

Indian SEMICONDUCTOR Space Most Significant Than Ever Before!

Om Gupta
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Contributors:

Anurag Awasthi, Vice President (Public Policy, Government and Corporate Relations), IESA
Vijay Krishna Nekkhalapudi, Director, Government & Public Services at KPMG Advisory Services
Sumukh Narendra, Director, Vinyas Innovative Technologies
Shiv Bhambri, Country Manager at RS India
Sudhama Dharmappa, Assistant Field Application Manager at KYOCERA AVX Components Division
Dr. Satya Gupta, CEO, EPIC Foundation & President, VLSI Society of India
Devroop Dhar, Co-Founder, Primus Partners



The year 2022 has been, indeed, a good year after 2 hiatus years since the start of the Covid-19 pandemic. Industries have been recovering from the disruption caused by Covid-19 and returning to business as usual. This year, the electronic industry has again started physical events and exhibitions. After a gap of 2 years, leading manufacturers, industry experts, potential investors, and buyers assembled at Greater Noida for Electronica and Productronica India.

The automotive industry has become one of the main markets for electronic components due to the increased focus on safety and the popularity of ADAS and infotainment systems. When the pandemic started, the automotive industry, anticipating a lull in demand for vehicles, canceled their orders with component manufacturers. The vacant slots were taken over by the consumer electronics industry where the demand, during the pandemic, was fuelled by remote works and booming e-commerce.

The end of 2021 and early 2022 saw the automotive industry struggling to get back their slots because opposite to what was anticipated by the automotive industry experts, demand recovered early. As a result, automotive manufacturers discontinued many features and, in some cases, they asked their customers to wait for weeks for a spare key.

Demand and supply mismatch for semiconductor chips increased to such an extent that industries saw a price increase of 20-30%.

On the one side, where industries were struggling with slots and supply, on the other, the geopolitical situation changed much to impact the semiconductor industry in a negative/positive way, depending on the side from where you are looking at it.

The US passed its "Chips and Science Act" to provide "\$52 billion in subsidies and additional tax credits" to companies that manufacture chips in the US. One provision in the act prohibits any semiconductor company that receives financial assistance through the newly passed CHIPS act, from supporting the manufacture of advanced chips in China. China's tension with Taiwan bought the world's largest semiconductor chips manufacturer, Taiwan Semiconductor Manufacturing Company Limited, in limelight. Russia's invasion of Ukraine and its successive advancement and rollbacks highlighted the importance of advanced electronics and semiconductor chips in warfare.

Considering all these developments, countries are trying to gather resources and partners, to manufacture semiconductors chips within their boundaries for their national security.

India's Strides in Semiconductor Manufacturing:

After so many attempts India has finally seen concrete steps being taken for indigenous semiconductor manufacturing. In 2022, Indian conglomerate Vedanta and electronics manufacturing giant Foxconn signed a Memorandum of Understanding with the Gujarat government to set up a semiconductor and display FAB manufacturing unit in the

state. Vedanta and Foxconn to invest 1,54,000 crore to set up the facility in Gujarat.

This initiative of Vedanta has received a lot of cheers within the country. Industry and experts have welcomed this move alike. Indigenous manufacturing of semiconductors will benefit the country in many ways.



Vijay Krishna Nakkalapudi, Director, Government & Public Services at KPMG Advisory Services says, "Post covid acceleration of Digitalization of multiple sectors, rapid growth in usage of IoTs, deployment of 5G, Artificial Intelligence, the building of Data Centers, building Smart cities, eCommerce, Highways and major infrastructure, global semiconductor

usage will only grow. Our dependence on semiconductors cannot be ignored."

Citing the example of the automotive industry he said, "If one were to analyze the automotive sector, the recent lockdowns across various parts of the world have induced supply chain shortages in the semiconductor. For a country such as India, in which the auto sector contributed almost half of its manufacturing GDP, such reliance can be catastrophic in the event of onset of any largescale disruption." (Views expressed by Vijay in this story are his personal views and do not represent that of the organisation he is working with in any way.)

Giving a glimpse of the challenges that the Electronics Manufacturing Services industry faces due to no indigenous manufacturing of semiconductors,

Sumukh Narendra, Director, Vinyas Innovative Technologies says, "Vinyas being a leading OEM/ODM, imports 100% of its semiconductor requirement, and this puts a lot of burden on the supply chain management. We are significantly dependent on foreign suppliers even for the simplest of the semiconductor components, which calls for the need for India to transform from being a chip importer to a chip-maker!"



Shiv Bhambri, Country Manager at RS India says, "Chip demand will rise in tandem with the expansion of the electronics manufacturing industry, and if it can be satisfied in India, it might have a significant impact on the nation."

Highlighting the impact of semiconductor chips on India's import bill, **Sudhama Dharmappa, Assistant Field Application Manager at KYOCERA AVX Components Division** says, "Since there's almost no local semiconductor manufacturing in India, the country is expected to import \$75 billion worth of semiconductors a year by 2026, which illustrates the dire need to develop a local manufacturing ecosystem."



