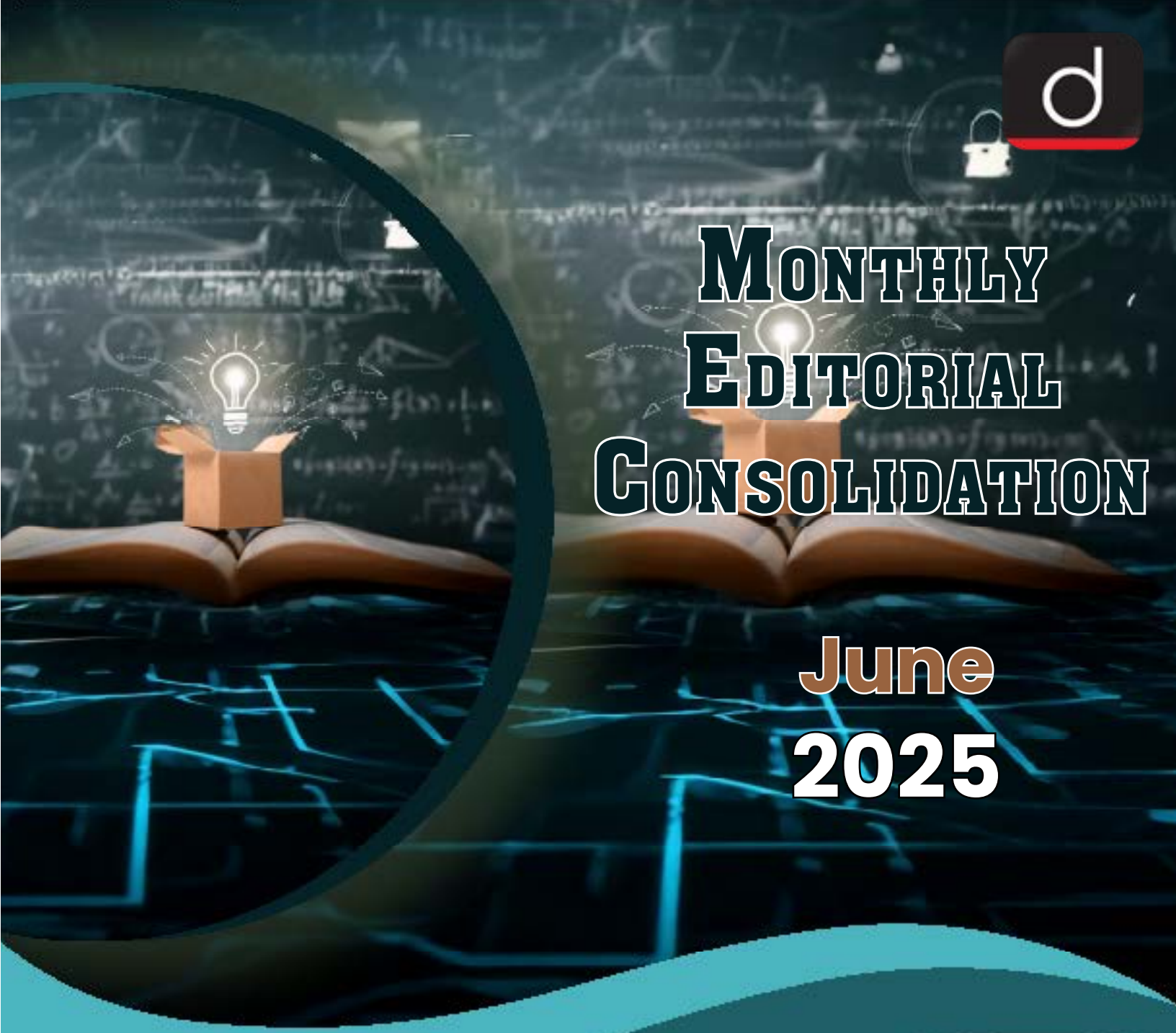


Monthly Editorial Consolidation

June 2025

C-171/2, Block-A, Sector-15, Noida

641, Mukherjee Nagar, Opp. Signature View Apartment, New Delhi

21, Pusa Road, Karol Bagh New Delhi

Tashkent Marg, Civil Lines, Prayagraj, Uttar Pradesh

Tonk Road, Vasundhra Colony, Jaipur, Rajasthan

Burlington Arcade Mall, Burlington Chauraha, Vidhan Sabha Marg, Lucknow

12, Main AB Road, Bhawar Kuan, Indore, Madhya Pradesh

E-mail : care@groupdrishti.in

Phone: +91-87501-87501

Content

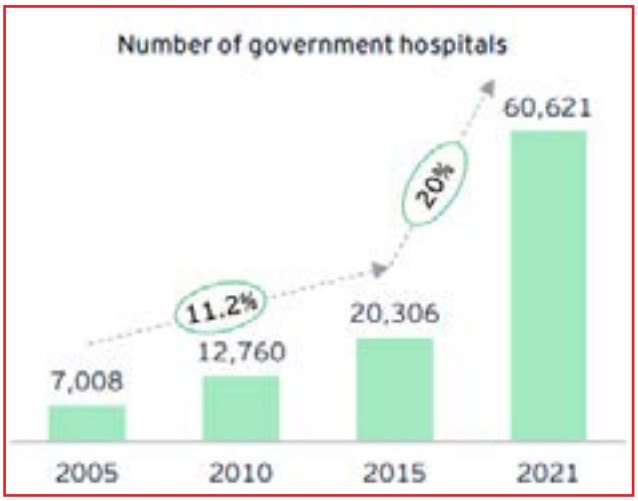
India'S Road to Universal Health Coverage

This editorial is based on "The road to Universal Health Coverage in India" which was published in The Indian Express on 30/05/2025. The article brings into picture the push for Universal Health Coverage through Ayushman Bharat, highlighting gaps like 400 million uninsured, and stresses the need to balance booming private healthcare with stronger public investment in primary care.

Tag: GS Paper - 2, Health, Government Policies & Interventions, GS Paper - 3, Government Budgeting, Planning

What are the Key Recent Developments in India's Healthcare Sector?

- **Expansion through Ayushman Arogya Mandirs:** Strengthening primary health care is crucial for universal health coverage and reducing the burden on tertiary facilities.
  - The **Ayushman Bharat** initiative's transformation of more than **1.7 lakh Health and Wellness Centres by March 2024** exemplifies this focus.
  - These centres integrate preventive, promotive, and rehabilitative care, including **Yoga and AYUSH**, addressing holistic health needs.
  - The **AAMs grew at a CAGR of 46.6% from 2018-19 to 2023-24**.
- **Surge in Public Hospitals Growth:** Robust healthcare delivery depends on infrastructure availability; hence, increasing public hospitals improves accessibility and affordability.
  - From **7,008 hospitals in 2005 to 60,621 in 2021**, India recorded a CAGR of **14.4% in public hospitals**, reflecting massive infrastructure scaling.
  - This expansion alleviates strain on urban hospitals and improves rural healthcare reach, vital for equitable health outcomes.



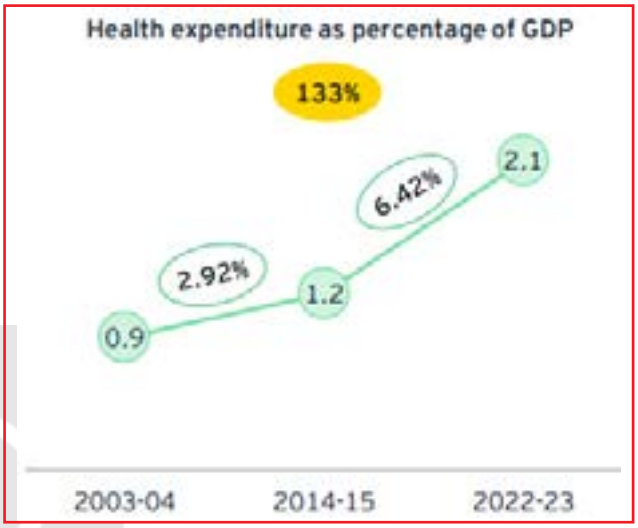
- **Digital Transformation in Healthcare Delivery:** Digital tools are revolutionizing healthcare access, improving efficiency, transparency, and data-driven decision making.
  - Initiatives like the **Ayushman Bharat Digital Mission, CoWIN, Aarogya Setu, and e-Sanjeevani** have digitally connected millions, enhancing telemedicine and pandemic response.
  - Over 2.96 lakh health professionals are registered on the **Health Professionals Registry (HPR)**, enabling interoperable digital services nationwide.
- **Expanding Health Insurance Coverage via PM-JAY:** Reducing catastrophic out-of-pocket expenses requires robust health insurance coverage and financial risk protection.
  - **PM-JAY extends coverage to nearly 15 crore families,** with INR 5 lakh per family annually, encompassing secondary and tertiary care with 1,900 packages and no pre-existing condition exclusions.
  - So far, **6.5 crore hospital admissions worth INR 81,979 crore** have been authorized, demonstrating scale and impact.
- **Enhanced Focus on Disease Surveillance and Prevention:** Early detection and prevention of communicable diseases remain key to reducing health system burden.

- The **Integrated Disease Surveillance Programme (IDSP),** operational since 2004, strengthens public health monitoring for rapid outbreak response.
- Combined with Janani Suraksha schemes, these programs significantly contribute to reducing morbidity and mortality.

- **Increase in Public Healthcare Utilization and Quality Standards:** Rising trust in public healthcare is visible as government hospitals' share of OPD and IPD rose by over **25% since 2014,** reflecting improved access and affordability.
  - Implementation of **National Quality Assurance Standards (NQAS)** for hospitals and PHCs ensures benchmarked service quality, promoting patient safety and satisfaction nationwide.
- **Growing Pharmaceutical Industry and Medical Device Sector:** India's pharma sector, the "pharmacy of the world," is expanding with a projected market size of **$130 billion by 2030, boosting affordable access and exports.**
  - The 2023 Medical Device Policy enhances domestic manufacturing capacity and quality, aligning with Make in India **and Atma Nirbhar Bharat** initiatives to reduce import dependence and foster innovation.
- **Strengthened Healthcare Workforce and Education:** An adequate, skilled workforce is the backbone of quality healthcare; hence, **India has ramped up medical and nursing education.**
  - Registered nurses increased from **14.81 lakh in 2005 to 36.14 lakh in 2022 (CAGR ~4.9%),** while allopathic doctors rose from 6.6 lakh to 13.08 lakh (CAGR ~4.1%).
  - The **FY23 budget's 157 new nursing colleges** will address workforce shortages and global demand for Indian nurses.

What are the Key Issues Hindering the Effectiveness of India's Healthcare Sector?

- **Inadequate Public Health Expenditure:** Low and uneven public spending constraints infrastructure, workforce, and quality improvements in healthcare.
  - India's public health expenditure is just **2.1% of GDP (2022-23)**, below the recommended **2.5% by the 15th Finance Commission.**
  - This limits the scaling up of critical services despite growing demand. Many developed countries allocate **5-10% of GDP to health**, underscoring India's underinvestment challenge



- **Persistently High Out-of-Pocket Expenditure (OOPE):** High OOPE leads to financial hardship and pushes millions into poverty, limiting healthcare access for vulnerable populations.
  - Despite progress, **OOPE remains at 39.4%,** with outpatient care accounting for **two-thirds of this spending.**
  - **Drugs alone constitute over 67% of OOPE,** emphasizing the need for affordable medicines and insurance coverage expansion.
  - **Absence of uniform standards** and unchecked commercialization result in variable quality and high costs.
- **Insufficient Insurance Coverage and Focus on Outpatient Care:** Nearly **400 million Indians remain uninsured**, especially for outpatient expenses which dominate healthcare costs.
  - **PM-JAY mainly covers inpatient hospitalization**, leaving outpatient and chronic care uncovered, impacting affordability and early intervention.

- The gap in comprehensive coverage hampers **Universal Health Coverage goals by 2030.**

- **Skewed Healthcare Workforce Distribution and Shortages:** Though numbers of doctors and nurses have risen, there is a **significant urban-rural and public-private imbalance affecting access and quality.**
  - Though **India's doctor-population ratio at 1:854** is better than the World Health Organisation's standard of 1:1000, rural areas face acute shortages, and **registered AYUSH practitioners remain underutilized** despite growing demand for integrative medicine.
  - Also, private facilities cater largely to **urban and affluent populations,** creating disparities.
- **Infrastructure Deficits and Quality Gaps in Public Facilities:** Though public hospitals have expanded, **many still suffer from inadequate beds, equipment, and maintenance, affecting patient outcomes.**
  - **India's hospital bed density remains around 0.5 beds per 1,000 population,** well below **WHO's 3 beds per 1,000 benchmark**.
  - Quality gaps persist despite **National Quality Assurance Standards (NQAS),** especially in rural and remote areas.
- **Limited Emphasis on Preventive and Primary Care:** Healthcare remains skewed towards curative **tertiary care rather than prevention and primary health services.**
  - **Non-communicable diseases (NCDs) now account for over 60% of deaths,** yet preventive outreach is insufficient.
  - Strengthening Health and Wellness Centres is ongoing but **needs faster scaling and integration with community health workers.**
- **Data Privacy Issues in Digital Health Integration:** While digital health initiatives have progressed**, interoperability, data privacy, and inclusion remain issues.**
  - For instance, the Indian healthcare industry faced more than 1.9 million cyberattacks in 2022. Major cyber attacks reported around India over the past five years involved hospitals, including **AIIMS Delhi and Safdarjung Hospital.**

What Measures can India Adopt to Enhance the Healthcare Sector?

- **Strengthen and Integrate Primary Healthcare Networks:** Transform **Ayushman Arogya Mandirs into vibrant hubs** that not only deliver comprehensive primary care but also synergize with **sanitation (Swachh Bharat), nutrition (Poshan Abhiyan), and education initiatives.**
  - This integrated model will enhance health determinants holistically, promote early disease detection, and significantly reduce the tertiary care burden.
  - Creating **robust referral linkages and ensuring seamless data flow across PHCs, CHCs, and higher centers** can institutionalize continuity of care and equity in access.
- **Revolutionize Health Workforce Capacity:** Adopt an **incentive-driven ecosystem incorporating rural service bonds**, accelerated career progression, and financial rewards to retain healthcare professionals in underserved areas.
  - Align **medical education curricula with community health needs** and embed training for multidisciplinary health workers, including AYUSH practitioners, through schemes like the **National Health Mission.**
  - This will create a **resilient, versatile workforce** attuned to India's epidemiological transition and demographic diversity.
- **Expand Universal Health Insurance to Holistically Cover Outpatient, Preventive, and Chronic Care:** India can rethink **PM-JAY and insurance schemes to encompass outpatient diagnostics, medicines, and preventive screenings,** tackling the major share of out-of-pocket expenditure **(only to most vulnerable section in initial stages).**
  - Introduce modular insurance products for chronic diseases management, incentivizing early intervention and reducing hospitalization.

- This **paradigm shift will ensure financial risk protection** while aligning with global best practices for universal health coverage.

- **Unified Regulatory Framework for Private Healthcare with Digital Oversight:** Create a centralized regulatory authority empowered to **enforce comprehensive quality standards, ethical pricing, and grievance redressal** across private providers.
  - Integrate this framework with digital health initiatives such as ABDM and hospital accreditation bodies to enable real-time monitoring and transparency.
  - Such **harmonization will foster trust, reduce exploitative practices**, and promote equitable healthcare delivery.
- **Driving Data-Enabled, Patient-Centric Care:** Accelerate the nationwide implementation of interoperable digital health records linked to AI-powered analytics for predictive disease modeling, resource optimization, and personalized care pathways.
  - Ensure **100% registration of healthcare professionals and facilities on the Health Professionals Registry** and Healthcare Facilities Registry under ABDM.
  - Concurrently, **enforce stringent data privacy and cybersecurity frameworks** to build citizen confidence and promote ethical data use.
- **Drive Innovation and Self-Reliance in Pharmaceuticals and Medical Devices:** Promote public-private partnerships and increase R&D funding for frontier technologies like **organ bioprinting, robotics, and AI diagnostics** under the **Medical Device Policy 2023**.
  - Facilitate backward integration in supply chains and streamline regulatory approvals to bolster India's global competitiveness.
  - Align these initiatives with the **Make in India and Aatmanirbhar Bharat missions** to transform India into a global hub for affordable, high-quality healthcare innovation.

What India can Learn from Others in Healthcare?

- **Universal Primary Care Access:** Adopt Brazil's Family Health Strategy for community-based primary care coverage.
- **Efficient Health Financing:** Learn from Thailand's Universal Coverage Scheme to reduce out-of-pocket expenses.
- **Digital Health Integration:** Emulate Estonia's nationwide e-health record system for seamless data sharing.
- **Public-Private Collaboration:** Study Germany's regulated private insurance and public system synergy.
- **Preventive Health Focus:** Incorporate Finland's successful non-communicable disease prevention programs **(North Karelia Project).**

Conclusion:

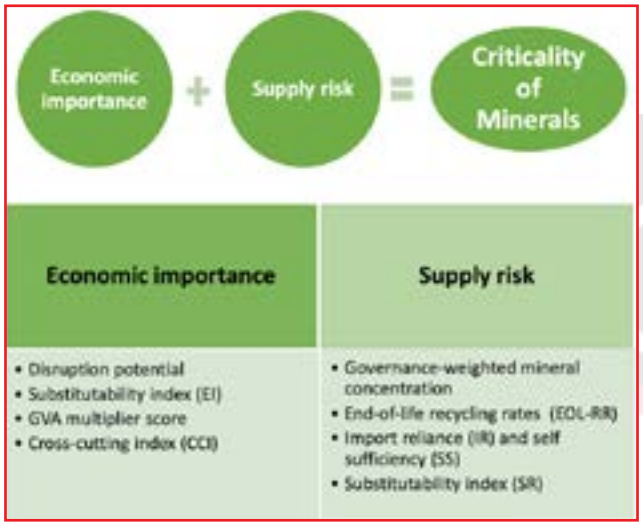
India's healthcare transformation demonstrates significant progress toward achieving **Universal Health Coverage,** aligning with **Sustainable Development Goal 3 (Good Health and Well-being).** To move from **reactive to preventive care,** India must balance the rapid growth of its private healthcare sector with increased public investment in primary health systems, digital integration, and health workforce expansion. A **people-centric, inclusive, and resilient healthcare** ecosystem is essential **to ensure equitable access and financial protection for all by 2030.**

Strengthening India'S Critical Mineral Supply Chain

This editorial is based on "India's critical mineral challenge threatens its 2030 economic goals" which was published in Business Standard on 02/06/2025. The article brings into picture the risks of India's import dependence for critical minerals, as China's rare earth export curbs threaten EV supply chains.

