Indian Semiconductor Mission

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Why is in news? Learning from the CHIPS Act of the U.S.

The United States' **Creating Helpful Incentives to Produce Semiconductors and Science Act of 2022 (CHIPS Act)** completes one year as a law today (August 9).

The Act authorises $52.7 billion over five years to boost American competitiveness, innovation and national security in semiconductors.

Key takeaway of the act for India:

Need for **cooperation and coordination between several arms of the government**. The **India Semiconductor Mission committee** (under MeitY) is a good beginning, ensuring that the semiconductor strategy survives beyond government terms requires a whole-of-government approach along the lines of the CHIPS Act.

Create collaboration with industry and educational institutions. MeitY has begun a **Chips2 Startup (C2S) programme**, collaborating with over 100 universities and colleges. C2S aims to scale up workforce expansion by supporting existing quality training programmes.

India also has **guidelines for assessing the viability of proposals**, a lot remains to be done concerning transparency. The government **needs to put out regular monthly progress reports** on its semiconductor programme. This will help manage expectations and instil reassurance in India's plans.

Need for investment in future research in the field of semiconductor, example in the branch of **advanced manufacturing and packaging research**.

About the mission:

India Semiconductor Mission (ISM) aims to **build a vibrant semiconductor and display ecosystem** to enable India's emergence as a global hub for electronics manufacturing and design.

It is **part of the comprehensive program** for the development of sustainable semiconductor and display ecosystems in the country.

ISM will serve as the nodal agency for efficient, coherent and smooth implementation of the schemes.

Semiconductors:

Semiconductors, or chips, have **properties** that are somewhere **between conductors and insulators**.

Usually made of silicon, they are used to power a wide range of devices - cars, laptops, smart-phones, household appliances and gaming consoles.

These tiny objects perform a host of functions such as powering displays and transferring data.

So, a supply crunch has a consequent impact on sales of cars, fridges, laptops, TVs and other electronic devices.

Components:

Scheme for setting up of Semiconductor Fabs in India: aimed at attracting large investments for setting up semiconductor wafer fabrication facilities in the country.

Scheme for setting up of Display Fabs in India: 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

Design Linked Incentive (DLI) Scheme

Various challenges:

Huge Investments involved: Semiconductor Fabrication facility **requires many expensive devices** to function. Complex tools and equipment are required to test quality and move silicon from location to location within the ultra-clean confines of the plant.

Economy of scale:In semiconductor fabrication, a high volume of production is required to be maintain so as to meet the increasing demand of the marketplace, at the same time, a strong financial backing as Indian market is very much uncertain about financial fluctuations.

Requirement highly skilled labour: Semiconductor fabrication is a multiple-step sequence of photolithographic and chemical processing steps during which electronic circuits are gradually created on a wafer made of pure semiconducting material. This actually requires high skills.

Scarcity of raw materials: From a value-chain perspective, it needs silicon, Germanium & Gallium arsenide and Silicon carbide which are not available in India and needs to be imported.

Uncertain Indian market: A semiconductor fabrication facility in India cannot independently rely on Indian customers for their entire sales structure. They have to maintain overseas customer base to balance inflections from Indian market due to market trends, government policies etc.

Disposal of hazardous waste: Many toxic materials are used in the fabrication process such as arsenic, antimony, and phosphorus. Hazardous impact on the environment by the industry may act as an impediment to India’s commitment to mitigate climate change.

Way forward:

To ensure greater resilience in a volatile world, India needs to undertake the measures to sustain the domestic and global semiconductor demand.

Policy framework: As foundry setup is highly Capital intensive, it must be supported with a **solid long term plan and financial backing.** This backing is required from the entrepreneur & the government both.

Fiscal sustenance: In text of Indian Government as tax holiday, subsidy, zero duty, financial investment etc. will play an important role in promoting the Fab along with the semiconductor industry in India; this will put further pressure on already large Fiscal Deficit.

Support Infrastructure: World class, sustainable infrastructure, as required by a modern Fab be provided, with swift transportation, large quantity of pure water, uninterrupted electricity, communication, pollutant free

environment etc.

India needs to drop the dream of swadeshi semiconductors. Instead, it should aim to become a key player in a trusted, plurilateral semiconductor ecosystem that keeps key adversaries out.

Favourable trade policies are critical for building a plurilateral semiconductor ecosystem.