



## India's Semiconductor Diplomacy

This editorial is based on [“Blueprint for Semicon Diplomacy”](#) which was published in Indian Express on 30/04/2022. It talks about the significance of semiconductors and suggests a Semicon Diplomacy Action Plan for becoming self-sufficient in semiconductor chip manufacturing.

**For Prelims:** Semiconductors, Scheme for Promotion of Manufacturing of Electronic Components and Semiconductors (SPECS), Design Linked Incentive (DLI) Scheme, Major Manufacturers of Semiconductor-chips, India's initiatives for semiconductor manufacturing.

**For Mains:** India's Semiconductor Diplomacy, Significance of Semiconductor-Chips, Challenges Faced by India in establishing a chip-manufacturing ecosystem, How India can become self-reliant in chip-manufacturing, Leveraging multilateral groupings to become a semiconductor-manufacturing hub.

**Semiconductors** are the basic building blocks that serve as the heart and brain of all modern electronics. These semiconductor chips are now an integral part of contemporary automobiles, household gadgets and essential medical devices such as ECG machines.

India in the last few years has put its special focus towards the domestic manufacturing of semiconductor chips in India. Although a plethora of initiatives in this regard are appreciable, it is not sufficient. **To become self-sufficient in chip manufacturing India needs a Semiconductor Diplomacy Action Plan.**

### Why is the Significance of Semiconductors?

- Semiconductor chips are the **lifeblood of the modern information age**. They enable electronic products to compute and control actions that simplify our lives.
- The process of making the meticulous semiconductor chips is an **excellent example of peacetime global cooperation**.
  - For instance, it would not be difficult to imagine that the chip in the devices that we use are made by a Japanese engineer working on Dutch machinery in an American foundry in Taiwan to produce wafers which were shipped to Malaysia for packaging before being sent to India as a finished product.
- These semiconductor chips are the **drivers for ICT (Information and Communication Technologies) development** and one of the key reasons for the current **flattening of the world**.
- Semiconductors are **used in critical infrastructures such as communication, power transmission etc.**, that have implications for **national security**.
- Development of the semiconductor and display ecosystem will have a **multiplier effect across different sectors of the economy** with **deeper integration to the global value chain**.

### Where does India Stand in the Growth Story of the Semiconductor Market?

- India currently imports all chips and the market is estimated to touch \$100 billion by 2025 from \$24 billion now. However, for the domestic manufacturing of semiconductor chips, India has recently launched several initiatives:
  - The Union Cabinet has allocated an amount of **₹76,000 crore for supporting the development of a 'semiconductors and display manufacturing ecosystem'**.
  - India has also launched the [Scheme for Promotion of Manufacturing of Electronic Components and Semiconductors \(SPecs\)](#) for manufacturing of electronics components and semiconductors.
  - The MeitY also launched the [Design Linked Incentive \(DLI\) Scheme](#) to nurture at least 20 domestic companies involved in semiconductor design and facilitate them to achieve turnover of more than Rs.1500 Crore in the next 5 years.
- Considering that the **global semiconductor market is projected to be \$1.2 trillion by 2030, India needs to be well-positioned to capture it.**
  - The recently announced **Semicon India programme** which provides \$10 bn fiscal support and other non-fiscal measures is a step in the right direction.
  - Due to the [USA's allegations on China](#) for worsening [Covid-19](#) and [India-China conflict](#) and [recent developments because of it](#), numerous multinational companies (MNCs) are shifting their production out of China.
    - This is the right **opportunity to establish India as the right choice** for setting up production houses for semicon chips.