Tag: GS Paper - 3, Growth and Development, GS Paper - 1, Mineral & Energy Resources, GS Paper - 2, Government Policies & Interventions

China's recent restrictions on rare earth magnet exports have created supply concerns for India's growing EV sector, revealing the country's significant **reliance on imports for critical minerals.** While India possesses considerable reserves of important minerals like cobalt and rare earth elements, the nation has historically focused less on exploration and processing infrastructure development. This import dependency extends to other **essential minerals including lithium, graphite, and emerging resources like natural hydrogen and thorium**. As India works toward becoming the **world's third-largest economy**, developing domestic mining and processing capabilities will be essential for securing **mineral supply chains and reducing import dependence.**



What Role does Critical Minerals Play in India's Growth Story?

- **Driving Renewable Energy Expansion:** Critical minerals like **silicon, tellurium, and rare earth elements** are indispensable for **solar panels and wind turbines,** forming the foundation of India's clean energy goals.
  - India's renewable capacity aims for **50% non-fossil power by 2030,** relying heavily on these minerals.
  - For instance, India's solar capacity reached 64 GW in 2024, with wind set to grow from 42 GW to 140 GW by 2030. This creates massive demand for these minerals to meet climate targets.
- **Powering Electric Mobility Revolution: Lithium, cobalt, and nickel** are essential for lithium-ion batteries, which are the heart of **India's electric vehicle (EV) ambitions.**
  - Currently, **India imports 100% of its lithium and cobalt,** with China supplying over 70% of lithium imports. This supply is critical to sustain India's EV industry growth.
- **Strengthening Electronics and Semiconductor Manufacturing: Gallium, germanium, and indium** serve as core inputs for semiconductors and advanced electronics **(IndiaAI Mission and Semiconductor Mission)**, crucial for India's goal of self-reliance in high-tech manufacturing.
  - India is almost fully **import-dependent on these minerals, primarily from China.**
  - Recent strategic partnerships, including joining the **Minerals Security Partnership,** aim to secure these inputs and boost domestic manufacturing capabilities.
- **Enhancing National Security and Defence Capability: Titanium, rare earth elements, and nickel** are critical for **aerospace, defense electronics, and strategic equipment manufacturing.**
  - India's defence sector depends heavily on imports, with **over 50% reliance on titanium and significant dependence on rare earths.**
  - The government's centralized auction system for critical minerals enhances control over these vital resources for national security.
- **Fueling Economic Growth and Employment:** Domestic mining and processing of critical minerals can catalyze industrial development and job creation in mineral-rich regions.
  - The National Critical Mineral Mission aims to train 10,000 skilled workers and initiate **1,200 exploration projects by 2031**.
  - Auctions involving companies like Vedanta and Ola Electric demonstrate growing private sector participation, boosting local economies and reducing import bills.

What are the Key Issues Associated with India's Critical Mineral Supply Chain?

- **Overdependence on Chinese Imports:** India's critical mineral supply chain is perilously dependent on China, creating a geopolitical chokehold that threatens national security and economic growth.
  - Minerals like **lithium (82% import share), bismuth (85.6%), and silicon (76%)** are overwhelmingly sourced from China, exposing India to supply manipulation amid rising bilateral tensions.
  - The **recent rare earth export restrictions by China** spotlight the fragility of this dependency.
- **Bottlenecks in Domestic Exploration and Auctioning:** Despite substantial mineral reserves, India's domestic extraction suffers from **bureaucratic delays and unattractive auction designs,** deterring private investment.
  - Since 2023, **over 100 critical mineral blocks have been auctioned but many remain unsold**—14 out of 18 auctions in June 2024 were annulled for lack of technical bids—highlighting industry scepticism.
  - Complex mineralogy, like **lithium in clay form in Jammu & Kashmir,** demands high upfront risk capital, further discouraging exploration.
- **Underdevelopment of Mineral Processing and Refining Ecosystem:** India's value chain bottleneck lies in its negligible processing capabilities, compelling it to **export raw ores and import costly refined materials.**
  - China commands over **87% of rare earth processing and 58% of lithium refining,** enabling supply chain dominance.
  - India's IREL, with **a capacity of 600,000 tons/year,** struggles to meet the growing demand for battery-grade minerals, delaying indigenous EV and semiconductor manufacturing ambitions.
    - This processing gap erodes domestic value addition.
- **Environmental and Socio-Political Challenges:** Mining operations face growing scrutiny over **ecological degradation, pollution, and displacement of indigenous communities,** intensifying project delays.
  - Many critical mineral deposits lie in **ecologically fragile or tribal regions**, where environmental clearances are arduous.
  - **Rajasthan's rare earth projects have stalled amid such issues.** Without stringent **ESG frameworks and community engagement**, opposition risks escalating, jeopardizing mining licenses and supply security.
- **Volatile Global Market Prices and Investment Risks:** The fluctuating and unpredictable prices of critical minerals create uncertainty for policymakers and manufacturers.
  - For example, the **price of lithium fell 75% in 2023 after spiking over 400%** in 2022, and **cobalt has lost two-thirds of its value from its peak in 2022**. **(World Economic Forum)**
  - Supply disruptions, driven by geopolitical tensions and export controls, magnify **price swings.**
    - Such volatility **inflates green tech project costs**, complicates budgeting, and deters long-term investments necessary for India's ambitious renewable and EV targets.
- **Technological Deficiency and Human Capital Gaps:** Advanced mining and beneficiation technologies are critical for exploiting deep and complex deposits, but India lacks **both technology and skilled manpower at scale.**
  - The **National Critical Mineral Mission's plan to train 10,000 workers addresses this,** but current shortfalls slow project timelines.
  - Extraction of **lithium from clay in Reasi** requires sophisticated **hydrometallurgical expertise** absent domestically, prolonging import reliance and delaying strategic autonomy
- **Nascent Circular Economy and Recycling Infrastructure:** India's recycling framework for critical minerals is underdeveloped, limiting recovery from **e-waste and spent batteries,** which could mitigate import dependence and environmental impact.
  - Although **India plans ₹1,500 crore incentives to recycle 24 critical minerals like lithium & cobalt,** current infrastructure is sparse and inefficient.

- Furthermore, **export bans by China and Europe on battery scrap ('black mass')** restrict secondary raw material access, stalling India's transition to a sustainable circular mineral economy.

What Measures can India Adopt to Strengthen its Critical Mineral Supply Chain?

- **Streamline Regulatory Framework and Simplify Mineral Auction Processes:** India must overhaul and modernize its mining laws to enable faster grant of exploration and mining leases, reducing bureaucratic delays and enhancing transparency.
  - Introducing **single-window clearances and digitized land and environmental approvals** can accelerate project execution.
  - Flexible auction models, **such as exploration-cum-mining rights,** should incentivize private investment by allowing firms to mine discovered deposits. This will attract risk capital and catalyze domestic production.
- **Integrated Mineral Processing Parks:** Develop dedicated mineral processing hubs equipped with advanced beneficiation and refining technologies to **create value-added products domestically.**
  - These parks should facilitate **co-location of mining, processing, and manufacturing units,** improving logistics and reducing costs.
  - **Public-private partnerships and technology transfer agreements** can accelerate capacity building. This integration will enhance supply chain resilience and reduce dependency on imported refined minerals.
- **Invest Heavily in R&D for Alternative Materials:** Focus on research to develop **substitutes for critical minerals and eco-friendly extraction techniques** tailored for India's unique geology.
  - Collaborations between academia, industry, and government research institutions can foster innovation in low-cost, sustainable mining and recycling technologies.
  - Prioritizing technology to extract minerals from complex sources, such as **lithium from clay, will unlock untapped domestic reserves.** This will reduce import reliance and environmental impact.
- **Strategic Mineral Stockpiling and Supply Chain Diversification:** Create and maintain strategic reserves of critical minerals to buffer against global supply shocks and price volatility.
  - Simultaneously, **diversify import sources by strengthening bilateral and multilateral partnerships** with multiple resource-rich countries beyond China.
  - **Institutionalize long-term off-take agreements and joint ventures** to secure stable supplies. This dual approach ensures uninterrupted availability while mitigating geopolitical risks.
- **Scale Up Skill Development and Specialized Training Programs:** Launch comprehensive capacity-building initiatives to develop a skilled workforce proficient in advanced mining, mineral processing, and environmental management.
  - Incorporate emerging technologies like **AI and IoT for precision mining into training curricula.**
  - Collaborate with global centers of excellence to upgrade local expertise rapidly. A robust talent pipeline is critical to operational excellence and scaling domestic critical mineral industries.
- **Promote Circular Economy with Incentivized Recycling:** Formulate policies that incentivize recovery of critical minerals from **e-waste, battery scrap, and mining tailings through financial subsidies and regulatory support.**
  - Establish certified recycling infrastructure and streamline waste collection mechanisms nationwide.
  - **Foster innovation in urban mining technologies** and mandate minimum recycled content standards in manufacturing. This will reduce virgin mineral demand and environmental footprint.
- **Leverage Digital Technologies for Transparent and Efficient Supply Chain Management:** Adopt blockchain and **AI-driven platforms to track mineral provenance, quality, and movement across the supply chain,** enhancing transparency and reducing illicit mining and trade.

- Real-time data analytics can optimize inventory management and forecast supply-demand imbalances.
- Digitalization enables swift regulatory compliance, enhances investor confidence, and strengthens India's global credibility in responsible sourcing.

Conclusion:

Securing India's critical mineral supply chain is vital for its clean energy ambitions, economic growth, and national security. Holistic measures—**ranging from regulatory reforms and advanced processing to strategic diversification and circular economy initiatives**—are essential to reduce import dependence and build resilience. A proactive, integrated approach will position **India as a self-reliant leader in the critical minerals ecosystem**

Reimagining India'S Manufacturing Future

This editorial is based on "Manufacturing is crying out for a reality check" which was published in The Livemint on 04/06/2024.The article brings into focus the global challenges in reviving manufacturing amid automation and China's overproduction woes. It emphasizes that India should pursue a diversified growth model, leveraging its strengths in services and skilled workforce alongside manufacturing.

Tag: GS Paper - 3, Industrial Policy, Infrastructure, Growth & Development

The global push to revive **manufacturing** jobs faces challenges as **automation reduces labor requirements,** while countries like China struggle with overproduction and financial inefficiencies in sectors like electric vehicles. For **India's manufacturing sector,** this global experience offers crucial lessons as the **country seeks to balance industrial growth with employment generation.** India's path to sustainable industrial growth lies **not in replicating China's manufacturing-heavy model, but in developing a diversified economy** that combines production capabilities with the nation's natural advantages in services and skilled workforce development.

What are the Key Drivers of Growth for India's Manufacturing Sector?

- **Policy Support and Government's Push:** India's government has made substantial efforts to boost manufacturing through schemes like the **Production Linked Incentive (PLI)** and **Atmanirbhar Bharat Abhiyan.**
  - These policies encourage investment and capacity building in sectors like electronics, textiles, and semiconductors.
  - The **PLI scheme** alone has attracted investments of over INR **1.03 lakh crore** by November 2023.
  - Moreover, **foreign direct investment (FDI)** inflows in the manufacturing sector grew by **69%** from 2014-2024, demonstrating the positive impact of policy reforms.
- **Demographic Dividend and Labor Force:** India's large, youthful labor force is a crucial driver for the growth of labor-intensive sectors like textiles and apparel.
  - With a **working-age population** of **900 million**, the country has a competitive edge in global markets.
  - For instance, the textile and garment sector employs nearly **45 million people**, providing significant employment opportunities.
  - Additionally, the growth of the **gig economy**, expected to reach **230 million workers** by 2030, adds further dynamism to manufacturing.
- **Technological Advancements and Smart Manufacturing:** The adoption of **Industry 4.0 technologies** like **AI, IoT**, and **automation** is enhancing productivity and reducing costs in India's manufacturing sector.
  - Companies are increasingly integrating **automation technologies** to stay competitive.
  - For example, **Larsen & Toubro** and **Siemens** have implemented **AI-driven** production systems to improve quality and reduce cycle times.
  - **India leads globally in manufacturing technology investment**, signaling a shift towards advanced production techniques.

- **Export Growth and Global Supply Chain Integration:** India's expanding role in global supply chains, particularly in sectors like **electronics, pharmaceuticals, and automotive**, is a major driver of manufacturing growth.
  - The rise of the China+1 strategy has led many global companies to shift their production to India.
  - For instance, **Apple's production in India** reached **$14 billion** in 2023, marking a significant increase.
    - Global firms like **Siemens**, **Micron**, and **Tesla** have increased investments, strengthening India's position in high-tech manufacturing
  - Additionally, India's **manufactured exports** surged to **$450 billion** in 2023-24, with key sectors like **pharmaceuticals** and **electronics** driving much of the growth.
- **Infrastructure Development and Logistics Efficiency:** The government's focus on improving **infrastructure**, such as **industrial parks**, **logistics hubs**, and **smart cities**, is pivotal for manufacturing growth.
  - The National Infrastructure Pipeline (NIP) aims to invest **$1.4 trillion** into infrastructure over the next decade.
  - For instance, **Gujarat has become a top destination for manufacturing with a 45% contribution to its GDP from manufacturing**, aided by robust infrastructure and logistical advantages.
- **Domestic Market Growth and Consumption Demand:** The rise of India's **middle class** and increasing **domestic consumption** is a significant driver for manufacturing, especially in sectors like **consumer goods, automobiles**, and **electronics**.
  - India's **GDP growth** at **6.4%** in FY 2024-25 supports the potential for domestic demand-driven manufacturing growth.
  - With India set to become the **3rd-largest consumer market by 2026**, it presents a promising avenue for manufacturers to cater to growing domestic demand.
- **Sustainability and Green Manufacturing:** India's emphasis on **sustainable manufacturing practices** is becoming a crucial driver for growth.
  - Policies promoting **clean energy** and electric vehicles **(EVs)**, alongside a commitment to the National Green Hydrogen Mission, are reshaping the sector.
  - The **electric vehicle (EV) market** alone is expected to contribute **$1 billion** in **exports by 2025**, driven by increasing demand for **green technologies** and sustainable products globally.

What Factors Are Limiting Manufacturing Sector's Contribution to India's Economic Growth?

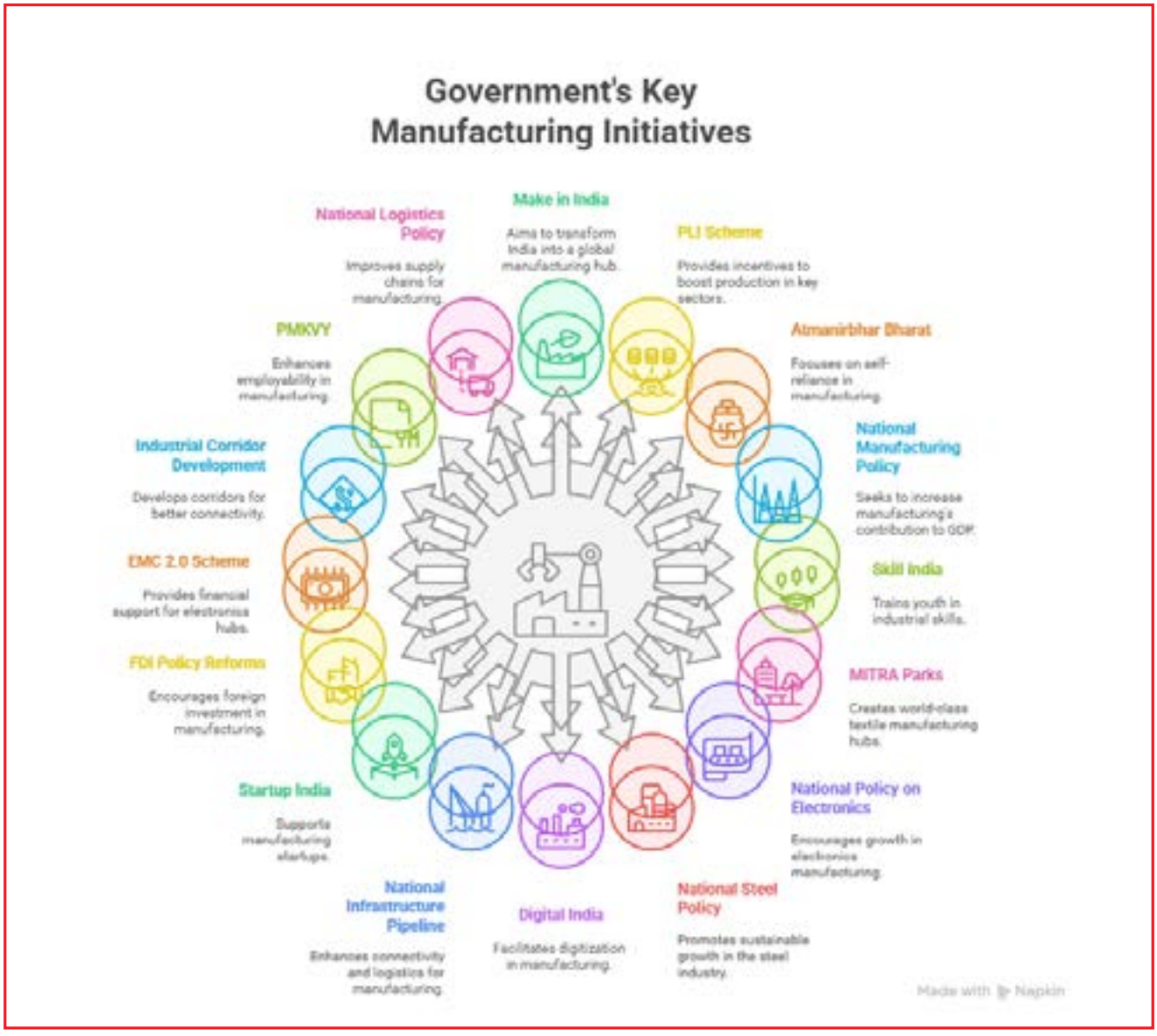
- **Inadequate Infrastructure and Logistical Challenges:** Poor infrastructure and logistical bottlenecks severely restrict the efficiency of India's manufacturing sector.
  - Despite the National Infrastructure Pipeline **(NIP)** targeting **$1.4 trillion** investments, issues in road, rail, and port connectivity persist.
  - India in the logistics performance index ranks **38th** globally (2023), far behind China and Vietnam.
  - These infrastructure inefficiencies increase manufacturing costs by **20-30%**, **making it difficult for India to compete with nations like Vietnam**, which offers more efficient logistics systems.
- **Regulatory Complexity and Bureaucratic Hurdles:** India's manufacturing sector faces significant challenges due to complex regulations and a burdensome compliance framework.
  - Despite reforms, bureaucratic inefficiencies continue to hinder growth. For example, the **Ease of Doing Business** ranking, though improved to **63rd** in 2020, still lags behind regional competitors like **Malaysia**.
  - The **constant policy changes and delays in approvals from state and central authorities** further increase operational costs for manufacturers, impacting global competitiveness.

