vivek Prasad:** India is a large semiconductor market estimated to be valued at USD 27 billion in 2022 and is expected to grow at 19% CAGR over the next few years. The market is largely served by imports with only a few elements of the semiconductor supply value chain being represented in India – design, testing, verification & validation.

However, there is now a clear and present mandate to enhance India's participation in the semiconductor value chain and develop it into a manufacturing hub. This move is primarily driven by 4 factors –

1. Strong growth in demand especially in applications segments like automotive, consumer electronics and telecommunications
2. Geo-political concerns that necessitate a reduced dependence on supply from China
3. Opportunities in the global semiconductor market arising from a "China plus one" push by many countries
4. Alignment of favourable inputs factors like the government's Make-in-India policy push to support domestic manufacturing, a large engineering talent pool to provide the necessary human capital and a friendly investment climate for global investors

Accordingly, the government has launched the Indian Semiconductor Mission (ISM) in Dec 2022 under the Digital India Initiative with a planned outlay of USD 10 billion to attract investments in the semiconductor sector. The ISM primarily has 4 schemes -

1. Fiscal support for setting up semiconductor fabs in India: with up to 50% of the project cost for fabs making 28nm or lower nodes; up to 40% of the project cost for fabs manufacturing 28–45 nm; and up to 30% for those manufacturing 45–65 nm.
2. Fiscal support of 30% of the total capital expenditure to eligible applicants for establishing silicon photonics, compound semiconductor, sensor (including MEMS) fabs and semiconductor ATMP or OSAT facilities in India.
3. Fiscal support of up to 50% of project cost (subject to a ceiling of approximately USD 1.4 billion per fab) for establishing thin-film-transistor liquid-crystal display or active-matrix organic light-emitting diode display fabrication units in India.

4. A Design-Linked Incentive Scheme that offers various financial incentives, design infrastructure support at various stages of design (up to 50% with a ceiling of approximately USD 1.8 million per application) and deployment (6-4 % of net sales over five years) of integrated circuits, chipsets, system on chips, systems and IP cores.

Additionally, the Indian government's Production-Linked Incentive scheme known SPECS (Scheme for Promotion of Manufacturing of Electronic Components and Semiconductors), which was announced on 1 April 2020, offers a financial incentive of 25% of capital expenditure for various semiconductor-related goods.

These initiatives are designed to attract global semiconductor companies to invest in manufacturing facilities in the country. The announcement of Micron's facility at Sanand, Gujarat is a vindication of this thought process. Micron's major vendors Simmtech and Air Liquide also announcing feeder facilities in Sanand indicates that other semiconductor value chain companies also see the opportunity.

However, there are still challenges that the government will need to address to ensure enduring interest in the opportunity.

1. Land acquisition continues to be notoriously difficult in India
2. Ease of doing business metrics have improved but still need work
3. Access to licenses for production technology will be a challenge for new entrants

Despite a large pool of engineers, the relevance and employability of a large section of this pool can pose challenges for recruiters

### **TimesTech Buzz: How is India's semiconductor industry influencing automotive, healthcare, and telecommunications sectors, and what are the current market trends and emerging niches?**

**Vivek Prasad:** Semiconductor chips are today the heart of many products including vehicles, medical equipment, consumer electronics, mobile phones, etc. The recent stress in the automotive industry on account of chip shortages in the post-pandemic period indicates the dependence on semiconductors of many industries. Many auto OEMs had waiting periods as long as 12-14 months on certain models due to the non-availability of chips.

**Automotive:** The automotive industry is one of the largest consumers of semiconductors in the world. Indian semiconductor companies are developing new technologies that are making cars safer and more efficient. These technologies include sensors that can detect pedestrians and other vehicles and chips that can control the car's engine and brakes. For example, Indian company Tata Elxsi has developed a new type of chip that can be used to control the car's brakes. This new chip is more efficient and reliable than traditional chips, making it possible to improve the safety of cars.

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**Healthcare:** The healthcare industry is another major consumer of semiconductors. Indian semiconductor companies are developing new technologies that are making medical devices more affordable and accessible. These technologies include chips that can be used to diagnose diseases and sensors that can monitor patients' vital signs. For Example, Sterlite Technologies have developed innovative technology for healthcare applications

**Telecommunications:** The telecommunications industry is also a major consumer of semiconductors. Indian semiconductor companies are developing new technologies that are improving the performance and efficiency of telecommunications networks. These technologies are being used to develop 5G networks, which will provide faster and more reliable internet access. For example, Indian company Saankhya Labs has developed a new type of chip that is more energy efficient than traditional chips. This new chip could revolutionize the telecommunications industry and make it possible to develop more powerful and affordable 5G networks.

Apart from these applications, further innovation in semiconductor technology can drive transformation in other industries as,

- 1. Industrial Automation:** The integration of IoT devices and sensors could lead to improved process automation, predictive maintenance, and overall operational efficiency.
- 2. Agriculture:** IoT and sensor technologies could be used to create smart agricultural solutions, leading to better crop management, reduced resource wastage, and increased yield.
- 3 Space Exploration:** Advancements in radiation-hardened components could make space missions more reliable, enabling deeper space exploration and scientific research.

### **TimesTech Buzz: What is the future of India's semiconductor industry, its impact on the global market, and the investment opportunities and investor sentiment for semiconductor startups and companies in India?**

**Vivek Prasad:** The semiconductor industry has generated a lot of interest globally in recent times primarily due to the realisation that many other vital industry sectors like automotive, telecommunications and consumer electronics depend on it for survival. India is no different especially since its growing economy and thriving manufacturing sector have a lot at stake.

Indigenisation of semiconductor manufacturing is a critical ingredient to India's success as a global manufacturing hub and is seen as a foil to China's historical dominance in this area.

However, India is not alone in this race. The US and EU plan to buttress their design capabilities with accelerated semiconductor production capacity building. Through policy initiatives such as the Chips Act, the US Government is providing incentives to set up semiconductor farms that could be operational in the next 3-4 years. These facilities

will require ATMP (assembly testing marking and packaging) support for successful integration into end-use applications. Indian companies can leverage this opportunity by setting up OSAT (Outsourced Semiconductor Assembly and Test) facilities. India's Semiconductor Mission has incentives for such companies.

Yet, fabs remain the lynchpin for India's Semiconductor Mission.

Taiwan's TSMC is the only large pure-play semiconductor company that has announced plans to set up a fab in India. Intel and Samsung are yet to make any announcements. Setting up fabs requires technical licenses which are closely held and create barriers for new entrants. The Indian government received 3 bids under the ISM to set up semiconductor fabs in India – Vedanta, ISMC-Tower and IGSS. Each of these proposals is stuck for various reasons – inability to access licenses or corporate-level complications or just lack of merit.

Therefore, in the near term, India may have to be satisfied with establishing ATMP and OSAT plants that cater to the needs of the global semiconductor value chain. For example, Tata Motors and Renesas (Japan) have entered a strategic partnership to set up an OSAT, with an investment of USD 500 million, catering exclusively to automotive semiconductors.

However, the entry of Micron and its key partners Simmtech and Air Liquide will provide a strong fillip and proof of concept for India as a global semiconductor manufacturing hub. If Micron is successful in this venture, it will encourage others in the semiconductor value chain to follow suit. So, the Indian semiconductor ecosystem needs to work with the government to ensure Micron's success.