Semiconductors Market in India

Since there is a lot of talk going around indigenous manufacturing of semiconductors and considering the investment that is needed for semiconductor manufacturing, does India have that market for semiconductors? Vijay says, "By many estimations, India's consumption of consumer electronics is going to go from around USD 70 Billion in 2022 to USD 125 Billion by 2030. This growth is reinforced by rapid growth in market segments such as healthcare, transportation, mobile, Industrial IoTs, Defence electronics, education, etc. Multiple Indian start-ups are experimenting with using IoTs to address India-specific problems such as virtual classrooms, delivery of essential medicines using Drones, increasing farm output while managing risk, making urban infrastructure more efficient, etc. Social media and sharing economy combined with the power of 5G is only going to accelerate the consumption of data, which will further fuel increase in usage of semiconductor chips."

To expand semiconductor chip manufacturing within the country government has started a Production Linked Incentive Scheme. Shiv says, "the Indian government has approved a Rs 76,000 crores production-linked incentive (PLI) scheme. Many international companies have decided to establish fabs in India thanks to the PLI initiatives. As of now, Karnataka may become the first state to have a \$3 billion semiconductor plant in India and other projects including a 154,000-crore semiconductor plant in Gujarat and a \$3.5 billion facility in Tamil Nadu are in process."

Resources and Skills in India

Industry experts agree in unison that there is no dearth of talent or resources like raw materials required for Semiconductor manufacturing in India. But they have their own set of apprehensions.



As per **Dr. Satya Gupta, CEO, EPIC Foundation & President, VLSI Society of India**, for the optimal utilization of resources government should build an ecosystem around semiconductor manufacturing. He says, "we must consolidate multiple semiconductor manufacturing efforts (Semiconductor Fabs, Display Fabs, ATMP/OSAT), etc. by

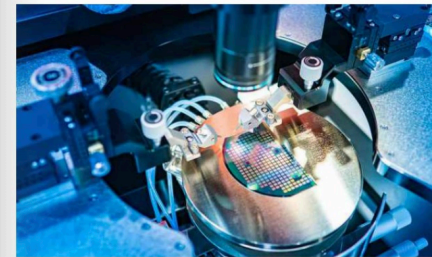
many promoters and investors into a mega semiconductor technology park with about 2,000 Acres of land. Creating infrastructure and the ecosystem at multiple locations will be very tough, and expensive and will not yield optimal results. Based on the learnings from Hsinchu Science Park, Taiwan, and Kulim Technology Park in Malaysia, we must consolidate multiple semiconductor efforts into a single Mega semiconductor tech park."

Indian talent has been working with the pioneers of semiconductor technology across the world and within the country, they are innovating products based on that technology. Vijay says, "the need of the hour is to seek learnings on how this talent has been built and encourage those firms which can innovate in technologies currently not home grown in India. Additionally, governments and the

private sector can work with the large talent pool available across various top engineering schools within the country, conduct workshops to create awareness on VLSI design and manufacturing, and especially focus on graduate programs that help students specialize in niche areas of chip development."

Raising apprehensions around the gestation period and capital requirement Shiv says, "Manufacturing of semiconductors and displays is a highly complicated and technologically advanced industry that involves substantial and ongoing investments due to its high risk, lengthy gestation and payback times, and large capital expenditures."

Where should India Start?



Since many technology nodes are available and existing fabs across the world are very advance, in such a scenario a question arises where should a country like India start Semiconductor manufacturing?

Sudhama says, "India must first decide which end applications and parts to focus on (e.g., power, semi, analog, memory, etc.) and then evaluate the technology curve to decide whether Indian fabs should focus on 20nm, 28nm, or 45nm nodes. We cannot compete with TSMC for 5nm and below. Instead, we must balance out investment versus market potential versus global capacity for that node. The key will be to get some customer commitments upfront."

Similar observations have been made by Dr. Satya Gupta too. He says, "It is a journey, India is starting in the semiconductor manufacturing space. As we progress in this endeavor the fabs will start making products with more advanced technologies even if in the beginning the technology node is 28nm or lower. Making Fab commercially successful should be the main thrust in choosing a technology node."



Anurag Awasthi, Vice President (Public Policy, Government and Corporate Relations), IESA says, "The focus is to achieve a state of self-reliance, and in due course, become a major exporter of semiconductors. Once the manufacturing kicks in, this will be achieved by first creating a balance between indigenous manufacturing and imports, and gradually

taking the manufacturing up by a notch as per my understanding."

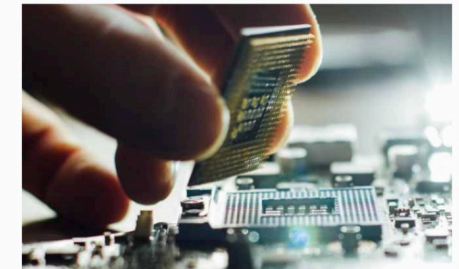
Sumukh suggests looking at considering the need of domestic industry in the beginning, he says, "India should look at investing in building home-grown semiconductor design houses to cater to the vast requirement of the electronics industry and also give impetus to design houses to tape out and encourage them to bring domestic designs into the market."