- **Skill Gap and Labor Shortages:** The shortage of skilled labor is a persistent issue that limits the productivity and growth of India's manufacturing sector.
  - Despite initiatives like Skill India, there remains a significant mismatch between the skills required by industries and those available in the labor market.
    - **India's Graduate Skill Index 2025** reveals that only 42.6% of Indian graduates are employable.
  - **India's labor productivity** in manufacturing remains much lower than that of **China**. In sectors like **textiles and automotive**, skilled labor is in short supply, preventing manufacturers from scaling efficiently.
- **High Energy Costs and Inadequate Power Supply:** High energy costs and unreliable power supply hinder the competitiveness of Indian manufacturers.
  - Compared to regional competitors, **India's energy prices** are **10-60% higher.**
  - Recent data states that India's industrial electricity tariffs will average nearly **₹8/kWh in 2025**, with costs expected to rise.
  - The combination of high energy expenses and the frequent instability of power supply exacerbates the situation, making it difficult for industries to operate efficiently.
- **Dependence on Imports and Lack of Domestic Innovation:** India's manufacturing sector remains overly dependent on imports, especially for critical raw materials and high-tech components.
  - The **automobile industry** is a prime example, where a large portion of parts and materials are still imported.
    - Also, India's semiconductor imports reached ₹1.71 lakh crore in FY24.
  - **FDI in the manufacturing sector** surged by **69%** over the last decade, yet India's R&D expenditure on manufacturing remains low, at just **0.64% of GDP**, compared to China's **2.4%**.
    - This lack of indigenous innovation limits long-term industrial self-sufficiency.
- **Land Acquisition Issues and Expensive Real Estate:** Land acquisition remains a major bottleneck for manufacturing growth in India, with **cumbersome processes and land acquisition laws** causing delays in factory establishment.
  - The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013 (LARR Act) was introduced to address these issues by ensuring fair compensation and a transparent process.
    - However, its implementation has faced criticism for being cumbersome and time-consuming, deterring investment and slowing down project implementation.
  - Moreover, **high land prices and limited availability of affordable land** in industrial zones increase the cost of setting up manufacturing units.
    - **For instance, Maharashtra**, despite being an industrial hub, faces land-related issues that slow down industrial development.
- **Environmental Regulations and Sustainability Constraints:** While the shift to sustainable manufacturing is essential**, stringent environmental regulations often create additional compliance costs for manufacturers.**
  - Despite initiatives like **Make in India** and **PLI schemes**, the stringent environmental standards in India create barriers for manufacturers.
  - In sectors like **textiles**, compliance with **pollution control norms** increases production costs by approximately **15-20%**.
    - These regulations, though crucial for long-term sustainability, **burden small and medium-sized enterprises (SMEs) particularly**, limiting their scalability.
- **Global Competition and Declining Share in Global Manufacturing:** India's share in global manufacturing remains low compared to leading countries like **China** and **Vietnam**.

- With **China controlling 31%** of global manufacturing, India's share is only **2.87%**.
- This gap has widened due to India's slower adoption of cutting-edge manufacturing technologies like **automation** and **AI**.
- While India's **Manufacturing PMI** of **57.6** in May 2025 indicates positive growth, it lags behind more competitive nations, putting its manufacturing ambitions at risk in an increasingly globalized market.

External Market Vulnerabilities and Trade Policy Risks: India's manufacturing sector is increasingly vulnerable to external shocks, such as **trade disruptions, tariff hikes, and geopolitical tensions.**

- For instance, the US-China trade war **(tariff escalation)** led many companies to shift production to India, but protectionist policies in major markets like the **US** and **Europe** pose risks for Indian exporters.
- With **India's export growth** stagnating at **$450 billion in FY 2023-24,** rising trade barriers and fluctuating global demand limit the sector's ability to grow in international markets.



What Measures India Can Adopt to Enhance the Productivity and Sustainability of the Manufacturing Sector?

- **Promote Smart Manufacturing and Digital Transformation:** India must accelerate the adoption of Industry 4.0 technologies, including **AI, IoT, and automation**, to modernize manufacturing processes.
  - By integrating **smart sensors**, predictive maintenance, and **real-time data analytics**, manufacturers can increase efficiency and reduce operational costs.
  - Establishing **technology hubs** and incentivizing **public-private partnerships (PPPs)** in advanced manufacturing will help small and medium-sized enterprises (SMEs) adopt digital technologies at scale.
- **Strengthen Skill Development with Industry-Specific Training Programs:** Bridging the skill gap is essential for enhancing manufacturing productivity. India should create **sector-specific training institutes** in collaboration with industry leaders to address the evolving needs of the manufacturing sector.
  - These institutes should focus on **advanced manufacturing techniques**, **robotics**, and **sustainable production methods** to ensure a workforce ready for the next generation of industrial growth.
- **Streamline Regulatory Processes for Ease of Doing Business:** A critical measure is the simplification of India's regulatory framework to reduce compliance costs and delays.
  - Implementing a **single-window clearance system** for all industrial permits, aligning state and central regulations, and reducing the complexity of labor laws can create a smoother environment for manufacturers.
  - A **national policy for expedited approval processes** in key sectors like **electronics, textiles, and automotive** will help improve the ease of setting up new factories, fostering greater investment.
- **Develop Robust Industrial Clusters and Infrastructure:** Establishing **integrated industrial clusters** and **logistics hubs** with modern infrastructure will significantly enhance manufacturing efficiency.
  - These clusters should have access to **shared utilities**, **skilled labor**, and **logistics networks**, fostering collaboration and economies of scale.
  - By focusing on creating **greenfield industrial zones** with **adequate water, power, and transportation facilities,** India can reduce the cost and time needed to establish new manufacturing plants, attracting both domestic and foreign investments.
- **Incentivize Research and Development in Green Technologies:** India must intensify efforts to **innovate and invest** in sustainable manufacturing practices.
  - Providing fiscal incentives such as **tax rebates** and **R&D grants** for the development of **green technologies** can help the industry transition towards environmentally friendly production.
  - Integrating **renewable energy sources** and **waste-to-energy solutions** within industrial zones will promote both sustainability and cost savings.
  - Additionally, policies should focus on promoting **eco-labeling** and **green certification programs** to encourage the adoption of eco-friendly practices
- **Implement a National Strategy for Circular Economy:** A **circular economy framework** can help India build a more sustainable manufacturing sector by encouraging **waste reduction**, **reuse**, and **recycling** of materials.
  - A national strategy focused on **resource recovery**, **closed-loop supply chains**, and **waste minimization** will not only enhance sustainability but also reduce costs and dependency on raw materials.
  - Manufacturers should be incentivized to develop **closed-loop systems** and engage in **eco-design** that minimizes environmental impact throughout the product lifecycle.
- **Foster Innovation Ecosystems and Startup Incubators:** India should focus on fostering a culture of **innovation** by developing **startup incubators** and **innovation clusters** within industrial zones.

- Supporting startups in sectors like **additive manufacturing (3D printing)**, **robotics**, and **bio-manufacturing** can help create cutting-edge technologies and new business models in manufacturing.
- Linking these startups with established manufacturers will allow for a **continuous flow of innovation**, driving productivity and competitiveness in the global market.

- **Align Manufacturing with Export Competitiveness through Trade Agreements:** Strengthening India's **export-oriented manufacturing** by aligning it with international **free trade agreements (FTAs)** is a key measure.
  - India can enhance its market share in the global economy by utilizing **duty-free access** to key markets and improving **standards compliance** through trade agreements.
  - Moreover, ensuring that **manufactured goods** meet international quality standards and **certifications will open up more opportunities in high-demand global sectors,** boosting manufacturing productivity.

Conclusion:

India's manufacturing sector stands at a **crucial juncture, balancing the need for growth with employment generation and sustainability.** Leveraging key initiatives like **PLI, fostering a tech-driven ecosystem, and expanding export capabilities** are pivotal for future success. With a clear focus on innovation and strategic policy alignment, India can emerge as a competitive manufacturing hub globally while fostering inclusive economic growth.

Transforming Plastic Waste Management in India

This editorial is based on "What needs to be done to end plastic pollution" which was published in Hindustan Times on 04/06/2025. The article brings into focus India's proactive plastic waste policies amid a global surge in plastic use, but highlights persistent implementation gaps. It calls for a lifecycle-based, circular economy approach to align policy with on-ground action for real environmental impact.

Tag: GS Paper - 3, Conservation, Environmental Pollution & Degradation, Government Policies & Interventions

As World Environment Day reminds us of our collective responsibility toward the planet, global plastic consumption is set to exceed half a billion tons this year—**a 30% jump in just 12 months.** India has taken progressive legislative steps by updating its Plastic Waste Management Rules **through 2024,** that position the country ahead of many nations. However, critical implementation challenges persist, **including inadequate collection and recycling infrastructure, widespread lack of awareness,** and poor disposal practices leading to burning and abandonment of plastics. India's unique position to influence global sustainability targets requires adopting a **lifecycle approach grounded in circularity principles** while building a comprehensive movement that bridges policy vision with ground-level execution.

What are the Key Provisions and Institutional Mechanisms Under India's Plastic Waste Management Framework?

- **Solid Waste Management Rules, 2016**: Focused on **waste segregation at source**, **manufacturer responsibility**, and **user fees** for waste collection, ensuring scientific waste management practices.
- **Plastic Waste Management Rules, 2016**: Introduced **Extended Producer Responsibility (EPR)** for plastic producers, raising plastic carry bag thickness to **50 microns**. It mandated **segregation** and **proper disposal** of plastic waste, including rural areas in the implementation.

- **Plastic Waste Management Amendment Rules, 2018**: Phased out **non-recyclable multi-layered plastics (MLP)** and introduced a **registration system** for producers under **CPCB**, enhancing accountability in plastic waste management.
- **Plastic Waste Management Amendment Rules, 2021**: Banned **single-use plastics (SUPs)** by 2022 and increased **plastic bag thickness to 120 microns**. Strengthened **EPR** rules for **packaging waste**, promoting **recycling** and **design for reuse**.
- **Plastic Waste Management Amendment Rules, 2022**: Set **mandatory recycling** and **reuse targets** with **environmental compensation** for non-compliance. Promoted a **circular economy** approach for plastic recovery and reuse.
- **Plastic Waste Management Amendment Rules, 2024**: Defined **registration, reporting**, and **certification** requirements for manufacturers. Introduced **certification for biodegradable plastics** and mandates reporting of **pre-consumer plastic waste**.
- **National Dashboard for Single-Use Plastics**: Launched a **nationwide awareness campaign** on SUPs, along with a **grievance redressal app** for citizens to report illegal plastic activities and **monitor compliance**.
- **India Plastics Pact**: India's first **Plastics Pact**, aiming for a **reduction, reuse**, and **recycling** of plastics across the value chain, bringing together **stakeholders** to promote circularity.
- **Project REPLAN**: **Khadi and Village Industries Commission** launched **REPLAN**, offering sustainable alternatives to plastic bags, reducing plastic usage through **cloth bags**.

What Factors Are Undermining the Effectiveness of India's Plastic Waste Management Framework?

- **Inadequate Infrastructure for Waste Collection and Recycling:** While urban local bodies (ULBs) are mandated to ensure **100% waste segregation** and access to **Material Recovery Facilities (MRFs)**, much of the infrastructure is insufficient or poorly managed.
  - As a result, the **informal sector** manages over **60% of plastic recycling**, but lacks recognition and integration into formal systems.
  - Recent data reveals that only **8-10% of India's daily plastic waste (26,000 tonnes)** gets recycled, with the rest either **burned or dumped** in landfills and waterways.
- **Weak Enforcement of Plastic Waste Management Laws:** Although India has enacted **Plastic Waste Management (PWM) Rules** (2016) and subsequent amendments, **enforcement remains weak**, especially at local levels.
  - Bans on **single-use plastics (SUPs)** rules are often flouted, and **non-compliance** is widespread.
  - For instance, Despite a nationwide ban on single-use plastics, **carry bags** under **120 microns** continue to be sold, with **data** showing 775,577 kg of banned plastics seized in 2023 but the broader market still flooded with them.
    - For instance, in **Maharashtra**, over **80% of plastic debris** on beaches **still comprises banned SUPs,** illustrating the failure to implement these bans effectively.
- **Inadequate Alternatives and Innovation in Plastic Substitutes:** While India has attempted to phase out plastics, research indicates that **the plastic-alternatives market is niche**, with few cost-effective and **widely available substitutes**.
  - **In Madhya Pradesh**, **sal-leaf plates** are a successful alternative, but such solutions are not scalable across the country.
  - The **failure to incentivize alternative industries** means that plastic consumption continues to surge, with plastic waste only growing annually by **9%**.
- **Fragmented Extended Producer Responsibility (EPR) System:** The **EPR system** in India, although a step forward, is largely **inefficient** due to weak **compliance monitoring** and reliance on self-reporting.

- Producers are supposed to collect and recycle an equivalent amount of plastic waste they produce, but **lack of third-party auditing** and **data transparency** has led to subpar outcomes.
- **Recent reports** indicate that only a **fraction** of producers, importers, and brand owners have adhered to EPR targets, with **over 70% of registered companies failing** to meet plastic collection and recycling goals.

- **Public Awareness and Behavioral Change Gaps:** The **lack of comprehensive public awareness** is another critical factor undermining India's plastic waste management.
  - While there are sporadic campaigns like the Swachh Bharat Mission, they largely fail to engage communities and promote long-term behavior change.
  - Despite **national bans** on plastics, **field surveys** reveal that **in 2023**, public adherence to plastic bans was only 50-60%, with **low awareness** regarding the **harmful environmental effects of plastics**.
    - Data from **Delhi** shows that **690 tonnes of plastic waste** are generated every day, indicating that **simple awareness campaigns** have had limited success in changing consumer habits.
- **Fragmentation in Governance and Policy Implementation:** India's plastic waste management suffers from **fragmented governance** at multiple levels, from local municipal bodies to state and national agencies.
  - The diverse nature of India's waste sector, including both formal and informal stakeholders, leads to **confusion and delays in policy implementation**.
  - For instance, **municipalities** like **Pune** and **Chhattisgarh's Ambikapur** have made progress, but **national-level coordination is often lacking**, with local bodies unable to implement strategies without central support.
    - With **informal workers** handling **60% of recycling**, their exclusion from formal systems hinders effectiveness and complicates governance.

What Measures can Enhance the Effectiveness of Plastic Waste Management in India?

- **Decentralized Waste Processing Infrastructure:** Instead of relying solely on large-scale **centralized waste management systems**, the focus should shift to creating **decentralized, localized infrastructure** like **Material Recovery Facilities (MRFs)** at the community or ward level.
  - These MRFs should be equipped with modern **sorting technologies** like **AI-powered sorting machines**, making it easier to separate plastics from other waste types.
    - This would not **only reduce transportation costs** but also ensure quicker processing and higher recycling rates.
- **Enhanced Community Involvement through Micro-segregation:** One critical way to enhance local waste management is by promoting **micro-level segregation** in communities.
  - This involves encouraging households and local businesses to **segregate waste at the point of generation**, specifically plastics, food waste, and non-recyclables.
  - Local **waste collection systems** can be **incentivized by offering rewards or recognition (Indore Model)** to those consistently following proper segregation, thus creating a community-driven approach to plastic waste management.
- **Public-Private Partnerships for Technology Adoption:** To improve recycling infrastructure, the government should encourage **public-private partnerships (PPPs)** for the development of **advanced sorting technologies** and waste-to-energy systems.
  - The government can **encourage the use of plastic waste as raw material for 3D printing** by developing facilities that convert plastic waste into high-quality 3D printing filament.
  - Government incentives and subsidies for **clean-tech startups** in the waste management sector can spur growth in sustainable solutions.

- In 2016, the Government of India announced a mandate for the use of **plastic waste in road construction,** which has since led to the construction of over **100,000 kilometers of roads using this technology,** which is a significant step in the right direction.

- **Circular Economy-Based Incentives for Businesses:** India can implement a **circular economy model** by offering **financial incentives** for businesses that use recycled materials or **produce reusable packaging**.
  - This could include tax breaks, credits, or grants for adopting **closed-loop production systems**.
  - Encouraging businesses to embrace a **cradle-to-cradle** approach would ensure **resource efficiency** while driving industry-wide shifts toward sustainable plastic use and **waste reduction**.
- **National Plastic Waste Awareness and Education Campaigns:** Comprehensive **nationwide education campaigns** should be launched, targeting both urban and rural populations, to raise awareness about the **environmental impacts of plastic** and the importance of **waste segregation**.
  - These campaigns should focus on **behavioral change**, incorporating the significance of **sustainable consumption** and **responsible disposal** practices. **School-based programs** can also instill a culture of waste management at an early age.
- **Regulated Market for Plastic Alternatives:** India should facilitate the development of a **regulated market for plastic alternatives** by incentivizing the production of materials such as **plant-based bioplastics** and **compostable packaging**.
  - Set up innovation hubs or incubators focused on the research and development of biodegradable plastic alternatives.
    - These hubs can bring together scientists, engineers, and entrepreneurs to explore new materials, such as **plant-based plastics or plastic-like materials made from seaweed or mushrooms**, that can decompose in the environment.
- **Stronger Enforcement of Plastic Bans through Technology:** A more **tech-driven approach** to enforcement should be adopted, including the use of **data analytics** and **AI-powered surveillance** to track plastic usage and sales in real-time.
  - **Mobile apps** can be developed for citizens to report illegal plastic activities, and penalties can be automated through a **centralized digital platform** that connects regulators and the public.
    - This would enhance monitoring and ensure swift action against violators.
- **Incorporation of Waste Pickers into Formal Systems: Waste pickers**, who currently contribute significantly to recycling, should be formally integrated into the waste management system.
  - This includes **providing them with legal recognition**, health benefits, and a **fair wage** structure.
  - By empowering the informal sector and integrating them into formal **recycling chains**, India can significantly improve **collection efficiency** and reduce plastic leakage into the environment.
- **Implementation of Plastic Credits for Plastic Offset Programs:** India can start trails to introduce a **plastic credit** system, allowing businesses to **offset their plastic footprint** by purchasing credits from verified **plastic recovery and recycling programs**.
  - This would incentivize companies to **invest in plastic waste recovery** and support innovative waste management initiatives.
  - The introduction of **plastic credits** could also promote private sector involvement in tackling plastic pollution.
- **Strengthening Plastic Waste Regulations for Small and Medium Enterprises (SMEs):** There should be a focused effort to help **small and medium enterprises (SMEs)** transition from plastic use to sustainable alternatives. Government programs can offer **subsidies, training, and technology support** to these businesses, ensuring they adopt **eco-friendly practices** without compromising their operations.

