



## Mains Practice Question

**Q.** Discuss the significance and challenges of developing a semiconductor and display manufacturing ecosystem in India. (150 Words)

24 Jan, 2024 GS Paper 3 Science & Technology

### Approach

- Write an introduction about the semiconductor.
- Mention the significance of semiconductor development.
- Write challenges associated with the display manufacturing ecosystem.
- Write a way forward.

### Introduction

A semiconductor is a type of material that has properties that fall between those of conductors and insulators in terms of its ability to conduct electrical current. The electrical conductivity of semiconductors can be manipulated by introducing impurities or applying an external electric field.

### Body

#### Significance:

- **Strategic Security:** As semiconductors are omnipresent, from smartphones to defense equipment, domestic production reduces dependence on foreign suppliers and mitigates the risk of supply chain disruptions. This empowers India's strategic autonomy and enhances national security.
- **Tech Independence:** Reliance on imported chips hinders domestic technology development. An indigenous ecosystem accelerates technology development across sectors, empowering India to create its own solutions and break free from reliance on foreign technologies.
- **Economic Booster:** The industry offers high-skilled jobs, attracts foreign investments, and fosters innovation. It stimulates downstream industries like electronics manufacturing, creating a ripple effect in the economy.
- **Reduced Imports:** India currently imports over \$60 billion worth of semiconductors annually. Domestic production can significantly decrease this import bill, strengthening the balance of payments and saving valuable foreign exchange.
  - Reducing reliance on foreign suppliers for components translates to shorter supply chains, lower logistics costs, and quicker turnaround times, all contributing to cost reduction.

#### Challenges associated with display manufacturing ecosystem:

- **Technological Complexity:** Developing a display manufacturing ecosystem poses challenges due to the inherent technological complexity associated with producing advanced display technologies.
- **Capital Intensive:** Establishing a robust display manufacturing infrastructure requires substantial capital investments in cutting-edge equipment and facilities.
- **Supply Chain Constraints:** Vulnerabilities in the supply chain, such as geopolitical tensions or

disruptions, can adversely impact manufacturing operations.

- **Global Competition:** Competing on cost, quality, and technological innovation requires strategic planning and continuous improvement efforts at the global level.
- **Infrastructure Bottlenecks:** Unreliable power supply, inadequate water resources, and inefficient logistics hinder fab operations. Upgrading infrastructure to meet the sector's stringent requirements is a significant hurdle.

### Way forward

- **Investment in Research and Development:** Embrace innovation to remain competitive and address the evolving needs of the market.
- **Collaborative Partnerships:** Joint efforts can help share expertise, mitigate risks, and collectively address challenges in technology development and manufacturing.
- **Diversification of Supply Chains:** Identify alternative sources for critical raw materials and components, ensuring a more resilient and adaptable manufacturing ecosystem.
- **Agile Market Strategies:** Stay agile in response to market dynamics and consumer preferences. Anticipate trends, invest in market intelligence, and adjust production strategies swiftly to meet changing demands.
- **Intellectual Property Protection:** Invest in robust patent strategies, engage in responsible licensing, and stay vigilant against infringement to safeguard proprietary technologies.
- **India Semiconductor Mission (ISM):** Government should promote and facilitate India's dream of becoming a global hub for electronics manufacturing and design through the success of the India Semiconductor Mission (ISM).

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