Devroop Dhar, Co-Founder, Primus Partners

says, "While leading manufacturers are ahead, increased collaboration between the government and the industry will make local manufacturing possible. India must push to promote its own Design Industries give our capable technical workforce. Collaboration and partnership between Indian and foreign firms can also be a win-win for all. One area where India needs to boost its efficiency is the creation of a dedicated MINI/MEGA/GIGA foundry – a missing link in India's semiconductor industry in the post-Silicon domain. Policies like PLI and Scheme for Promotion of Manufacturing of Electronic Components and Semiconductors (SPecs) need to be made more OSAT friendly so that the global OSAT leaders can set up the manufacturing units in India on their own and link their business with the already present design houses and assembly/ATMP manufacturers."

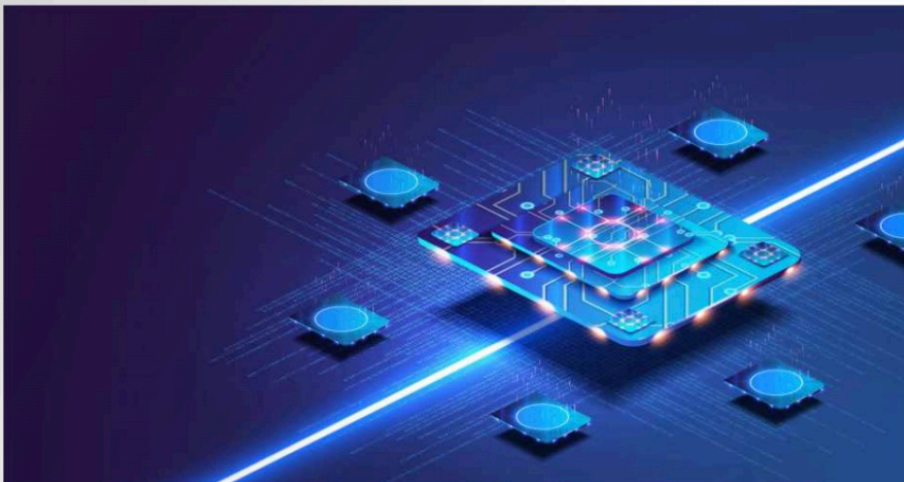


Step in National Interest



Russia's conflict with Ukraine and, US and European Union sanctions against Russia has shown us the problems with the modern globalized world where major players have all the say in everything. In such a fragile globalized world, where opening the economy is important to better integrate with the global supply chain, self-sufficiency in a way is much of a necessity.

Anurag says, "The shortage of semiconductors has had consequences on the economy of not just India, but that of the world. Chip stock prices have seen a decline and automotive stock has fluctuated, while secondary products like crude oil, and emerging industries like electric cars, communications (5G network), etc. have also seen multiple roadblocks owing to the disrupted global supply chains.



Various countries have enacted acts in this domain to ensure self-sufficiency in the future. In such uncertain times, it is important for India to become self-reliant so that the economy remains stable when pitched against the global economy which is likely to be largely dynamic in nature. In terms of national security, all critical and strategic electronics are configured around semiconductors as one of the core elements. It is obvious that any disruptions, transfer of technology issues, reliance on foreign sources etc will surely affect the overall metrics."



Devroop says, "There is no doubt that the civilian economy is deeply dependent on semiconductor-based platforms for its daily operations. Moreover, semiconductor technology is also used in developing advanced military systems, a shortage of semiconductors can affect the operational capabilities of Defence systems thereby risking national security. Therefore, it can be said that India is on the right path in reducing its dependency on other countries for semiconductors, and the recent announcement of the PLI scheme by the Government and investments in this space in some of the States is a

definitive start."

Sumukh says, "Even with the in-house manufacturing of the chips, India still needs to continue the import of chips and work on strengthening the import-export relationship with global partners to cater to the requirements of the electronics industry."

A growing interest in India:

Even though India does not have any semiconductor manufacturing, semiconductor companies across the world are partnering and acquiring companies in India to get further leverage their technical

know-how and market to bring new products into the market. In the year 2022, Renesas partnered with Tata group to design, develop and manufacture semiconductor solutions for enhancing innovation across electronics systems for the Indian and emerging markets. It also completed the acquisition of India-based fabless semiconductor company Steradian Semiconductors. This is just few of the many examples.

Semiconductor companies are also acquiring companies based out of India but that have a significant presence in India. The acquisition of C&K switches by Littelfuse and Xilinx by AMD is an example. This gives the parent company opportunity to expand its presence in India.

Conclusion:

With the recovery of economic activity, the semiconductor industry is also coming on track. The shortage of semiconductor chips is flattening with the expansion of the capacity and some decline in demand for consumer electronics. But increasing interest rates and unstable geopolitical situations are challenges ahead. How the industry manoeuvres these challenges will decide its future. India is trying hard to strengthen its position in the semiconductor space but has a long way to go and it has a lot of opportunities ahead.