- Streamlining the process for SMEs to adopt **compliance with plastic waste regulations** would facilitate their participation in national plastic reduction goals.

Conclusion:

Implementing decentralized waste processing and fostering community involvement through micro-segregation are key to **achieving SDG 12: Responsible Consumption and Production.** Encouraging **public-private partnerships for innovation and establishing circular economy-based incentives** can accelerate India's transition to sustainable plastic management. These efforts align with India's goals of reducing waste, enhancing recycling, and promoting environmental sustainability.

Biodiversity As India'S Sustainable Edge

This editorial is based on "India's biodiversity is a strategic advantage" which was published in Hindustan Times on 04/06/2025. The article highlights India's rich biodiversity as key to achieving self-reliance and economic resilience by 2047, stressing its protection as a national and global responsibility.

Tag: GS Paper - 3, Conservation, Environmental Pollution & Degradation, GS Paper - 2, Important International Institutions, Government Policies & Interventions

India's rich biodiversity represents an untapped strategic asset that could serve as a cornerstone for the **nation's journey toward self-reliance and economic resilience by 2047**. India's natural capital offers immunity from trade wars while providing crucial ecosystem services worth billions annually. But, there is also an urgency: with **global forest loss accelerating and species facing extinction, protecting India's biodiversity is both a moral obligation under international commitments and a strategic imperative for long-term prosperity.** By viewing ourselves as trustees rather than shareholders of this ecological legacy, India can transform its **biodiversity from heritage asset to sustainable economic differentiator** in an increasingly resource-scarce world.

What is the Significance of Biodiversity in Shaping India's National Growth and Resilience?

- **Direct Economic Contribution:** Biodiversity is a cornerstone of India's economy, offering direct economic benefits through sectors like **agriculture, forestry, and fisheries.**
  - A vast pool of biological resources supports livelihoods and industries.
  - The forestry and logging sectors **contribute roughly 1% to India's GDP**, and over **200 million people depend on forests.**
  - The **Indian fisheries sector not only supports the livelihoods of around 30 million people**, especially in coastal and rural communities, but it also holds immense potential for growth, job creation, and rural development.
- **Climate Change Mitigation and Carbon Sequestration:** Biodiversity plays a critical role in combating climate change by sequestering carbon, thus mitigating environmental risks.
  - India's forests currently **neutralize nearly 11% of the country's greenhouse gas emissions**, contributing to the Nationally Determined Contributions (NDCs) under the Paris Agreement. Forests' role in carbon sequestration directly supports climate change goals and national resilience.
  - The Green India Mission aims for protecting, restoring, and enhancing India's forest cover and **responding to climate change by undertaking eco-restoration activities.**
- **Healthcare and Medicinal Resources:** Biodiversity is integral to healthcare, providing medicinal resources for indigenous and modern medicine.
  - Over **45,000 plant species, including those with medicinal properties,** form the backbone of India's traditional medicine systems like **Ayurveda**.
  - India's National Gene Bank **holds 0.47 million accessions (plant material stored and used for breeding)**, ensures the preservation of plant genetic resources.

- This rich biodiversity base supports the discovery of **novel pharmaceutical solutions,** boosting healthcare innovation.

- **Enhancing Agricultural Productivity and Food Security:** Biodiversity enriches agriculture by **enhancing crop resilience and productivity**, vital for India's food security.
  - India is a center for crop diversity, with **over 50,000 rice varieties and 5,000 types of sorghum.**
  - This **genetic diversity ensures crop resilience against climate change and pests,** improving food security.
    - The role of biodiversity in agriculture is pivotal, with India being the **world's second-largest producer of rice,** relying heavily on its agricultural biodiversity.
- **Ecosystem Services and Livelihoods:** Biodiversity directly supports ecosystem services such as **pollination, soil fertility, and water regulation,** essential for human well-being and economic stability.
  - **Wetlands, for instance, support fisheries, water purification, and flood mitigation**, while forests maintain water cycles.
  - **India's 4,991.68 km2 of mangroves protect coastal communities** from storm surges, contributing to resilience.
    - With **250 million people living within 50 km of India's coastline,** these ecosystem services are essential for economic stability.
- **Strengthening Tourism and Conservation Initiatives:** India's rich biodiversity is a cornerstone of its growing eco-tourism sector, contributing to sustainable national development.
  - **Eco-tourism generates income for local communities** and fosters conservation awareness.
  - The **Western Ghats and Sundarbans are prime eco-tourism destinations,** with the Sundarbans hosts more than one lakh local and foreign tourists annually, generating substantial revenue.
    - Such initiatives also drive local conservation, as seen with the **Amur Falcon conservation project in Nagaland,particularly in areas like Pangti and Doyang.**
- **Socio-Cultural and Spiritual Value:** Biodiversity is woven into India's cultural fabric, influencing traditions, rituals, and spiritual practices.
  - **Sacred groves (like Sarna in Bihar, Dev Van in Himachal Pradesh, Devarakadu in Karnataka),** often preserved by local communities, contribute to biodiversity conservation while fostering cultural values.
  - An estimated 1,00,000 to 1,50,000 sacred groves across India help conserve diverse flora and fauna.
    - **Such areas are not only vital for maintaining biodiversity** but also hold cultural significance, supporting community-driven conservation efforts.
- **International Collaboration and Global Responsibility:** India's biodiversity places it at the **heart of international environmental governance,** as seen in its active role in global agreements like the **Convention on Biological Diversity (CBD).**
  - India has set ambitious biodiversity targets, aligned with the global **Kunming-Montreal Global Biodiversity Framework**, aiming to protect **30% of its land, inland water, and marine areas by 2030.**
    - This global responsibility fosters both national and international partnerships, strengthening India's role in global biodiversity conservation efforts.

What are the Key Emerging Threats to India's Biodiversity?

- **Climate Change and Its Impact on Ecosystems:** Climate change is intensifying stress on India's ecosystems, altering rainfall patterns, temperatures, and causing extreme weather events.
  - **Rising temperatures are shifting the natural range of species,** with the Himalayan ecosystem being particularly vulnerable.

- For example, the **rare dancing frog of the Western Ghats is now at risk due to changing micro-climates**.
  - The IPCC's report warned that Indian biodiversity hotspots, especially the **Western Ghats** regions, **could lose up to 33% biodiversity by 2050 due to climate change.**

- **Invasive Alien Species:** Invasive species are emerging as one of the most pressing threats to India's biodiversity, outcompeting native species for resources and spreading diseases.
  - For instance, the **spread of Prosopis juliflora, an invasive tree species in Rajasthan**, is disrupting native plant communities and reducing grazing land for wildlife.
    - It is estimated that **40% of species of Indian flora are alien, of which 25% are invasive,** leading to reduced agricultural productivity and habitat degradation.
    - Invasive species like the **African apple snail** also threaten freshwater ecosystems.

- **Habitat Fragmentation and Loss:** The rapid expansion of **urbanization, industrialization, and agriculture** is fragmenting India's critical ecosystems, isolating species and impeding their movement.
  - Fragmentation disrupts ecological connectivity, exacerbating species vulnerability to extinction.
  - For instance, the **Brahmaputra floodplains have seen forest loss and fragmentation** in the past due to large-scale tea expansion and agriculture.

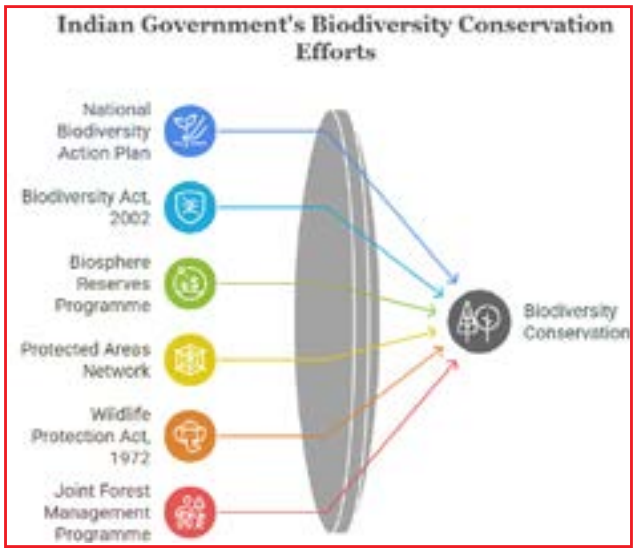
- **Pollution and Contaminants:** Pollution, including chemical runoff from agriculture, industrial effluents, and plastic waste, is severely impacting India's biodiversity.
  - **Aquatic life, particularly in the Ganga and Yamuna rivers,** faces rising toxicity levels, affecting species like the **Ganga dolphin.**
  - **Less than one-third of India's urban wastewater and sewage are treated**, leaving over **70% of untreated wastewater flowing into rivers, lakes and land** (Centre for Science and Environment).
    - This pollution disrupts breeding patterns, reduces species populations, and introduces toxins into the food chain.

- **Overexploitation of Natural Resources:** Unsustainable extraction of resources, such as **deforestation for timber, overfishing, and illegal wildlife trade**, continues to threaten India's biodiversity.
  - For example, the **illegal poaching of elephants for ivory and tigers for their pelts** remains a serious issue.
    - Between 2021 and 2023, **poaching claimed the lives of 32 tigers across India**, with Madhya Pradesh's forests bearing the brunt.
    - Additionally, India's 7500-km coastline is threatened by illegal light fishing, **despite a 2017 ban**, impacting both biodiversity and local economies dependent on fisheries.

- **Unsustainable Developmental Projects and Unregulated Infrastructure Expansion:** Infrastructure projects like **dams, highways, and mining operations** are encroaching upon ecologically sensitive areas, causing permanent damage to ecosystems.
  - More than **500,000 acres of wildlife habitat are reportedly lost each year** due to urban expansion and infrastructure development.
  - The proposed **INR 80,000 crore infrastructure project in the Great Nicobar Island threatens** to destroy tropical rainforests that harbor rare species like the **Nicobar scrubfowl and leatherback turtles.**

- **Agricultural Intensification and Land Use Change:** The intensification of agriculture, driven by the need to feed a growing population, is putting immense pressure on India's biodiversity.
  - Practices like **monocropping, excessive use of pesticides, and land conversion for farming** destroy natural habitats.
  - The decline in species such as the **Great Indian Bustard and Lesser Florican,** which rely on grasslands, is linked to agricultural expansion.

- **Lack of Effective Enforcement and Legal Frameworks:** Although India has a strong legal framework, including the **Wildlife Protection Act,** enforcement remains weak, leading to continued illegal activities.
  - The lack of adequate monitoring and penalties for biodiversity crimes often allow**s illegal logging, mining, and poaching to thrive.**
  - According to the **National Crime Records Bureau, there was a 20% increase in wildlife crimes in 2022 from 2021,** highlighting the inadequacies in law enforcement.
    - This weak governance undermines conservation efforts, leaving many species at risk.
- **Over-tourism and Human-Wildlife Conflict: Over-tourism in India's wildlife sanctuaries** and national parks is leading to environmental degradation and increased human-wildlife conflict.
  - The influx of tourists into tiger reserves like **Ranthambhore** has caused habitat disturbance, affecting animal behavior and breeding.
    - **Human-wildlife conflicts have also risen sharply (Uttarakhand alone reported 700 cases in the year 2022)**, with incidents of tigers attacking livestock and humans escalating in forested areas.



How can India Harness Biodiversity as an Economic Differentiator while Ensuring its Sustainable Conservation?

- **Green Economy Integration into National Policy:** India can embed biodiversity into its economic framework by **integrating natural capital accounting into national and state GDP calculations.**
  - This would assign a **value to ecosystem services**, recognizing their contributions to sectors like **agriculture, forestry, and tourism.**
  - By incorporating biodiversity into economic models, the government can incentivize industries to invest in conservation while promoting sustainability as an economic asset.
    - Such integration **would create a more inclusive green economy**, where biodiversity acts as a key differentiator in the global marketplace.
- **Promoting Nature-based Solutions for Infrastructure Development:** Instead of relying on conventional infrastructure projects that harm ecosystems, India can adopt **nature-based solutions that harness biodiversity for resilient development.**
  - This could involve creating green infrastructure such as **urban forests, wetland restoration for flood management, and mangrove ecosystems** for coastal protection building upon the **recommendations of the Kasturirangan Committee.**
  - These projects can provide multiple co-benefits such as **carbon sequestration, water purification, and erosion control,** all while enhancing biodiversity.
- **Biodiversity-Driven Eco-Tourism Models:** India can develop and promote **biodiversity-driven eco-tourism** that emphasizes the conservation of lesser-known but ecologically critical species and habitats.
  - This **involves shifting the focus from traditional wildlife tourism centered on flagship species** to including biodiversity hotspots like wetlands, grasslands, and coastal ecosystems.

- Such a model would generate income through sustainable tourism activities, reduce the pressure on high-profile areas, and encourage conservation across diverse ecosystems.
  - It would also **create decentralized employment opportunities,** directly linking rural development to biodiversity conservation.

- **Incentivizing Biodiversity-Friendly Agricultural Practices:** India can encourage **farmers to adopt biodiversity-friendly agricultural practices** by providing incentives such as **subsidies for organic farming, payment for ecosystem services, and access to biodiversity-certified markets.**
  - By promoting **agroecology**, sustainable land-use practices, and the conservation of traditional crop varieties, India can enhance food security while reducing biodiversity loss.
  - These practices can be incorporated into government schemes like the **National Mission on Sustainable Agriculture,** aligning food production with biodiversity conservation for long-term agricultural productivity.
- **Strengthening the Bio-based Economy through Biotechnology and Pharmaceuticals:** India can leverage its rich biodiversity to boost its bio-based economy, particularly in biotechnology and pharmaceuticals, by **promoting sustainable bioprospecting.**
  - Focusing on the conservation of genetic resources for medicinal plants, marine organisms, and agricultural biodiversity can **position India as a leader in sustainable biomanufacturing.**
  - The **establishment of biotechnological research hubs,** integrated with biodiversity conservation efforts, would enhance India's position in the global biopharmaceutical market.
- **Enhancing Legal Frameworks for Biodiversity-Based Intellectual Property:** India can **reform the current legal framework to protect its biodiversity-related intellectual property,** particularly traditional knowledge systems.
  - By aligning the protection of genetic resources and traditional knowledge with the global **Convention on Biological Diversity's Access and Benefit-Sharing (ABS)** provisions, India can generate revenue through the licensing of genetic resources for research and development.
  - This framework would not only protect indigenous communities' rights but also create a new revenue stream from the **global biotrade sector,** enhancing the country's economic position on the global stage.
- **Integrating Biodiversity into Corporate Social Responsibility (CSR):** India can encourage the corporate sector to invest in biodiversity conservation through CSR initiatives, by incentivizing companies to **integrate biodiversity into their environmental, social, and governance (ESG) strategies.**
  - Corporates can be provided tax benefits or recognition for investing in biodiversity conservation projects, such as habitat restoration or the promotion of sustainable supply chains**.**
- **Implementing a Circular Economy Based on Biodiversity:** India can adopt a circular economy approach that not only minimizes waste but also fosters biodiversity conservation.
  - By focusing on **sustainable production and consumption patterns,** reducing resource extraction, and recycling biological materials**, India can reduce its ecological footprint.**
  - Such an economy would prioritize products and processes that regenerate ecosystems, promoting sustainable industries like **organic textiles, biodegradable packaging, and eco-friendly construction materials,** all of which would depend on healthy, functioning biodiversity.

Conclusion:

India's biodiversity represents both a **moral responsibility and a strategic opportunity for economic growth and resilience.** By aligning its policies with international frameworks like the **Convention on Biological Diversity (CBD)**, India can transform its natural assets into sustainable economic drivers. A holistic approach that integrates biodiversity into national development, eco-tourism, and agriculture will ensure long-term prosperity.

Revamping India'S Secondary Education

This editorial is based on Secondary education needs to improve, which was published in Business Line on 06/06/2025. The article highlights India's neglect of secondary and vocational education post-Unnikrishnan judgment, while Asian economies focused on these stages for growth.

Tag: GS Paper 2, Education, Human Resource, Skill Development, Government Policies & Interventions, Issues Relating to Development

The **Public Report on Secondary Education (PROSE) 2024** reveals **India's critical neglect of secondary and vocational education** despite gains in elementary enrollment. While high-performing Asian economies like Singapore and Japan leveraged robust secondary schooling to drive growth, India's underinvestment has created a severe **skill-employability mismatch.** Alarmingly, **systemic deficits in teacher recruitment,** infrastructure, and governance threaten to squander the **demographic dividend**, risking the peril of "**growing old before becoming rich**." Urgent reorientation toward **quality, equity, and industry-aligned skills** is imperative to transform **human capital** into economic resilience.

What are the Key Issues in the Secondary Education System?

- **Teacher Vacancies and Ad-hocism:** Many states rely on **contract or guest teachers** to fill in for unfilled permanent positions, particularly in science. The **Ministry of Education reported over 8.4 lakh teaching vacancies** in government schools across India, covering both elementary and secondary levels.
- **Extreme Infrastructure Disparities:** The **disparity in per-child spending** across different schools is staggering. For example, Telangana's residential schools receive ₹2 lakh per student, while **Kendriya Vidyalayas are allocated just ₹65,000**.
  - Furthermore, **47% of schools lack drinking water facilities,** and 53% do not have separate toilets for girls, as reported by PROSE 2024.
- **Dysfunctional Governance and Funding:** School Management Committees (SMCs) are **largely ineffective, with minimal financial support**. Local governments are often sidelined, leading to poor management and oversight.
  - As per the **Comptroller and Auditor General (CAG) report,** audits across 12 States/UTs revealed that between 3% and 88% of **schools lacked School Management Committees (SMCs)**, with several committees being formed after significant delays.
  - The funds allocated under the **PM SHRI scheme** are inadequate, even for established schools like Navodaya and Kendriya Vidyalayas, while Kerala, Tamil Nadu, and West Bengal have received no funding from the Centre's share under the Samagra Shiksha scheme (SSA) for the 2024-25 financial year.
- **Vocational Education-Employment Gap:** There is a persistent gap between vocational education and industry demands, with **only 45% of Indian graduates deemed employable**, as highlighted by a recent Mercer-Mettl study, limiting their access to well-paying job opportunities.
- **Misaligned Digital Tools:** Digital tools in education are frequently misused, with **pre-recorded materials serving as replacements** for teachers instead of being used as conceptual aids to enhance learning.
  - According to data from the Union Education Ministry, **only 57.2% of schools in India have functional computers,** and just 53.9% are equipped with Internet access.
- **Socio-Economic Disparities:** Persistent economic and social inequalities hinder inclusive education, **limiting access to quality learning** for children from disadvantaged, rural, and tribal backgrounds.
  - Tribal students in **Eklavya Model Residential Schools (EMRS)** face educational challenges due to language barriers, as instruction is in Hindi rather than their native languages, like English or Telugu. This issue is worsened by **central hiring policies** that overlook students' linguistic diversity.

