



## India-Japan Chip Supply Chain Partnership

**For Prelims:** [Semiconductor Supply Chain Partnership](#), Advanced Micro Devices (AMD), G20.

**For Mains:** Significance and impact of the evolving semiconductor supply chain on India's economic growth and development.

**Source:** IE

### Why in News?

Recently, the Union Cabinet has approved a **Memorandum of Cooperation (MoC)** between India and Japan on developing a semiconductor supply chain partnership.

- In recent times, India is looking to establish itself as a reliable presence in the [semiconductor supply chain](#), especially at a time when companies are looking to diversify from China, which has been the hub of electronics manufacturing.

### What is the Significance of the Present Memorandum of Cooperation?

- **India-Japan Semiconductor Cooperation:**
  - The Memorandum of Cooperation (MoC) between India and Japan in the semiconductor supply chain **recognizes the significance of semiconductors for industry and digital advancements.**
  - This MoC was initially signed in July between **India's IT Ministry and Japan's Ministry of Economy, Trade, and Industry.**
- **India's Semiconductor Ambitions:**
  - India is **determined to establish a dependable presence in the global semiconductor supply chain while banking on its [India Semiconductor Mission](#), particularly as companies seek alternatives to China, post [Covid pandemic](#).**
  - India has **initiated a \$10 billion plan to bolster local chip production**, with companies like Micron Technology setting up assembly and packaging facilities in Gujarat.
  - **India-US Collaboration in Semiconductor Industry:**
    - India and the United States are collaborating to strengthen chip supply chains. **Both the countries reaffirmed their commitment to building resilient global semiconductor supply chains.**
    - **Major Investments in India's Semiconductor Sector:**
      - US chip companies like Microchip Technology and AMD are investing millions of dollars in India to expand their operations and set up research and development facilities.
      - Additionally, **Lam Research and Applied Materials are planning substantial investments** in engineering and training programs in India's semiconductor sector.

### What are Semiconductors?

- Any of a class of crystalline solids **intermediate in electrical conductivity between a conductor and an insulator.**
- Semiconductors are employed in the **manufacture of various kinds of electronic devices, including diodes, transistors, and integrated circuits.**
- Such devices have found wide application because of their **compactness, reliability, power efficiency, and low cost.**
- As discrete components, they have found use in **power devices, optical sensors, and light emitters, including solid-state lasers.**

## What is the India Semiconductor Mission (ISM)?

- **About:**
  - The ISM was **launched in 2021** with a **total financial outlay of Rs 76,000 crore** under the aegis of the **Ministry of Electronics and IT (MeitY).**
  - It is part of the **[comprehensive program for the development of sustainable semiconductor and display ecosystems](#)** in the country.
  - The programme aims to **provide financial support to companies investing in semiconductors**, display manufacturing and design ecosystem.
- **Components:**
  - **Scheme for setting up of Semiconductor Fabs in India:**
    - It provides **fiscal support to eligible applicants for setting up of Semiconductor Fabs** which is aimed at attracting large investments for setting up semiconductor wafer fabrication facilities in the country.
  - **Scheme for setting up of Display Fabs in India:**
    - It provides fiscal support to eligible applicants for setting up of Display Fabs which is aimed at attracting large investments for **setting up TFT LCD / AMOLED based display fabrication facilities** in the country.
  - **Scheme for setting up of Compound Semiconductors / Silicon Photonics / Sensors Fab and Semiconductor Assembly, Testing, Marking and Packaging (ATMP) / OSAT facilities in India:**
    - The Scheme **provides a fiscal support of 30% of the Capital Expenditure** to the eligible applicants for setting up of Compound Semiconductors / Silicon Photonics (SiPh) / Sensors (including MEMS) Fab and Semiconductor ATMP / OSAT(Outsourced Semiconductor Assembly and Test) facilities in India.
  - **Design Linked Incentive (DLI) Scheme:**
    - **DLI scheme** offers **financial incentives, design infrastructure support across various stages of development and deployment of semiconductor design** for Integrated Circuits (ICs), Chipsets, System on Chips (SoCs), Systems & IP Cores and semiconductor linked design.

## What are the Challenges Regarding Semiconductor Manufacturing in India?

- **Extremely Expensive Fab Setup:**
  - A semiconductor fabrication facility (or fab) can cost multiples of a billion dollars to set up even on a relatively small scale and lagging by a generation or two behind the latest in technology.
- **Higher Investment:**
  - Semiconductors and display manufacturing is a **very complex and technology-intensive sector** involving huge capital investments, high risk, long gestation and payback periods, and rapid changes in technology, which require significant and sustained investments.
- **Minimal Fiscal Support from Government:**
  - The level of **fiscal support currently envisioned is minuscule when one considers the scale of investments** typically required to set up manufacturing capacities in the various sub-sectors of the semiconductor industry.
- **Lack of Fabrication Capacities:**

- India has a decent chip design talent but it **never built-up chip fab capacity**. The **Indian Space Research Organisation (ISRO)** and the **Defense Research and Development Organisation (DRDO)** have their respective fab foundries but they are primarily for their own requirements and are also not as sophisticated as the latest in the world.

- **India has only one old fab which is located in Mohali, Punjab.**

- **Resource Inefficient Sector:**

- Chip fabs are also very thirsty units requiring millions of litres of clean water, an extremely stable power supply, a lot of land and a highly skilled workforce.

## What can be the Way Forward?

- **Consistent Fiscal Support for All the Elements:**

- Considering India's considerable talent and experience, it may be best if the new mission focuses fiscal support, at least for now, on the chip-making chain including design centres, testing facilities, packaging, etc.

- **Maximising Self-Reliance:**

- Future chip production shouldn't be a one-trick pony and must develop an ecosystem from design to fabrication, to packing and testing. India must also improve research and development in this sector where it is currently lacking.

- **Collaboration:**

- Besides the US, India should also explore similar opportunities to **collaborate with other countries such as Taiwan or other technologically advanced**, friendly nations to promote the Domestic manufacturing and reduce import dependency in the Semiconductor Sector.

## UPSC Civil Services Examination, Previous Year Question (PYQ)

**Q. With reference to solar power production in India, consider the following statements: (2018)**

1. India is the third largest in the world in the manufacture of silicon wafers used in photovoltaic units.
2. The solar power tariffs are determined by the Solar Energy Corporation of India.

**Which of the statements given above is/are correct?**

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2

**Ans: (d)**

**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)**

