



Achieving semiconductor dream

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(Mains GS 3 : Science and Technology- Developments and their Applications and Effects in Everyday Life.)

Context:

The pandemic has brought to the fore the fragility of the global supply chain of semiconductor manufacturing; however, the supply disruptions would not worsen in 2022 as the Omicron surge should have a milder impact on the chip supply chain.

Increase domestic capacity:

- The situation is exacerbated by the overdependence of the world on East Asia for fab manufacturing, the rising price of silicon, and the China-U.S. trade war.
- Governments around the world support and fund efforts to increase domestic capacity in chip manufacturing as well as supply-chain resilience.
- However, most new foundries are built to manufacture new-generation chips of 7 nanometers or less, leading to constrained supply for older-generation chips that are also typically consumed in larger quantities.

Incentivise the manufacturing:

- Recently India has approved a \$10 billion package to incentivise the manufacturing of semiconductors in the country.
- The government has drawn out a list of incentives to get leading international manufacturers to set up their manufacturing unit in India either by themselves or with the help of a local partner.

- Considering the current geopolitical dynamics and the fact that semiconductors are at the core of fourth industrial revolution technologies, this is a welcome first step.

India's strength in design:

- Getting fab manufacturing will build on India's strength in design where India has the largest number of chip designers outside of the U.S. who are working on state-of-the-art systems and technologies. For example, Karnataka boasts of over 85 fabless chip design houses of various global companies.
- The strong expertise of our semiconductor design professionals in EDA (Electronic Design Automation) tools provides solid ground to move towards manufacturing.
- To create the ecosystem for fab manufacturing, it is important to lock in the demand for semiconductors produced within the country.

Demand for semiconductors:

- The total demand for semiconductors stands at \$24 billion which is expected to grow to \$80-90 billion by 2030; however, this demand is for different categories of semiconductors used in various electronic devices and applications.
- Considering that initial manufacturing would be in mature tech, it would be ideal to enter into an agreement with the consumers of such semiconductors like automotive manufacturers to ensure that whatever is produced is consumed.
- Better still is to get established fab companies to come on their own as they bring with them their demand base.

Fab clustering:

- Fab clustering, where key semiconductor supply chains and related businesses are in one place to create backward and forward linkages, would also play a key role in creating an ecosystem for the semiconductor industry.
- Such a site should be chosen purely on the ability of the location to act as a force multiplier for the development of such an ecosystem.
- It needs to ensure high-quality infrastructure along with uninterrupted power availability with more than 99.7% uptime, connected to two different grids to ensure redundancy.
- Additionally, a conducive environment needs to be created for women to work night shifts along with zero labour disputes.

Way forward:

- Apart from incentivising more FDI in electronics to deepen our supply chains through incentive schemes, India needs to focus on encouraging Indian manufacturers and start-ups to enter and master complex R&D and manufacturing verticals so that valuable Intellectual Property is created and owned by Indian companies.
- The semiconductor industry is changing fast as new-age technologies require innovation at the design, material, and process levels.
- Indian engineers have contributed immensely to this area in multinational companies; thus the government must encourage them to set up their design start-ups with handsome government grants and tax incentives.
- Premier research institutions such as the Indian Institute of Science should also be asked to work aggressively on R&D in chip designing and manufacturing.
- Further, the government must focus on emerging technologies like LiDAR and Phased Array in which incumbents do not have a disproportionate advantage and the entry barrier is low.

Conclusion:

By working aggressively in new cutting-edge technologies, India can ensure that it becomes atmanirbhar in both existing and emerging technologies.