- **Shortcomings in Learning Methods:** India's education system **still prioritizes memorization** over developing analytical and problem-solving skills, limiting students' cognitive growth.
  - Although the National Education Policy, 2020 advocates for competency-based learning, the shift from outdated exam-driven approaches is sluggish, with surveys revealing that a **majority of Class 3 students struggle with basic reading** comprehension.

Structure of School Education in India

- India's school education system is transitioning in a phased manner from the 10+2 format to the 5+3+3+4 structure under the NEP, 2020.
- This revamped model spans ages 3-18, integrating early childhood care and education. It comprises:
  - **Foundational Stage (5 years):** 3 years pre-school + Classes 1–2
  - **Preparatory Stage (3 years):** Classes 3–5
  - **Middle Stage (3 years):** Classes 6–8
  - **Secondary Stage (4 years):** Classes 9–12

What are the Outcomes of the Government Initiatives in India's Education System?

- **Equity-Driven Enrollment Surge:** The participation of SC/ST students and girls in secondary education has seen a significant rise, largely due to initiatives such as the Sarva Shiksha Abhiyan (SSA), bicycle schemes for girls, and various scholarships.
  - According to the Ministry of Education report, there has been an **80.1% rise in female ST student enrollment** since 2014-15, with an additional 7.5 lakh students joining.
  - While gender parity has been achieved in several backward regions, the issue of early marriage **continues** to pose a significant barrier to the educational progression of adolescent girls.
- **Emergence of Blended Learning:** The use of smart boards and pre-recorded digital content, like YouTube videos, has **enriched the learning experience** by complementing traditional teaching methods.
  - However, these digital tools **often serve as substitutes for absent teachers,** which can limit students' understanding of key concepts and hinder deeper engagement with the material.
  - The **ICT and Digital Initiatives** component of **Samagra Shiksha** supports government and aided schools with classes VI to XII by providing financial aid for setting up ICT labs and smart classrooms.
- **Innovation Infrastructure:** Atal Tinkering Labs have been established to promote creativity and experimentation among students, yet their potential **remains largely untapped in schools** that lack qualified science teachers.
  - This underutilization highlights the challenges schools face in leveraging innovation-focused infrastructure to its fullest potential.
- **Expansion of Kasturba Gandhi Balika Vidyalayas (KGBVs):** The KGBV scheme, launched in 2004, aims to provide quality education to girls from disadvantaged communities, including SC, ST, OBC, and minority groups.
  - As of 2025, 2,578 KGBVs have been sanctioned across 28 states and union territories. These residential schools **offer a minimum of 75% reservation for girls from these communities**, ensuring access to education for those who might otherwise be excluded
- **Teacher Recruitment and Gender Sensitization:** Efforts have been made to **recruit more female teachers and provide gender-sensitive training.** This includes sensitization programs for teachers and the construction of separate toilet blocks for girls, which have **collectively contributed to improved enrollment** and retention rates among girls in schools.

Global Lessons for India

Country Model	Core Strength	Lesson for India
Japan	Teacher autonomy and innovation	Empower teachers to design curricula and experiment.
Germany	Vocational-employment integration	Strengthen industry apprenticeships in schools.
Finland	Professional development	Invest in continuous professional development.
Singapore	Project-based learning (PBL)	Adopt PBL to enhance problem-solving skills and creativity.
Estonia	Digital learning infrastructure	Accelerate digital transformation and ensure equitable access to technology.
South Korea	Student-centered learning	Implement more personalized learning paths for diverse student needs.

What are the Measures Needed to Transform Secondary Education?

- **Teacher Capacity Building:** The vacancies for teaching positions, **especially in specialized fields like science**, should be filled based on priority, ensuring that qualified and skilled educators are recruited.
  - In addition, it is **essential to mandate pedagogical training** for all science teachers, ensuring they are **equipped with the latest teaching strategies** and methodologies to enhance their effectiveness in the classroom.
- **Community-Driven Governance:** School committees, where they do not yet exist, should be established. Once formed, they should be **empowered with the autonomy to manage their finances,** enabling them to oversee budgets and allocate resources effectively for the growth of their institutions.
  - However, this independence should be **balanced with strong oversight from local government bodies** to ensure the funds are spent wisely and in line with educational goals.
- **Equitable Infrastructure Fund:** To promote equal access to quality education, resources should be **redirected from well-funded "model schools" to ordinary State schools,** where the need is greater.
  - This shift would help **address disparities in educational infrastructure** and ensure that all students, regardless of their location or socio-economic status, have access to similar levels of support.
  - Additionally, **per-child spending across schools should be standardized** so that each student benefits equally from government investment.
- **Vocational-Employment Corridors:** The curricula in Industrial Training Institutes (ITIs) **and polytechnics must be restructured** to align more closely with the needs of industry. This alignment will better prepare students for the workforce, ensuring they possess the skills required by employers.
  - Furthermore, **the modernization of labs** and equipment in these institutions should be prioritized and can be achieved through Public-Private Partnership (PPP) models.
  - This collaborative approach will ensure that **these institutions are equipped with cutting-edge technology,** offering students the best learning experience possible.

- **Revision of Curriculum:** A shift from rote **learning to competency-based education** is essential, with an **updated curriculum that emphasizes critical thinking**, problem-solving, creativity, and interdisciplinary learning to equip students for contemporary challenges.
- **Blended Learning Framework:** Digital tools should be **integrated into the classroom** to **reinforce key concepts** and enhance the learning experience, but they should never replace teachers.
  - The role of digital tools should be to **support and supplement** the teacher's efforts, making learning more engaging and effective. By using technology in this way, **educators can maintain their central role** in the classroom while taking advantage of the benefits that digital resources offer.

Conclusion

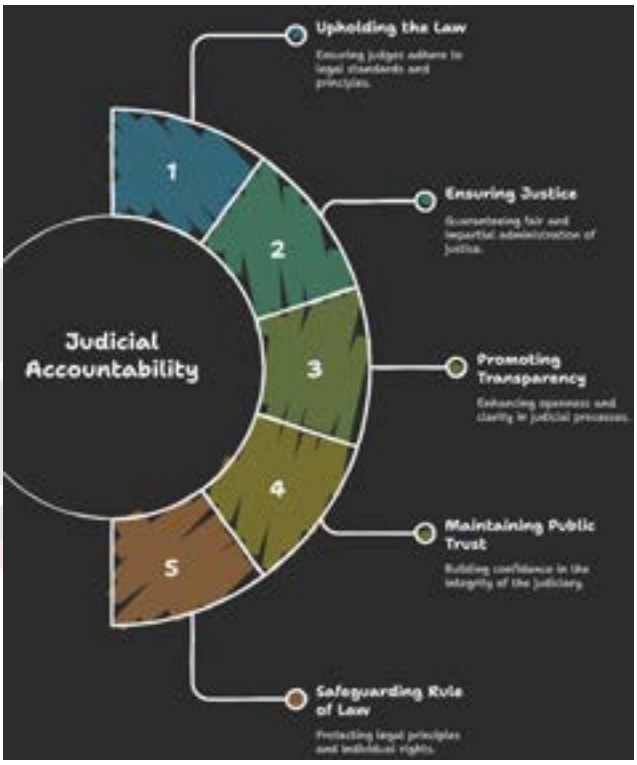
India's secondary education stands at a make-or-break juncture. While **equity gains reflect policy commitment,** the neglect of quality, governance, and vocational linkages threatens to turn the "demographic dividend" into a crisis. Learning from PISA leaders, India must prioritise teacher empowerment, community ownership, and skills integration **to avoid "growing old before becoming rich."**

Strengthening Judicial Accountability in India

This editorial is based on "Impeachment motion against Allahabad High Court judge Yashwant Varma in Monsoon session" which was published in Times of India on 05/06/2025. The article brings into picture the rare impeachment move against an Allahabad High Court judge, highlighting the gaps in practical judicial accountability.

Tag: GS Paper - 2, Judiciary, Fundamental Rights, Judicial Review, Separation of Powers, Judgements & Cases

The **Union government's** impending **impeachment motion against Allahabad High Court Judge,** following allegations of financial misconduct, brings **judicial accountability into sharp focus.** While India's Constitution provides mechanisms for judicial oversight, the **rarity of such proceedings—this being potentially the first High Court judge impeachment**—raises questions about their practical implementation. The judiciary, as one of the three pillars of democratic governance, must be subject to the **same rigorous standards of accountability as the executive and legislative branches.** The current case thus offers an opportunity to examine how effectively India's existing judicial accountability systems function in practice.



What is the Current Mechanism for Judicial Accountability in India?

- **Impeachment Process**: The **Judges (Inquiry) Act, 1968**, outlines the impeachment process for removing **Supreme Court** and **High Court judges**.
  - A motion must be signed by at least **100 Lok Sabha** or **50 Rajya Sabha** members and then investigated by a three-member committee of judges and jurists.
  - If found guilty, it must be approved by a **two-thirds majority** in both Houses of Parliament.
- **In-House Mechanism**: The **Supreme Court's in-house procedure** was established to handle

complaints against judges, primarily for misconduct.

- **Complaints are reviewed by the Chief Justice of India (CJI)** or the respective High Court CJI.
- If the complaint is found credible, an internal committee investigates it. While this mechanism is seen as a safeguard, it lacks statutory backing and transparency, which often raises concerns over its effectiveness.

- **Judicial Standards and Accountability Bill 2010 (Lapsed)**: This bill sought to introduce an external oversight body, the **National Judicial Oversight Committee**, along with other bodies for complaints and investigations.
  - It was passed by the Lok Sabha but lapsed in the Rajya Sabha, leaving judicial accountability largely unaddressed through formal legislative channels.
- **Judicial Review and Public Scrutiny**: The judiciary is subject to judicial review by **higher courts**, but there is no independent external body or comprehensive statutory framework to oversee judicial conduct.
  - **Allegations against judges often lead to internal investigations or resignation**, but such actions are not always transparent or publicly disclosed.

What are the Key Factors Underscoring the Growing Imperative for Judicial Accountability in India?

- **Lack of Robust Accountability Mechanisms in Judiciary:** The existing frameworks for judicial accountability, such as the **Judges (Inquiry) Act, 1968**, are cumbersome and ineffective.
  - Despite its importance, **impeachment motions for judicial misconduct have not been successful**, leading to public distrust in the judiciary's ability to self-regulate.
  - For instance, **no judge has been impeached since 1993**, despite several allegations
- **Judicial Independence vs. Judicial Accountability:** The balance between maintaining judicial independence and ensuring accountability remains a core issue.
  - Critics argue that too much autonomy leads to a lack of **external scrutiny, fostering a culture of impunity.**
  - Judicial independence has become a shield against accountability, undermining public trust in the system.
  - The issue over Justice Yashwant Varma of the Allahabad High Court, accused of **corruption, and the Supreme Court's in-house procedure for judicial discipline,** reflects the lack of external checks despite serious charges.
- **Opacities in the Judicial Appointment Process:** The lack of transparency in the **judicial appointment process under the collegium system** contributes to concerns over judicial accountability.
  - Critics argue that this **opacity not only breeds nepotism** but also prevents scrutiny of judicial performance.
  - Furthermore, the **absence of prescribed norms** regarding eligibility criteria and selection procedures further contributes to the perception of a **closed-door affair.**
- **Inadequate External Oversight Mechanisms:** The absence of a **statutory, independent body to oversee judicial conduct** exacerbates accountability issues.
  - While the judiciary relies on internal mechanisms, they are often perceived as inadequate due to lack of transparency and public involvement.
  - The **judicial reforms bill of 2010, which proposed a National Judicial Oversight Committee, lapsed in 2014**, leaving judicial oversight to self-regulation, which has often been opaque and ineffective.
- **Challenges of Judicial Activism and Overreach:** Judicial activism has led to the judiciary stepping into domains traditionally reserved for the executive and legislature.
  - While this is seen as **necessary in some cases,** it raises concerns about the accountability of unelected judges making policy decisions.
  - The **Supreme Court's recent intervention in setting specific timelines for the President to**

act on Bills **reserved for their consideration by a Governor**, have been criticized as an encroachment on executive functions, raising questions about judicial accountability.

- **Global Shift Towards Judicial Transparency:** Globally, **there has been a growing trend towards judicial transparency and accountability,** with many nations introducing external oversight mechanisms.
  - **Countries like the UK and the US have established independent judicial oversight bodies**.
  - India's failure to implement such reforms contrasts with global standards, making the system more vulnerable to criticisms of opacity.

What are the Potential Risks Associated with Enforcing Judicial Accountability?

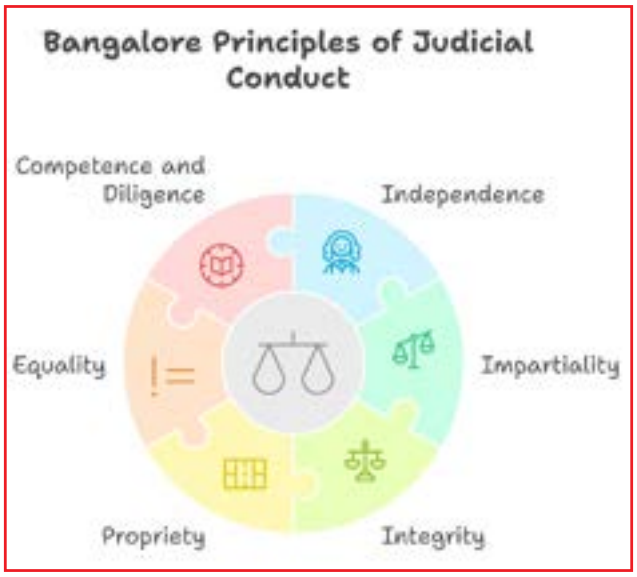
- **Threat to Judicial Independence:** Enforcing strict judicial accountability risks undermining the **principle of judicial independence, a cornerstone of the Constitution.**
  - If accountability mechanisms are overly stringent or politicized, they could **become tools for executive or legislative overreach**, compromising impartial decision-making.
  - The **Lokpal's recent ruling suggested that judges might come under the jurisdiction of the** Lokpal (which is an anti-corruption body established to address complaints of corruption against public officials).
  - This proposal raised concerns about infringing on judicial independence. The **Supreme Court, however, stayed the decision** to ensure the protection of the judiciary's autonomy.
- **Political Interference in Judiciary:** The impeachment process and other accountability measures are often heavily influenced by political dynamics, posing the risk of **political interference** in the judiciary's functioning.
  - If used for **partisan purposes**, such measures could be manipulated to target judges who make decisions unfavorable to the ruling government.
  - For instance, the **impeachment motion against Justice V. Ramaswami** in 1993 failed primarily due to political abstentions in the **Lok Sabha**, showcasing how political considerations can influence judicial accountability, despite clear allegations.
- **Erosion of Public Confidence:** Overzealous implementation of accountability mechanisms could lead to the **public perception of a judiciary under siege**, potentially eroding public trust in judicial independence.
  - If **judges face constant scrutiny or fear removal for political reasons**, they may become **hesitant to deliver judgments that challenge the status quo**, diminishing their role as impartial arbiters.
  - Also, the **contempt of court** charges levied against media personalities or activists critical of the judiciary reflect how the **judiciary might suppress external criticism**, leading to concerns about its accountability and transparency.
- **Lack of Uniform Standards:** Enforcing judicial accountability without clear, uniform guidelines can lead to **inconsistencies** in how cases of misconduct are handled.
  - The absence of a standardized framework could result in disparate interpretations of judicial behavior, leading to unfair targeting of certain judges or biased investigations.
  - For instance, the **in-house procedure** for investigating judicial misconduct remains inconsistent across various courts, with no statutory framework, leading to opaque decisions, as seen in cases involving the **Allahabad High Court Judge Yashwant Varma**.

What Measures can be Adopted to Ensure Robust and Transparent Judicial Accountability Framework in India?

- **Establishment of an Independent Judicial Oversight Body:** A **National Judicial Oversight Committee** should be established**, composed of retired judges, legal experts, and eminent persons from outside the judiciary,** with authority to investigate judicial misconduct.

- This body **would provide an impartial, transparent mechanism to review complaints against judges** while ensuring that the judiciary is not subject to external political pressures.
- Empowering such an independent body with legal standing would establish a credible and neutral oversight system, fostering public trust in judicial accountability.

- **Revamping the Impeachment Process:** The **impeachment process** should be reformed to make it more transparent and efficient.
  - Introducing **clear timelines for investigations, ensuring public disclosure of the proceedings,** and requiring a more accessible complaint mechanism could significantly improve the process.
  - This would ensure that accountability is not delayed or obstructed due to political maneuvering and would provide a stronger deterrent against judicial misconduct.
- **Public Disclosure of Judicial Assets and Liabilities:** Mandating **annual public declarations** of judicial assets and liabilities, **similar to those required of civil servants,** would increase transparency and serve as a deterrent against corruption.
  - Additionally, making these disclosures subject to scrutiny by an independent body or the media **could significantly enhance accountability, particularly in instances of disproportionate wealth accumulation.**
  - Such transparency would further bolster the public's confidence in the integrity of the judiciary.
    - In 1997, the **Supreme Court passed a resolution requiring judges to declare all assets**, including those of their spouses and dependents, to the Chief Justice of India.
- **Strengthening the In-House Mechanism with Transparency:** While the **in-house procedure** for handling judicial misconduct is valuable, it must be reformed to ensure greater transparency.
  - Introducing formal **reporting mechanisms** that allow for public access to the outcomes of inquiries, without compromising judicial privacy, would increase the system's credibility.
  - Ensuring that disciplinary decisions are clearly communicated to the public would strengthen the judiciary's accountability, while maintaining judicial independence.
- **Implementation of a National Judicial Conduct Code:** Introducing a **National Judicial Code of Conduct**, enforced by an independent body, would provide clear guidelines on ethical behavior, conflicts of interest, and other aspects of judicial responsibility.
  - This code would be more **comprehensive than the current informal guidelines and would set clear standards for judges to follow.** It would ensure that judges are held to consistent ethical standards, providing clarity and objectivity in disciplinary matters.
- **Judicial Performance Review and Reporting:** Introducing a **performance review system** for judges, where the **quality of their judgments and adherence to ethical standards is evaluated periodically**, would add a layer of accountability.
  - These reviews would be transparent, with aggregate results shared publicly while maintaining the confidentiality of individual cases.
  - This would **help monitor the effectiveness and integrity of the judiciary**, ensuring that judges remain committed to high standards of professionalism.
- **Whistleblower Protection for Judicial Misconduct:** To encourage the reporting of judicial misconduct, robust **whistleblower protection mechanisms** should be implemented within the judiciary.
  - This would ensure that those **who report misconduct, whether they are court employees or other stakeholders,** are shielded from retaliation. By protecting whistleblowers, the system would encourage a culture of openness and allow the judiciary to self-correct when necessary.