## What are the Issues Regarding Domestic Manufacturing of Semiconductors?

- **Dominance of Certain Countries:** The semiconductor manufacturing capacities are **concentrated in a few geographies**. Nearly all leading edge (sub 10nm) semiconductor manufacturing capacity is **limited to Taiwan and South Korea, with nearly 92% located in the former**.
  - Further, 75% of the semiconductor manufacturing capacity is concentrated in **East Asia and China**.
    - The concentration of capacities poses many challenges, leading several countries to be vulnerable to a few.
  - The short point is that there could be moments of stress and conflict between India and the major powers.
    - In order to preserve the capacity to stay autonomous, **India needs not just smart alliances but also indigenous capability**.
- **Pursuing Western Companies:** Although India has a decent chip design talent, it never built up chip fab capacity. It would also require convincing western companies to set up advance silicon fabs in India.
  - However, the coming of several semiconductor fabs to India is not sufficient. It would also require **maintaining a balance between pursuing globalisation in this field while ensuring that the vision of Atma Nirbhar Bharat is not undermined**.

## How India's Semiconductor Diplomacy can Help Overcome This Problem?

- **Seizing the Recent Opportunities:** The current decade presents a unique opportunity to India as;
  - **Companies are looking to diversify their supply chain** and for alternatives to their bases in China.
  - The [chip shortages due to Covid-19](#) have hit automakers with a revenue loss of \$110 bn in 2021.
  - The [Russia-Ukraine conflict](#) and its implications for raw material supplies for the semiconductor value chain has also poised chipmakers to invest in strengthening the semicon supply chain.
    - India must seize this opportunity and become an attractive alternative destination for semiconductor manufacturing.
- **Conceptualising A Semicon Diplomacy Action Plan:** Placing **semicon diplomacy at the heart of India's foreign policy** is essential both strategically and economically.
  - The establishment of the value chain for semiconductors would ensure a multiplier effect

on the entire economy.

- Further, since electronics items form one of the most highly imported items after oil and petroleum products, **domestic production would be saving forex and reducing the balance of payments**, especially vis a vis China.
- **Merging Semicon Diplomacy with Act East Policy:** Semicon diplomacy is pivotal to [India's Act East Policy](#), which aims to build resilient ties in the Asia Pacific region.
  - Considering that the semiconductor manufacturing and testing bases are heavily concentrated in East Asia, the Act East policy provides an **opportunity to connect and strengthen ties with key players** in the region.
  - At the same time, keeping an eye on the larger vision - **frequent technological exchanges between a regional bloc like ASEAN** via tracks in forums like the [East Asia Summit](#) and the **ASEAN regional forum** will also be beneficial.
- **Potential of QUAD in Semicon Diplomacy:** One of the ways of leveraging semicon diplomacy is increasing multilateral and bilateral cooperation. A key institution with immense potential in this regard is the [Quad](#).
  - **Australia, being rich in raw materials** required for semiconductors, can be an **important supplier to fill in India's deficits**.
    - The **US and Japan can be leveraged for capacity building** and their advanced semiconductor technology in logic and memory segments.
  - The [Quad Semiconductor Supply Chain Initiative](#) is a good starting point; India shall push for a **Quad Supply Chain Resilience Fund to immunise the supply chain** from geopolitical and geographic risks
- **Strengthening Engagement with Semicon Hubs:** Technical **collaboration with Vietnam may be stressed**, as it is home to many technical research and academic institutes in the area of microchip design and development besides having abundant availability of trained and skilled manpower.
  - **Strategic partnership with Taiwan**, a leading global hub for semiconductor design and manufacturing, with leading producers of the semiconductor chip like Taiwan Semiconductor Manufacturing Co., which caters to the needs of Apple, Intel, AMD, Nvidia and other conglomerates, will also be a good beginning in this direction.

### ***Drishti Mains Question***

“India’s neighbourhood has always held a special place in its diplomatic outreach. Attaining self-sufficiency in semiconductor manufacturing can mean collective growth of the South Asian region.”  
Comment.

## **UPSC Civil Services Examination, Previous Year Questions (PYQs)**

**Q. Which one of the following laser types is used in a laser printer? (2008)**

- (a) Dye laser
- (b) Gas laser
- (c) Semiconductor laser
- (d) Excimer laser

**Ans (c)**

