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Domestic Chip Fabrication

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In News: India has recently embarked on a journey to develop domestic chip fabrication facilities. Given the above commonalities the decision makers involved with electronics might draw useful lessons from our 'failed' experience in petroleum.

India is aiming to become the global hub for semiconductor design, manufacturing and technology development. However, the shortage of semiconductor chips has exposed vulnerabilities in the semiconductor supply chain and highlighted the need for increasing domestic manufacturing capacity.

What are Semiconductor Chips?

About: Semiconductors are materials which have a conductivity between conductors and insulators. They can be pure elements, silicon or germanium or compounds; gallium, arsenide or cadmium selenide.

Significance of Semiconductor Chips:

They are the basic building blocks that serve as the heart and brain of all modern electronics and information and communications technology products.

Semiconductors are essential to almost all sectors of the economy including aerospace, automobiles, communications, clean energy, information technology and medical devices etc.

These chips are now an integral part of contemporary automobiles, household gadgets and essential medical devices such as ECG machines.

Semiconductors and displays are the foundation of modern electronics driving the next phase of digital transformation under Industry 4.0.

Recent Increase in Demand:

The Covid-19 pandemic-driven push to take sizable parts of daily economic and essential activity online, or at least digitally enable them, has highlighted the centrality of the chip-powered computers and smartphones in people's lives.

Its shortage causes cascading effects, given that the first one creates pent-up demand that becomes the cause for the follow-up famine.

India's own consumption of semiconductors is expected to cross USD 80 billion by 2026 and to USD 110 billion by 2030.

Government Measures:

- 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:

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- In December 2021, the centre govt sanctioned ₹76,000 crore under the Production-Linked Incentive (PLI) scheme to encourage the manufacturing of various semiconductor goods within India. It is for supporting the development of a 'semiconductors and display manufacturing ecosystem'. Consequently, a significant amount of incentives would be provided to design companies to design chips.
- India has also launched the Scheme for Promotion of Manufacturing of Electronic Components and Semiconductors (SPECS) for manufacturing of electronics components and semiconductors.
- In 2021, 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 a turnover of more than Rs.1500 Crore in the next 5 years.

What are all the Challenges?

1. High Investment Required and High Risk involved, Long Gestation and Technology-Intensive Complexity.
2. Minimal Fiscal Support from Government.
3. Lack of Fabrication Capacities - ISRO and DRDO's fabrication foundries are limited utility.
4. Extremely Expensive Fabrication Facility Setup.
5. Resource Inefficiency: millions of litres of Clean Water, Extremely stable power supply, lot of land and highly skilled workforce.

Plan to build Chip Manufacturing Facility

Status of electronics industry in India

- Indian electronics sector is tremendously growing with the demand expected to cross USD 400 billion by 2023-24.
- Electronic mobile phones have contributed more to this growth. The consumer electronics and appliance industry in India is expected to become the fifth largest market in the world by 2025.
- A growing middle class, rising disposable incomes, declining prices of electronics and a number of government initiatives have led to a fast-growing market for electronics and hardware products.
- India has share of 1.5 percent in world in total electronics hardware production.

Most of this production takes place in the final assembly units (last-mile industries) located in India and focusing on them would help develop deep backward linkages, thus inducing industrialization.

Economic Survey 2019-20 also promoted this idea and suggested "assembly in India for the world", especially in "networked products", in a bid to create four crore well-paid jobs by 2025 and eight crore jobs by 2030.

Of the country's total demand for electronics, between 50-60% of the products and 70-80% of the components are imported.