Conclusion:

Current judicial accountability mechanisms, such as the Judges (Inquiry) Act, are often inefficient and politically influenced. To strengthen accountability, reforms like an independent oversight body, transparent asset declarations, and regular reviews are needed. These steps will safeguard judicial independence while boosting public trust. As former **CJI D.Y. Chandrachud** highlighted, **"True judicial independence is not a shield to protect wrongdoing, but an instrument to secure the fulfilment of constitutional values."**

Road to Resilient Indian Agriculture

This editorial is based on "Irrigation and cropping must be in sync" which was published in The Financial Express on 03/06/2025. The article brings into picture the mismatch between infrastructure-heavy agricultural policies and farmers' real-time, need-based decisions, highlighting the need for decentralized, responsive reforms to build a resilient and inclusive farm sector.

Tag: GS Paper - 3, Direct & Indirect Farm Subsidies, Public Distribution System (PDS), Buffer Stocks & Food Security, Agricultural Marketing

India's agricultural policy has long operated on the assumption that infrastructure-led development—**especially through large, long-gestation irrigation projects—will catalyze transformative changes in farming practices.** Recent ground-level evidence shows that farmers make decisions on cropping patterns, irrigation, and input use based on immediate needs, climate variability, and local resources. This **reveals a gap between top-down planning and the adaptive nature of grassroots decision-making.** To create a more resilient and inclusive agricultural system, India needs to focus on real-time support, decentralized planning, and flexible policies that align with farming cycles and risks.

What are the Key Factors Driving Agriculture Reforms in India?

- **Technological Advancements and Digital Agriculture:** Advancements in digital agriculture technologies like **AI, GIS, drones, and remote sensing** are revolutionizing the sector by improving productivity, resource management, and market access.
  - These technologies enable precision farming, thus reducing costs and enhancing output quality.
  - The launch of the National e-Governance Plan in Agriculture (NeGP-A) and initiatives like the Digital Agriculture Mission are facilitating tech adoption.
  - Additionally, the rise in agritech investments, **predicted to reach US$ 30-35 billion by 2025**, reflects a growing tech-driven agricultural ecosystem.
- **Climate Resilience and Water Management:** The focus on climate-resilient crops and water-efficient irrigation systems has intensified in response to India's growing vulnerability to climate change.
  - The Per Drop More Crop initiative under Pradhan Mantri Krishi Sinchayee Yojana, which covers over 95 lakh hectares, promotes micro-irrigation systems, enhancing water use efficiency.
  - Given that irrigation intensity has increased from **144.2% to 154.5% between 2015-2021,** this focus is vital for sustainable growth.

- In FY25, ₹21,968 crore has been allocated to states under this initiative, ensuring significant water conservation.

- **Diversification into High-Value Crops and Allied Sectors:** Diversification toward horticulture, livestock, and fisheries has driven substantial agricultural growth, as demand for these products has surged both domestically and internationally.
  - Fisheries, with a **CAGR of 13.67%** from FY13 to FY23, illustrate the success of such diversification.
  - The government's investment in allied sectors through schemes like PM Matsya Sampada Yojana (targeting ₹6,000 crore) has empowered farmers in these areas.
    - **India's seafood exports grew by 29.7% to ₹60,523 crore in FY24,** highlighting the sector's growing global presence.
- **Improved Access to Credit and Financial Support:** Access to institutional credit has significantly improved due to schemes like Kisan Credit Cards (KCC), which support farmers in acquiring timely financial assistance for inputs and operations.
  - In FY22, **₹18.6 lakh crore** was sanctioned to the agricultural sector in institutional credit, enhancing farmers' financial resilience.
  - The **PM-KISAN** scheme has also directly **disbursed ₹3.7 lakh crore to farmers**, reinforcing the financial support structure.
    - Such measures foster financial inclusion, allowing farmers to adopt better technologies and practices for increased productivity.
- **Infrastructure Development and Storage Capacity:** The development of agricultural infrastructure, particularly in storage and transportation, is critical to reduce post-harvest losses and ensure better market access for farmers.
  - The Agriculture Infrastructure Fund (AIF) has approved loans worth **₹10,000 crore to support infrastructure projects.**
  - India's total foodgrain production is expected to reach **347.44 million tonnes** in FY25, **reflecting the positive impact of infrastructure investments.**
- **Market Reforms and Digital Platforms:** The establishment of the e-National Agriculture Market (e-NAM) has been pivotal in improving price discovery, transparency, and market access for farmers.
  - With **1.74 crore farmers** and **2.39 lakh traders** participating, e-NAM has helped bridge the gap between rural producers and urban markets.
  - The government's move to ensure One Nation, One Ration Card has also streamlined the distribution of foodgrains and created a unified agricultural market system.
    - These reforms **reduce the dependence on middlemen, ensuring fairer prices for farmers**, which is crucial for improving their income.
- **Focus on Sustainable and Organic Farming:** With increasing demand for organic and sustainable farming practices, the government has provided incentives for farmers to shift toward organic farming.
  - India's organic food market is expected to grow at a **CAGR of 25.25%** between 2022-27.
  - Initiatives like the National Mission on Sustainable Agriculture (NMSA) push for more sustainable agricultural methods.
  - Additionally, the Millet Revolution, led by the Indian Institute of Millet Research, is positioning India as a global leader in **Shree Anna** production.

What are the Key Issues Hindering Agricultural Productivity and Sustainability in India?

- **Inadequate Water Management and Irrigation Infrastructure:** India's agricultural sector continues to face severe challenges due to inadequate water management and inconsistent irrigation infrastructure.
  - Despite government efforts like the **Per Drop More Crop** initiative, water scarcity remains a persistent issue, particularly in rain-dependent regions.

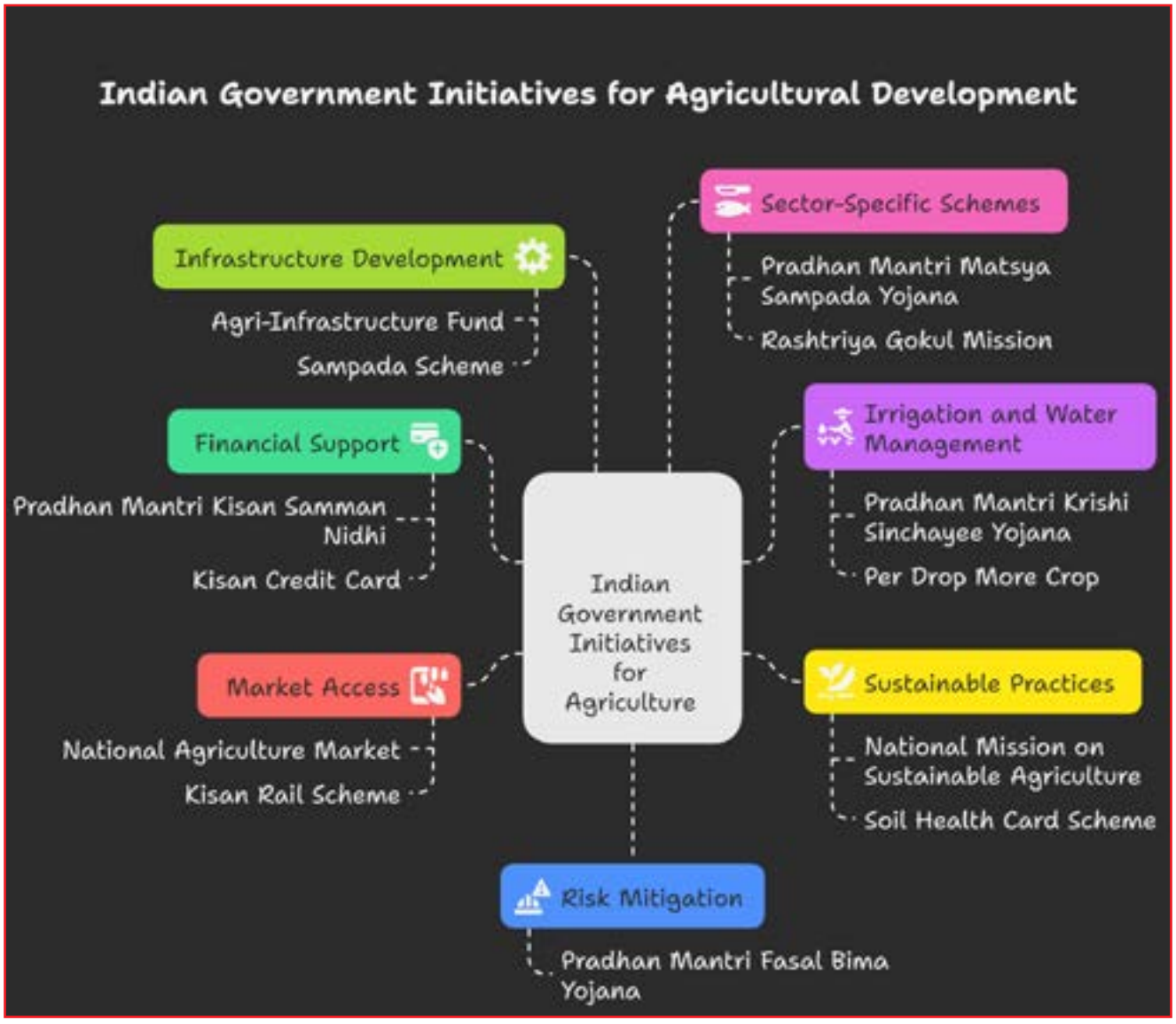
- The irrigation coverage has increased from **49.3% to 55%** of gross cropped area, yet significant gaps remain in states like **Jharkhand.**
- This uneven distribution of water resources affects agricultural productivity, especially in drought-prone areas.

- **Climate Change and Weather Uncertainty:** Climate change is significantly affecting agricultural productivity, with erratic rainfall patterns and rising temperatures posing threats to crop yields.
  - Farmers face the dual challenge of unpredictable weather, making traditional farming methods less reliable.
  - Currently, the annual average crop losses due to extreme weather events alone is resulting in **losses estimated at around 0.25 percent of India's GDP.**
  - It can also disproportionately impact crops like rice. For example, in India, an **increase in temperature by 1.5° C and decrease in the precipitation of 2 mm,** will reduce the rice yield by 3 to 15% .
- **Small Land Holdings and Fragmented Agriculture:** The dominance of small land holdings in India leads to inefficient farming practices and limited economies of scale.
  - With **96% of Indian landholdings** being marginal or small, farmers struggle to invest in advanced technologies and mechanization.
  - As land sizes decrease, the cost per unit of production rises, leading to lower productivity.
  - For example, the **average farm size** is expected to decline to **0.6 hectares** by **2047**, making it challenging to implement modern agricultural techniques.
- **Lack of Even Access to Modern Technology and Innovation:** Despite the availability of advanced agricultural technologies, their adoption remains slow, particularly among smallholder farmers.
  - The gap in access to **digital platforms**, **drones**, and **AI-driven farming techniques** hinders productivity improvements.
  - The government's **Digital Agriculture Mission** has initiated several tech-driven schemes, but **30% of farmers are still not utilizing such technologies**.
  - The slow pace of tech adoption, especially in remote areas, limits India's agricultural potential to scale up production and achieve sustainability.
- **Inefficient Agricultural Policies and Market Regulations:** While several policies have been introduced to boost agricultural productivity, their implementation often lacks coherence and doesn't address the localized needs of farmers.
  - For instance, the **Minimum Support Price (MSP)** system, though intended to protect farmers' incomes, **has faced criticism for not covering all crops and being poorly enforced.**
  - The **e-NAM** platform, aimed at ensuring better price discovery, has only engaged **1.74 crore farmers**, leaving many out of the formal market system.
  - This **fragmented policy approach hampers the smooth functioning of agricultural markets**, making them inefficient and opaque.
- **Soil Degradation and Limited Sustainable Practices:** Soil health is deteriorating rapidly in India due to the overuse of chemical fertilizers and inadequate focus on organic practices.
  - With **over 30% of Indian soils** being degraded, agricultural sustainability is at risk, leading to declining crop yields.
  - Despite schemes like the **National Mission on Sustainable Agriculture (NMSA)**, scientists estimate that fewer than 5% of Indian farmers have switched to sustainable farming methods.
  - The dependency on **chemical inputs has led to soil exhaustion,** requiring a deeper investment in long-term soil health restoration practices, which remains underfunded.
- **Inadequate Storage and Post-Harvest Infrastructure:** Post-harvest losses in India continue to be alarmingly high due to poor storage and inadequate infrastructure.

- In the absence of efficient cold storage and transportation networks, around 4**0% of the food wasted is equivalent to nearly 92,000 crore/year.**
  - This is equivalent to nearly **1% of the GDP** which is depleted in the form of food wastage in India.
- The government's focus on creating more storage capacity under schemes like the **Agriculture Infrastructure Fund (AIF)** has yielded some results, but substantial gaps remain in rural areas.
  - For example, the **kharif crop procurement** has risen significantly from **467.9 million tonnes** (2004-14) to **787.1 million tonnes** (2015-25), but **inadequate storage still results in losses.**

Limited Access to Credit and Financial Support: While initiatives like the Kisan Credit Card (KCC) and **PM-KISAN** have provided some financial relief, access to timely and adequate credit remains a barrier for many farmers.

- Many farmers still rely on informal sources of credit, which are often exploitative.
  - A recent RBI report highlights **this thriving informal finance in rural India,** with 31% of loans sourced informally.



What Measures can India Adopt to Enhance Agricultural Productivity and Effectiveness?

- **Accelerate Agricultural Mechanization:** India should prioritize widespread adoption of farm machinery through subsidized access, custom hiring centers, and farmer producer organizations.
  - The **Dalwai Committee's findings** demonstrate that mechanization can simultaneously **cut cultivation costs by 25% and increase productivity by 20%,** resulting in a substantial **25-30% rise in farm income.**
  - This dual benefit makes mechanization a critical pathway for enhancing both agricultural efficiency and farmer prosperity.
- **Promoting Climate-Resilient Agriculture:** India needs to focus on **developing and promoting climate-resilient crop varieties that can withstand extreme weather conditions** such as droughts, floods, and high temperatures.
  - Encouraging the use of precision farming techniques, such as weather forecasting tools and AI-driven models for real-time decision-making, can help farmers adapt their practices to changing climate patterns.
  - The release of **109 high yielding, climate resilient and biofortified varieties of crops in 2024** is a significant step in the right direction.
  - Existing digital platforms like **mKisan, Kisan Suvidha, and Pusa Krishi** should be leveraged to disseminate information about **crop varieties, available subsidies, and technical guidance to farmers**
- **Revamping Irrigation Infrastructure with Smart Technologies:** While irrigation infrastructure has seen progress, India must move toward smarter, more sustainable irrigation systems.
  - Investment in advanced technologies like **drip irrigation** and **sensor-based irrigation management** can significantly reduce water usage while improving efficiency.
  - Additionally, integrating **Agri- IoT-based** that provide **real-time data on soil moisture levels, hyperlocal weather forecasting to cater the local needs, and crop water requirements** can optimize irrigation schedules, reduce waste, and conserve water resources.
- **Strengthening Agricultural Research and Development (R&D):** India must scale up investment in agricultural research, focusing on innovations in **genetics, pest management, and sustainable farming techniques.**
  - Enhancing the accessibility of research findings to farmers **through digital platforms and extension services** is critical for translating cutting-edge research into practical on-ground applications.
- **Enhancing Market Access through Digital Platforms:** Expanding the reach and efficiency of digital agricultural marketplaces like **e-NAM** can empower farmers by offering transparent pricing, eliminating intermediaries, and expanding market access.
  - Further investment in **blockchain technology** for **traceability can ensure fair pricing and reduce exploitation.**
  - Additionally, strengthening mobile-based platforms to facilitate direct **farmer-consumer connections, particularly for perishable goods**, can minimize post-harvest losses and enhance farmers' bargaining power.
- **Encouraging Diversification into High-Value Crops:** To reduce dependency on traditional cereals and pulses, India should incentivize the cultivation of high-value crops such as **fruits, vegetables, spices**, and **herbs** that are in high demand both domestically and internationally.
  - Promoting **crop diversification by restructuring the MSP regime to incentivise farmer to move beyond wheat and rice and help them to achieve higher returns while reducing risks** associated with monoculture.
  - This shift could be supported by policy measures, including subsidies for inputs, improved access to quality seeds, and market linkage support.

- **Improving Soil Health through Integrated Nutrient Management:** Soil degradation continues to be a major challenge for India's agricultural productivity.
  - To combat this, the government should encourage **integrated nutrient management** (INM) practices, combining organic fertilizers, bio-fertilizers, and chemical fertilizers in a balanced manner.
  - Encouraging the use of **composting**, **green manuring**, and **crop rotation** can **restore soil fertility, improve water retention, and reduce dependency** on chemical inputs, ensuring sustainable productivity growth.
- **Fostering Public-Private Partnerships in Agricultural Infrastructure:** Private sector involvement in developing agricultural infrastructure, such as **cold storage facilities**, **food processing units**, and **warehouse networks**, can significantly improve the post-harvest value chain.
  - The government should facilitate **public-private partnerships (PPP)** that incentivize private investment in infrastructure while ensuring equitable benefits for smallholder farmers.
  - These partnerships can also focus on **logistics improvements** to reduce transportation costs and post-harvest losses.
- **Strengthening Farmer Producer Organizations (FPOs):** Farmer Producer Organizations (FPOs) can play a pivotal role in enhancing farmers' access to markets, technology, and finance.
  - By **strengthening FPOs, farmers can benefit from economies of scale,** improved negotiation power, and better access to credit.
  - Additionally, empowering FPOs with digital tools and capacity-building programs will enable them to effectively manage collective farming practices and **market their produce in a more structured and profitable manner.**
- **Facilitating Rural Entrepreneurship and Agri-Tech Startups:** Encouraging rural entrepreneurship and the growth of **agri-tech startups** can drive innovation in farm practices, product development, and service delivery.
  - The government can create dedicated **incubation centers** for agri-tech, offering training, funding, and mentorship to aspiring entrepreneurs.
  - Such initiatives can bridge the technology gap, particularly in areas like **automated farming**, **drone services**, and **AI-based analytics**, while also generating employment and fostering rural development.
  - For instance, **AmbiTAG** is an indigenous temperature data logger developed by IIT Ropar for cold chain management.
- **Boosting Sustainable and Organic Farming Practices:** To align with global market trends and growing consumer demand, India should push for large-scale adoption of **organic farming** by offering incentives such as **subsidies on organic inputs, and facilitating certification processes.**
  - Support for **natural farming methods**, such as **zero-budget natural farming (ZBNF)**, should be intensified, focusing on improving soil health, reducing chemical dependency, and offering a premium price for organic produce.
  - While promoting organic farming through subsidies and certification support, **India must ensure this shift maintains productivity** to prevent disruptions as seen in the case of **Sri Lanka.**

Conclusion:

To truly revitalize Indian agriculture**, policy must move beyond long-gestation infrastructure and align with farmers' real-time, localized needs.** By fostering climate-smart practices, digital solutions, and diversified value chains, reforms can enhance productivity and resilience. Strengthening FPOs, agri-tech, and inclusive credit systems will empower smallholders. A **responsive, tech-enabled, and sustainable approach** is key to securing India's food and income security goals.

