April 9, 2024

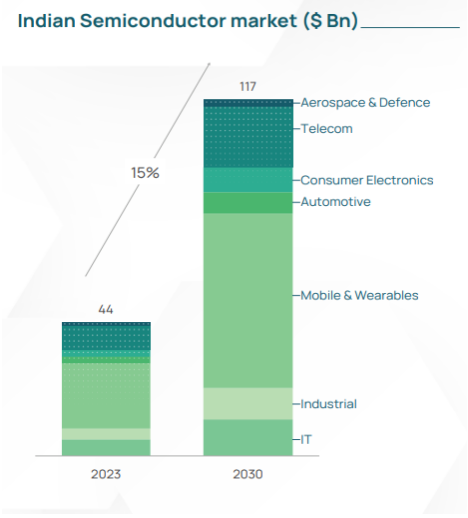
India's Semiconductor Mission – Success at Multiple Fronts!

What's the Point? (A Brief Summary)

Identified as among the most critical needs for *Atmanirbhar Bharat*, India's Semiconductor Mission is seeing success at multiple fronts. Recent, the cabinet announced setting up of three plants that will break ground soon. This includes one semiconductor manufacturing unit in Gujarat, and two packaging and test facilities in Assam and Gujarat. While increasing presence of electronic manufacturing ecosystem helps, India's talent base of semiconductor engineers is a key differentiator. A recent report highlighted that 30% of new Global Capacity Centres in India are from the semiconductor industry. Ecosystem evolution was the missing factor, and India seems to be getting there. This could at least partly address India's imports in a US$ 44 bn market and help India participate in high end manufacturing.

Numbers in perspective

Indian demand for semiconductors to increase at a healthy pace



India's presence in the front and the back of the supply chain make our foray into semiconductor manufacturing plausible

Value Chain	**Design** →	**Semiconductor Manufacturing (Foundry)** →	**Assembly and Testing (OSAT)** →	**PCB Assembly (PCBA)** →	**System level assembly (ODM, EMS)**
	Entails chip sizing, layout & transistor linking	Pattern wafers with designed layouts	Package individual IC chips & conduct testing	Assemble packaged IC chips onto PCB	Integrate PCBA with other modules
India's Presence	20% chip designers & engineers based in India	US$18bn of investment approved for OSAT and foundry to be commissioned in phases over CY25- 28		Over last 3Y India has emerged as fastest growing manufacturer in these verticals	
Way Forward	Possible to leverage this talent pool	More large-scale investments in foundries and OSAT are likely to be announced		Indian production expected to grow 3x and exports by 8x in next 4-5 years	

Source: Press Information Bureau (PIB), BCG Analysis. OSAT: Outsourced Semiconductor Assembly and Test, PCBA: Printed Circuit Board Assembly, ODM: Original Design Manufacturer, EMS: Electronic Manufacturing Service, IC Chips: Integrated Circuit Chips

What are Semiconductors and why are they important?

Technically, semiconductors are materials that possess properties between those of conductors (such as metals) and insulators (such as glass or plastic). The most commonly used semiconductor material is silicon (Si). Semiconductors is broad term used for a range of products such as microprocessors (CPUs for computers), memory chips (storing data), commodity integrated circuits, Systems on chips, and microcontrollers. They are an essential component of electronic devices, enabling advances in Artificial Intelligence, communications, computing, healthcare, military systems, transportation, clean energy, and countless other applications.

Ecosystem evolution was the missing factor, and India seems to be getting there.

Varied Industries within Chips Manufacturing Industry

There are various processes involved in the manufacturing of semiconductors. Over time, as technological advances increase the need for specialised instruments and capacities, the global supply chain has evolved into a concentrated field, with some countries dominating the production piece, such as Taiwan and Japan. Various steps within the manufacturing process are fulfilled by different entities in different countries.

The World is working to globalise Manufacturing of Chips

While leading governments across the world had long recognised the strategic importance of having the know-how and capacity to manufacture semiconductors, greater comfort in the globalised world had led to disaggregation of the industry. With the rise of the multipolar world, there is renewed focus on ensuring the supply chains become diverse and not dependant on one country/location. India could be a big beneficiary of this trend.

What is leading to confidence in India's plans in the Semiconductor Space?

Confluence of multiple factors are leading to confidence in India's capability in semiconductor manufacturing

- There are significant policy initiatives to facilitate creating a semiconductor manufacturing ecosystem in the country. The approach is phased, with initial target to make already mature technology, >28 nanometre (nm) nodes and then move to advanced nodes over time.
- Strong consumer demand for electronics products: India is amongst the largest consumers of mobile phones and other electronic products. This makes India a preferred destination for manufacturing for the world.
- Setting up of electronics manufacturing ecosystem with localised chip assembly and component assembly
- Significant presence of Indian engineers in the global semiconductor design space: India accounts for 20% of the world's semiconductor design engineers.

Some Trivia:

- Moore's Law, that predicts doubling of chips effectiveness every year, was made in 1965 for the next 10 years. Remarkably, this law has held true for nearly 60 years now!
- iPhone is powered by 4nm chip – the "4nm" represents the distance between transistors on the chip. To give perspective, a human hair is ~18,750 times wider. The chip can be observed only with microscopes.
- 70% of capacity in the Assam factory (which is yet to commence operations) has already been contracted by global customers!

Conclusion

As the world gets smarter and more technology driven, semiconductors are becoming omnipresent. When the world saw a shortage of semiconductors in 2022-23, deliveries of key consumer goods such as cars and laptops saw significant delays and price-increases. In the 21st century of digital activity and economy, semiconductors will be are as important oil / energy were in the 19th / 20th century. India's initiatives in this space are on the right track, and could lead to significant gains in terms of manufacturing competitiveness, technological advances, and economic growth.

Sources: PIB, CEA, Centre for Monitoring Indian Economy (CMIE) and other publicly available information

---

About Tuesday's Talking Points (TTP)*: TTP is an effort by HDFC AMC to guide key conversations in the Indian financial markets and investing ecosystem. We aspire to do this by providing relevant facts, along with our perspective on the issue at hand. If you have a topic that you would like to be featured here please write to us at hello@hdfcfund.com*

Disclaimer: Views expressed herein, involve known and unknown risks and uncertainties that could cause actual results, performance, or events to differ materially from those expressed or implied herein. Stocks/Sectors/Views referred are illustrative and should not be construed as an investment advice or a research report or a recommendation by HDFC Mutual Fund ("the Fund") / HDFC Asset Management Company Limited (HDFC AMC) to buy or sell the stock or any other security. The Fund/ HDFC AMC is not indicating or guaranteeing returns on any investments. Past performance may or may not be sustained in the future and is not a guarantee of any future returns. Readers should seek professional advice before taking any investment related decisions.

MUTUAL FUND INVESTMENTS ARE SUBJECT TO MARKET RISKS, READ ALL SCHEME RELATED DOCUMENTS CAREFULLY.