Revamping India'S Pharmaceutical Landscape

This editorial is based on "Pharma opportunity" which was published in The Hindu on 10/06/2025. The article brings into picture the strategic importance of India's $50 billion pharmaceutical industry, exempted from US tariffs, underscoring its global healthcare role and potential for innovation-driven growth.

Tag: GS Paper - 2, Government Policies & Interventions, Issues Relating to Development, GS Paper - 3, Industrial Growth

India's pharmaceutical industry, valued at **$50 billion in 2024** and projected to reach **$130 billion by 2030,** stands as a global powerhouse in affordable medicine supply. Despite recent widespread reciprocal tariffs imposed by the US administration affecting various sectors, **pharmaceuticals have received crucial exemptions,** highlighting the sector's strategic importance. This exemption from trade tensions underscores **India's indispensable role in maintaining affordable healthcare globally** while presenting opportunities for further growth through innovation and quality enhancement.

What is the Current Regulatory Framework Governing the Pharmaceutical Sector in India?

- **Central Drugs Standard Control Organization (CDSCO):** The CDSCO, under the Ministry of Health and Family Welfare, is the apex regulatory body responsible for ensuring the **quality, safety, and efficacy of pharmaceuticals in India.**
  - **It oversees the approval of new drugs, clinical trials, manufacturing licenses,** and the regulation of medical devices and cosmetics.
  - CDSCO sets standards for drug testing and labeling, and is also involved in the implementation of **Good Manufacturing Practices (GMP)** for pharmaceutical production.
- **Drugs and Cosmetics Act, 1940:** The Drugs and Cosmetics Act is the cornerstone of India's pharmaceutical regulatory framework.
  - It governs the manufacture, sale, and distribution of drugs, cosmetics, and medical devices in the country.
  - It ensures that only drugs meeting safety and efficacy standards are approved and sold in the market.
- **National Pharmaceutical Pricing Authority (NPPA):** The NPPA is a government agency responsible for regulating the prices of essential medicines in India.
  - It **ensures that essential drugs are available at affordable prices to the public,** and that manufacturers and suppliers do not exploit the market.
  - The **NPPA regularly revises the prices of medicines under the National List of Essential Medicines (recently increased by 1.74%)** and ensures compliance with price control mechanisms.
- **State Drugs Control Authorities:** In addition to the central authorities, individual states in India have their own Drugs Control Departments, which are responsible for the enforcement of drug laws at the regional level.
- **Regulation of Clinical Trials:** Clinical trials in India are regulated by the CDSCO in compliance with the Drugs and Cosmetics Act, 1940.
  - The Indian Council of Medical Research **(ICMR)** provides ethical guidelines for conducting clinical trials, which must adhere to Good Clinical Practice (GCP) standards
- **Pharmaceutical Advertising and Promotion:** The regulation of pharmaceutical advertising and promotion is another crucial aspect of India's pharma sector regulation.
  - The Drugs and Magic Remedies (Objectionable Advertisements) Act, 1954 regulates the advertisement of drugs, ensuring that claims made in marketing are truthful and not misleading.

- **Recent Reforms:** The Indian pharma sector has also witnessed several recent reforms aimed at improving regulatory efficiency.
  - National Medical Devices Policy, 2023 and the **Pharmaceutical Technology Upgradation Assistance Scheme** focus on the development of critical medical devices and drugs.

What are the Key Factors Driving the Growth of India's Pharmaceutical Sector?

- **Cost Efficiency in Manufacturing:** India's pharmaceutical sector thrives due to its **significant cost advantages in manufacturing.**
  - The country benefits from **lower operational costs, including cheaper labor and raw materials,** making it highly competitive in the global market.
  - For example, India's pharmaceutical manufacturing costs are approximately **30-35% lower than those in the US and Europe.**
    - This pricing advantage supports **India's position as the world's largest provider of generic drugs, contributing to nearly 20% of global exports.**
- **Government Support and Policy Initiatives:** Government support through various schemes like the Production-Linked Incentive **(PLI) and the** Pradhan Mantri Bhartiya Janaushadhi Pariyojana **(PMBJP)** fuels growth.
  - The Indian government has allocated **Rs. 15,000 crore (US$ 2.04 billion) for the PLI scheme,** aimed at boosting the sector's manufacturing capacity.
  - Additionally, the PMBJP has expanded to more than 15,000 Kendras, offering **generic medicines at up to 80% lower prices,** driving both accessibility and affordability.
- **Rising Global Demand for Generics:** India's dominant position in the global generics market, especially in developed countries like the US, underpins its growth.
  - Indian pharma companies account for **40% of the generic drugs consumed in the US,** a market valued at over US$ 9 billion in 2024.
  - Moreover, the **US FDA has approved more than 262 Indian plants,** the highest number outside the US, reflecting India's robust supply capabilities.
- **Advancements in Biotechnology and Biologics:** The biotechnology segment in India, which includes **biologics,** biosimilars**, and vaccines,** is becoming a key growth driver.
  - **India's biosimilars market is expected to grow at a CAGR of 22%**, reaching US$ 12 billion by 2025.
  - Additionally, **India supplies over 60% of the world's vaccines**, cementing its role in global healthcare innovation, especially in areas like cancer and diabetes treatments.
- **Expansion of International Markets:** India's pharma sector continues to expand its international footprint, especially in regulated markets like the **EU and Japan.**
  - With a growing number of facilities adhering to global standards, Indian companies are increasing their presence in these markets.
  - In FY24, **India's pharmaceutical exports reached US$ 27.82 billion, with exports to over 200 countries**.
- **Foreign Direct Investment (FDI) and Global Partnerships:** Foreign investment and international partnerships play a pivotal role in the growth of India's pharmaceutical industry. The relaxation of FDI norms has encouraged more global investments in India's pharma sector.
  - **India allows up to 100% FDI in Greenfield pharma projects** and has attracted US$ 23.04 billion in FDI since 2000.
  - Recent examples include **Sanofi's USD 435 million investment in expanding its global capability center in Hyderabad**, showcasing the growing global interest in India's pharmaceutical potential.
- **Expansion of Medical Device and Digital Health Sectors:** The convergence of **pharmaceuticals, medical technology, and digital health** is driving the growth of India's healthcare sector.

- With advancements in medical devices and digital health solutions, India is expanding its healthcare ecosystem.
- India's medical technology market is expected to reach **USD 50 billion by 2030, growing at a CAGR of 15%**.
  - Additionally, the **Ayushman Bharat Digital Mission (ABDM)** is transforming the healthcare landscape, facilitating digital health solutions and improving accessibility across the country.

What are the Key Issues Confronting India's Pharmaceutical Sector?

- **Quality Control and Regulatory Compliance:** India faces ongoing challenges in maintaining consistent quality control and ensuring adherence to global regulatory standards.
  - The rapid expansion of the pharma sector, combined with increasing competition, has sometimes led to lapses in quality standards.
  - Despite having the highest number of USFDA-compliant plants outside the US, **recent incidents such as the WHO's alerts on Indian-made cough syrups** point to potential gaps in compliance.
- **Intellectual Property and Patent Challenges:** I**ntellectual property (IP) rights** and patenting issues present significant challenges for India's pharma sector, particularly in generics.
  - I**ndia's strong stance on compulsory licensing**, as seen with the provision of generic antiretroviral drugs to countries like South Africa, has often led to tensions with global pharmaceutical giants.
  - For instance, **India has granted compulsory licenses for crucial cancer drugs**, leading to legal battles with multinational companies that claim intellectual property rights violations.
- **Dependence on Imports for Active Pharmaceutical Ingredients (APIs):** India remains highly dependent on imports for critical **Active Pharmaceutical Ingredients (APIs)**, especially from China.
  - This dependency poses a risk to supply chain stability, particularly in light of geopolitical tensions or disruptions in trade.
  - **Around 70-80% of India's API imports come from China,** which exposes the sector to significant supply chain risks.
    - In **2021**, disruptions in the global supply chain, particularly from China, caused shortages of essential APIs, highlighting the vulnerability in India's pharmaceutical production capacity.
- **Over-Reliance on Generic Drugs:** India's pharma industry is heavily dependent on generics, which makes up a large portion of its exports.
  - While generics are crucial to global healthcare, **over-reliance on them risks stifling innovation and long-term sustainability** in the sector.
  - Though generics constitute 40% of the US market, and India holds a 20% share in global generic exports, the **industry needs to transition towards high-value products like biologics and specialty drugs.**
    - Despite this, India's generic market dominance limits the sector's ability to diversify and capture higher margins in the pharmaceutical value chain.
- **Talent Shortage and Skill Gaps:** India's pharma sector faces a growing shortage of skilled talent, especially in emerging areas like **biologics, advanced therapies, and regulatory affairs.**
  - This talent gap impedes the industry's ability to scale and innovate effectively.
  - A PwC report shows that **43% of pharma companies** face difficulties in digital transformation due to skill shortages.
  - Additionally, with the **sector aiming to hit US$ 450 billion by 2047,** the demand for advanced expertise in R&D and clinical trials is expected to outstrip supply, posing a major bottleneck for growth.
- **Environmental Sustainability Issues:** India's pharmaceutical industry has significant environmental impacts, particularly **concerning waste management, energy consumption, and carbon emissions** from production facilities.

- As global sustainability standards rise, these issues need urgent attention.
- For instance, data from state pollution control boards and pollution control committees show that from the **656 tonnes of biomedical waste generated daily in 2020, only 590 tonnes a day were treated.**
  - It is contributing to the issue of rising Antimicrobial Resistance.

What Measures can be Adopted to Revamp India's Pharma Sector?

- **Focus on Innovation and R&D Investment**: To shift from a reliance on generics to high-value products, India must **significantly ramp up its investment in research and development (R&D).**
  - Prioritizing innovation will allow Indian pharma to move into emerging therapeutic areas like **biologics, biosimilars, and personalized medicine.**
  - Encouraging private sector partnerships with academic institutions can create synergies that foster groundbreaking research and result in new drug discoveries and technologies.
- **Strengthening API Manufacturing Capabilities:** India must reduce its dependence on foreign imports, particularly from China, for **Active Pharmaceutical Ingredients (APIs).**
  - Developing self-reliant API manufacturing ecosystems through government incentives, such as those in the PLI scheme, will safeguard the sector from supply chain disruptions.
  - **Establishing dedicated API parks and upgrading existing facilities** to global compliance standards would also ensure that Indian-made drugs are consistently of high quality and competitively priced.
- **Implementation of Green and Sustainable Manufacturing Practices:** Adopting greener, more sustainable manufacturing practices is essential for India's pharmaceutical industry to meet global environmental standards and remain competitive.
  - Embracing sustainable production methods will **reduce energy consumption, waste, and carbon emissions**, aligning with international sustainability goals.
  - The adoption of eco-friendly technologies, such as **renewable energy sources and zero-waste processes, should be incentivized.**
    - India can leverage its growing emphasis on environmental regulations to become a leader in **eco-friendly pharma manufacturing,** which will also boost its global reputation.
- **Expansion of Digital Health and AI Integration:** India must fully integrate digital health technologies, including artificial intelligence (AI) and machine learning, into **pharmaceutical research, production, and delivery systems.**
  - By utilizing AI, drug discovery and development processes can be expedited, and patient care can be personalized more efficiently.
  - The use of **AI-driven platforms to streamline drug development**, clinical trials, and predictive analytics will not only increase operational efficiency but also help in identifying novel treatment pathways.
    - Additionally, **AI can enhance quality control, reduce errors, and improve overall supply chain management.**
- **Public-Private Partnerships for Health Infrastructure:** To meet both domestic and global demands, India should foster stronger public-private partnerships (PPPs) to enhance pharmaceutical infrastructure.
  - Collaboration between the **government, private pharma companies, and research institutions** will provide the necessary infrastructure for scaling up production, distribution, and accessibility of essential drugs.
  - Such partnerships will also enable **better resource allocation for tackling emerging health challenges,** improving healthcare access in rural areas, and accelerating the delivery of vaccines and critical treatments to underserved populations.

- **Skilling and Talent Development in Advanced Therapies:** As the pharma industry advances into more complex drug development, India must invest heavily in skilling and talent development, particularly in cutting-edge areas like **biologics and personalized medicine.**
  - Collaboration between **academic institutions, pharma companies, and healthcare providers** will be critical in developing a skilled workforce adept at handling new technologies.
  - The government should offer incentives for companies that invest in upskilling employees in advanced pharmaceutical technologies, ensuring a sustainable talent pipeline for the future.
- **Revitalizing Domestic Pharmaceutical Market with Chronic Disease Focus:** To cater to the rising burden of non-communicable diseases (NCDs) like diabetes, cardiovascular diseases, and cancer, **India must refocus its domestic pharmaceutical market on chronic disease treatments.**
  - With NCDs rapidly becoming the leading cause of morbidity and mortality in India, **pharma companies should prioritize research and production in these therapeutic areas.**
  - Shifting the focus to long-term, high-value therapies will not only meet domestic healthcare needs but also create export opportunities in the growing global chronic disease market.
- **Streamlining Access to Affordable Medicine:** To ensure broader access to affordable medicines, particularly in rural and underserved regions, India must enhance distribution networks, including the **expansion of the Jan Aushadhi Scheme** and other government initiatives.
  - By scaling up the reach of affordable medicine outlets, India can address both cost and accessibility issues that prevent many citizens from receiving timely care.
- **Promoting Next-Generation Pharma Technologies:** India should invest in next-generation pharmaceutical technologies, such as **cell-based therapies, and gene therapies,** to move beyond generics and establish a leadership position in the global high-value drug market.
  - Leveraging technological advancements such as **CRISPR gene editing and RNA-based therapies** will diversify India's pharmaceutical offerings and open new global markets.
  - This forward-thinking approach will position India as a hub for innovative therapies, enhancing its export profile and global competitiveness.

Conclusion:

India's pharmaceutical sector stands at a defining moment, poised to evolve from being the **"pharmacy of the world" to a global leader in high-value innovation.** Strategic reforms in R&D, digital health, and skill development, backed by strong public-private collaboration, will be key to unlocking the sector's next phase. With a **vision rooted in self-reliance and global excellence**, India is well-positioned to shape the **future of affordable and cutting-edge healthcare worldwide.**

India'S Path to Inclusive Economic Growth

This editorial is based on "India's economic growth is not inclusive. It is a concentrated accumulation of wealth" which was published in The Indian Express on 11/06/2025. The article brings into picture the stark contrast between India's $3.9 trillion economy and the deep-rooted inequality, stressing the need for inclusive growth to ensure real progress for all citizens.

Tag: GS Paper - 3, Growth & Development, GS Paper - 2, Government Policies & Interventions

India's celebrated status as the **world's fourth-largest economy with a $3.9 trillion GDP** masks a harsh reality of extreme inequality and widespread deprivation. While the **top 1% controls over 40% of national wealth,** the average Indian survives on less than Rs 5,600 per month when elite wealth is excluded. India ranks dismally on human development indicators—**134th on HDI and 111th on Global Hunger Index**—revealing that GDP numbers do not translate to genuine prosperity for ordinary citizens. Moving forward, India needs dedicated efforts to ensure that its economic achievements create meaningful opportunities and **inclusive growth.**

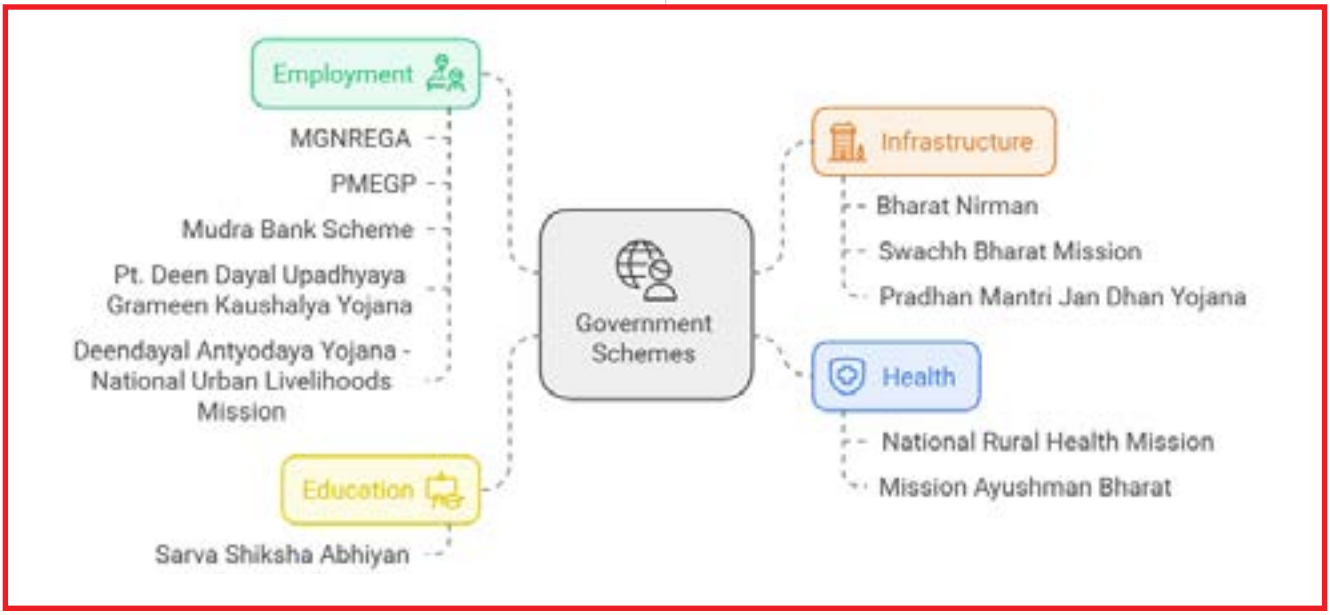
What has been the Trajectory of India's Pursuit of Inclusive Growth?

- **Post-Independence Era (1947-1970s):** In the early years after independence, India adopted a **socialist-oriented economic model** focused on **state-led industrialization, land reforms, and poverty alleviation.**
  - The focus was on improving the conditions of the marginalized through planned economic development, with the Green Revolution playing a key role in increasing food production and rural employment.
  - The **Five-Year Plans, especially the 11th and 12th**, emphasized inclusive growth.
- **Economic Reforms (1991-2000s):** The 1991 economic liberalization marked a significant shift in India's growth trajectory.
  - While the **liberalization of the economy spurred rapid growth, it also widened the inequality gap.**
  - The benefits of economic growth were more pronounced in urban areas, leaving rural and poorer regions behind.
  - However, th**e reforms set the stage for increasing trade, foreign direct investment (FDI), and industrial output,** contributing to overall national growth.
- **Rights-Based Approach (2005-2015):** In the mid-2000s, India shifted towards a rights-based approach to development.
  - Programs like the **Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) and the Right to Education (RTE) Act** were introduced to directly address social inclusion.
  - The government aimed at reducing poverty and empowering marginalized sections through guaranteed employment and access to education, although challenges in implementation remained.
- **Current Era (2015-Present):** In recent years, the focus has shifted towards digital and financial inclusion, with initiatives like the **Pradhan Mantri Jan Dhan Yojana (PMJDY), the Digital India campaign, and Ayushman Bharat.**
  - These programs are designed to expand access to banking, healthcare, and digital services, particularly in rural and underserved urban areas.
  - Additionally, **India's push for renewable energy, infrastructure development, and entrepreneurship** through initiatives like **Startup India** reflect the government's emphasis on broad-based economic participation.

What are the Key Issues Hindering Inclusive Growth in India?

- **Persistent Poverty and Inequality:** Despite economic growth, inequality in India has widened significantly, leaving millions trapped in poverty.
  - The **richest 1% of the population controls 53%** of the country's wealth, while the **bottom 50% of Indians hold a mere 4.1%.**
  - This stark wealth gap shows that growth has not trickled down to the majority of the population.
  - While government welfare programs like the **National Food Security Act (NFSA) benefit 80 crore people**, the wealth distribution remains disproportionately skewed, highlighting systemic barriers to equitable prosperity.
- **Large Informal Workforce:** A major barrier to inclusive growth in India is the dominance of the informal economy, **which accounts for 90% of the workforce.**
  - These workers lack access to social security, fair wages, and formal employment benefits.
  - The **International Labour Organization (ILO) highlights that informal workers are vulnerable to exploitation and economic shocks,** with no safety nets like pensions or healthcare.
  - For true inclusion, policies must focus on formalizing this vast workforce and improving labor laws to ensure basic protections.

- **Regional Disparities:** India's economic growth has been uneven, with substantial imbalances between states.
  - For instance, the **per capita Gross State Domestic Product (GSDP) in Bihar is roughly one-fifth that of Maharashtra,** underscoring stark regional economic differences.
  - These disparities hinder the country's ability to foster nationwide inclusive growth, as poorer states struggle to provide basic infrastructure and social services.
- **Gender Inequality:** Gender inequality continues to be a significant hurdle in India's inclusive growth trajectory.
  - Women, particularly in rural areas, are overwhelmingly employed in the informal sector, where wages are lower and job security is nonexistent.
  - According to the World Inequality Report **(2022), women earn just 18% of the income men do**, despite making up a significant portion of the labor force.
  - **India's rank of 135th out of 146 countries on the Global Gender Gap Index (2022)** highlights the depth of this issue, necessitating policies to ensure equal access to employment and credit for women.
- **Low Financial Literacy:** Financial literacy in India remains low, with **only 27% of the population financially literate, according to the RBI.**
  - This lack of knowledge limits individuals' ability to participate fully in the financial ecosystem, hindering savings, investments, and access to credit.
  - **Financial inclusion initiatives like PM Jan Dhan Yojana** have made strides, but more efforts are needed to educate and empower the masses, particularly in rural and marginalized communities, to make informed financial decisions.
- **Infrastructure Gaps:** Despite significant improvements in infrastructure, India still faces considerable gaps in basic services like electricity, healthcare, and education.
  - **Approximately 25% of Indians still lack access to electricity,** and many rural areas suffer from inadequate healthcare and educational facilities.
  - While initiatives like **PM Saubhagya and Ayushman Bharat** aim to address these issues, the quality and reach of infrastructure remain inconsistent, especially in rural and remote areas.



What Measures can be Adopted to Promote Inclusive Growth in India?

- **Expanding Employment Opportunities through MSMEs and Skill Development:** To tackle unemployment and underemployment, India should focus on the growth of Micro, Small, and Medium Enterprises (MSMEs), which are key drivers of job creation.
  - Strengthening MSMEs through easier access to credit, technology, and infrastructure can generate millions of jobs, particularly in rural and semi-urban areas.
  - Additionally, focusing on **skill development programs like PMKVY (Pradhan Mantri Kaushal Vikas Yojana)** and expanding vocational training will help the workforce adapt to evolving market needs, boosting employability and income levels for marginalized groups.
- **Strengthening Social Security and Welfare Schemes: Universal social security systems must be strengthened to cover the informal workforce**, which constitutes 90% of the Indian labor market.
  - Additionally**, targeted subsidies and direct benefit transfers (DBT) through the JAM trinity (Jan Dhan, Aadhaar, Mobile**) can effectively reach marginalized populations, improving their economic resilience.
- **Bridging Regional Disparities through Infrastructure Development:** To address the vast regional imbalances, India needs to prioritize investments in infrastructure and social services in underserved states.
  - Programs like **Gati Shakti and the National Logistics Policy** can enhance connectivity, while infrastructure development focused on rural education, healthcare, and energy access will foster economic integration.
  - By reducing the infrastructure gaps between states, India can create more balanced opportunities for employment and enterprise, particularly in lagging regions.
- **Promoting Gender Equity in the Workforce:** Gender inclusion must be prioritized in all economic sectors.
  - To achieve this, **policies should ensure equal pay, access to finance, and career opportunities for women**.
  - Additionally, addressing cultural and social barriers to women's participation in the workforce, such as c**hild care support and workplace safety**, will help women move into more formal and remunerative roles, contributing to inclusive growth.
- **Digital and Financial Inclusion through Technology:** Expanding digital access and literacy is essential for empowering marginalized communities and ensuring equitable participation in the economy.
  - Strengthening initiatives like the **PMGDISHA (Pradhan Mantri Gramin Digital Saksharta Abhiyan)** to enhance digital literacy, especially in rural areas, can bridge the gap between the urban-rural divide.
  - Additionally, enhancing credit access through the **PM MUDRA Yojana** will facilitate the growth of small enterprises and individual entrepreneurs.
- **Strengthening Public-Private Partnerships (PPPs) for Development:** The government should promote **public-private partnerships (PPPs)** in sectors like **healthcare, education, and infrastructure.**
  - Encouraging private investment in these sectors through strategic PPP models can accelerate the **delivery of critical services to underserved areas, fostering more inclusive growth.**
  - Moreover, collaboration between the public and private sectors can bring innovation, resources, and expertise, ensuring that economic development is sustainable and equitable across all regions of the country.

- **Climate-Smart and Sustainable Growth Models:** Given the environmental challenges India faces, promoting sustainable and inclusive growth means **integrating climate resilience into economic planning.**
  - Adopting green technologies in **agriculture, manufacturing, and energy will not only create new economic opportunities but also address issues of environmental degradation** and resource depletion.
  - Encouraging the adoption of renewable energy through incentives for solar power and electric vehicles, and pushing for a circular economy, will help mitigate climate impacts while promoting inclusive, eco-friendly growth.
- **Ensuring Transparency and Accountability in Governance:** Corruption and inefficiency often hinder the reach of welfare programs and inclusive growth.
  - Strengthening the **institutional framework for transparency, accountability, and governance through measures like the Jan Vishwas Bill** and the digitization of government services will ensure that the benefits of economic growth are more widely distributed.
  - **Improving public service delivery, simplifying compliance processes, and reducing bureaucratic hurdles** will make welfare schemes more effective and inclusive.

Conclusion:

India's economic growth must be accompanied by a **clear focus on inclusivity to ensure that prosperity reaches all sections of society.** While recent strides in GDP and welfare schemes are commendable, the deepening inequality, poverty, and social disparities require urgent attention. To achieve true growth, policies should prioritize **equitable wealth distribution, employment generation, and social security, alongside bridging regional and gender gaps.**

MSMEs As Pillars Of Economic Prosperity

This editorial is based on "Enduring growth of the MSME credit landscape" which was published in The Hindu on 10/06/2025. The article brings into picture the robust growth of India's MSME sector, marked by a 13% rise in credit exposure, while highlighting persistent challenges like limited credit access and regulatory hurdles that demand urgent policy reforms.

Tag: GS Paper - 2, Government Policies & Interventions, GS Paper - 3, Mobilization of Resources

India's MSME sector is experiencing robust growth, with **credit exposure increasing 13% year-on-year** to reach significant levels, driven by **strong demand from new borrowers who constitute nearly half of all fresh originations**. Despite this encouraging trajectory, MSMEs continue to grapple with persistent challenges including **limited access to formal credit, regulatory complexities**. India must urgently address these systemic issues through **comprehensive policy reforms and streamlined business processes** to ensure the MSME sector can truly become the backbone of sustainable economic development.

How India's MSME Sector is Driving India's Economic Growth?

- **Employment Generation and Job Creation**: MSMEs are the largest employment provider in India, contributing to nearly **60% of the workforce.**
  - With an estimated 7.34 crore MSMEs, the sector plays a pivotal role in absorbing India's young, expanding labor force.
  - The **Prime Minister's Employment Generation Programme (PMEGP)** alone supported 89,118 enterprises in 2023-24, creating over 7.1 lakh jobs.
- **Boost to Exports and Global Trade:** The MSME sector is a major driver of India's export performance, contributing to **45.79%** of India's total exports as of 2024-25.

- Their increasing participation in global trade is vital for improving India's trade balance and strengthening its position as a global manufacturing hub.
- A key policy initiative, the **Public Procurement Policy**, has boosted MSMEs' access to government procurement, fostering export capabilities.

- **Financial Inclusion and Credit Accessibility**: Access to credit remains one of the most pressing issues for MSMEs, but recent government initiatives like Mudra Yojana and **Credit Guarantee Fund (CGTMSE)** are bridging the gap.
  - The **MUDRA** loan scheme has disbursed **₹5.41 lakh crore** (FY24) to MSMEs, empowering businesses to scale and innovate.
    - By offering collateral-free loans and expanding credit guarantees, these measures provide MSMEs with much-needed liquidity.
- **Digital Transformation and Technological Adoption:** The sector is undergoing a digital transformation, crucial for improving efficiency and market reach.
  - About **72% of MSMEs** now prefer digital payments, enhancing transparency and reducing transaction costs.
    - The **UPI** ecosystem processed transactions worth **₹23.48 lakh crore** in 2024, demonstrating the sector's growing digital engagement and its potential for future growth.
- **Government Support and Policy Reforms:** The government has significantly increased its allocation for MSMEs, with a **₹23,168 crore** budget allocation in **FY26** to support growth.
  - Reforms like raising investment and turnover limits, as well as introducing the PM Vishwakarma scheme, offer tailored support to artisans, especially women and rural entrepreneurs.
- **Regional Development and Inclusive Growth:** MSMEs are critical in promoting regional development, especially in rural and remote areas.
  - Schemes like SFURTI (Scheme for Fund Regeneration of Traditional Industries) have transformed traditional sectors, enhancing the productivity of rural artisans.
  - Furthermore, **Jammu & Kashmir** alone generated **3.56 lakh jobs** under **PMEGP**, significantly reducing regional disparities.
- **Sustainability and Green Initiatives: Sustainability** is becoming central to MSME growth, with green technology adoption and eco-friendly manufacturing gaining momentum.
  - **Atmanirbhar Bharat** has encouraged MSMEs to focus on green manufacturing processes, including clean tech initiatives in solar energy, EV batteries, and wind turbines.
  - The National Manufacturing Mission has a focus on clean tech, such as **solar PV cells** and **EV batteries**.

What are the Key Issues Associated with India's MSME Sector?

- **Limited Access to Formal Credit:** One of the most pressing issues for MSMEs is their **limited access to formal credit,** which constrains their ability to scale.
  - While schemes like **Mudra Yojana** and **CGTMSE** have provided significant financial support, a substantial number of MSMEs still rely on informal lending sources.
    - Only **2.5 crore MSMEs** (out of 6.3 crore) have accessed formal credit sources.
- **Regulatory and Compliance Burden:** The MSME sector faces significant regulatory and compliance challenges, particularly for small enterprises.
  - The complexity of **tax, labor, and environmental regulations** often burdens MSMEs with high compliance costs and procedural delays.
    - These challenges are especially severe in manufacturing sectors like **auto components** and **pharmaceuticals**, where stringent standards are required.
  - MSMEs report **high compliance costs** as a barrier to productivity and competitiveness in global markets.
- **Skilled Labor Shortage:** The shortage of skilled labor remains a major bottleneck, especially in labor-intensive sectors such as **garments**, **food processing**, and **defense equipment**.
  - Despite efforts to increase vocational training, the mismatch between industry needs and

available skills limits productivity and innovation in MSMEs.

- About **25% of MSMEs** cite a skilled **labor shortage** as a significant challenge, particularly in sectors like **garments** and **food processing**.
- **PMEGP** and other schemes aim to address this, but skill gaps remain substantial, hindering MSME growth.

- **Technological Gap and Digital Divide:** While MSMEs are increasingly adopting digital payments, they are still behind in embracing advanced technologies like Industry 4.0, **AI, and automation.**
  - The lack of technological infrastructure, along with limited access to affordable R&D, hampers MSMEs from improving product quality and competitiveness.
  - **Though 90% of MSMEs** have adopted **digital payments**, only **18%** use **digital lending platforms** and just **13% actively use digital marketing or e-commerce** to reach customers
  - Limited investment in **R&D** and **technological infrastructure** hinders MSMEs' ability to scale efficiently.
- **Market Access and Competition:** MSMEs struggle to access larger, high-value markets due to competition from bigger players and a lack of marketing expertise.
  - This is particularly evident in the **export sector**, where despite strong performance,
  - MSMEs overall contribute **45.79%** to India's exports, **yet many face stiff competition from global giants.**
  - Udyam Portal registrations reached **5.7 crore**, but the sector's reach in international markets remains limited.
- **Inadequate Infrastructure and Logistics:** Infrastructure bottlenecks, **including poor roads, power supply, and unreliable logistics,** continue to affect MSME productivity.
  - These issues are most **prominent in rural and remote areas,** where MSMEs face challenges in transportation and raw material procurement, significantly increasing operational costs.
  - With India's logistics costs estimated at **14–18% of GDP (Economic Survey 2022–23) — nearly double the global benchmark of 8%** — systemic inefficiencies have become a major concern.
- **Gender Disparities in Entrepreneurship:** Although the government has introduced initiatives to support **women entrepreneurs**, they still face disproportionate challenges compared to their male counterparts, including limited access to credit, market linkages, and business networks.
  - **Women-led MSMEs** constitute **26.2%** of total MSME enterprises but face **higher credit access challenges** than men.
  - According to **ASUSE 2023–24,** women-led MSMEs now account for **26.2% of proprietary enterprises.** Although 76% have credit access, **41% cite limited financing and intense competition** as key barriers to their growth.

What Measures can India Adopt to Enhance the Effectiveness of India's MSME Sector?

- **Simplification of Regulatory Framework:** India must streamline regulatory processes to reduce the compliance burden on MSMEs.
  - This involves **simplifying tax filing,** reducing procedural delays, and creating a single-window clearance system.
  - Introducing **one-click compliance platforms** and leveraging digital tools for routine government interactions will help MSMEs comply more efficiently.
- **Strengthening Financial Support through Digital Lending:** The accessibility and affordability of credit remain major hurdles for MSMEs.
  - Expanding **digital lending platforms** and ensuring greater participation of **NBFCs (Non-Banking Financial Companies)** in providing loans would empower MSMEs, especially those in remote areas.
  - Offering **collateral-free loans** and expanding the **Credit Guarantee Fund** will provide financial flexibility, while also encouraging innovation in MSMEs.
- **Skilling and Workforce Development Initiatives:** Filling the skills gap is essential for MSMEs to remain competitive.

- The government should integrate **Industry 4.0** technologies, including automation, AI, and data analytics, into vocational training programs.
- Partnering with **private sector companies** and **educational institutions** to create customized skill development programs will align the workforce with the evolving needs of the sector.
- This will help improve productivity and innovation in MSMEs.

- **Promotion of E-commerce and Digital Marketing for MSMEs:** To enhance market access, MSMEs should be encouraged to adopt **e-commerce platforms** and **digital marketing tools**.
  - Providing incentives for MSMEs to set up **online stores** or integrate with large **digital marketplaces** like GeM (Government e-Marketplace) can help MSMEs reach broader markets, both domestically and internationally.
  - Support for digital training and the development of **user-friendly online platforms** is critical for this transformation.
- **Enhanced Infrastructure Development:** Addressing the infrastructure bottlenecks faced by MSMEs, particularly in rural areas, is key.
  - The government should prioritize developing **industrial parks**, **logistics hubs**, and **common facility centers (CFCs)** in underserved regions.
  - Additionally, improving **transportation networks** and **power supply reliability** will reduce operational costs and improve the competitiveness of MSMEs in global markets.
- **Focused Policy for Women Entrepreneurs:** There is a need for targeted schemes that provide **financial incentives**, **networking opportunities**, and **mentorship** to **women entrepreneurs** in the MSME sector.
  - This could include **increased credit guarantees**, specialized **loan products**, and **capacity-building programs** to overcome the unique challenges faced by women.
  - Empowering women entrepreneurs can significantly contribute to economic inclusivity and the overall growth of the sector.
- **Incentivizing Green and Sustainable Practices:** India should encourage MSMEs to adopt **green technologies** and **sustainable production methods** by providing financial incentives and facilitating easy access to **environmental credits**.
  - Policies aimed at **import substitution**, such as support for local sourcing of sustainable materials, would also help MSMEs transition towards environmentally responsible practices.
  - This will enable MSMEs to not only align with global sustainability goals but also reduce their dependence on imports.
- **Sector-Specific Credit Programs:** As per NITI Aayog**'s recommendations**, it is crucial to establish **sector-specific credit programs** tailored to meet the distinct needs of industries like textiles, defense manufacturing, and food processing.
  - These programs should focus on addressing challenges such as **working capital requirements**, **technology adoption**, and **market access**, particularly for MSMEs in these high-growth sectors.
  - Such specialized financing will help enhance their productivity and global competitiveness.
- **Improved Market Intelligence and Export Assistance:** To boost MSME exports, India should implement **market intelligence** programs that provide real-time insights into global market trends, trade barriers, and consumer preferences.
  - Establishing **dedicated export support cells** in MSME clusters, along with **training MSMEs in export procedures**, will ensure they are better equipped to engage in international trade.
  - **Public-private partnerships** can help MSMEs navigate export compliance and regulations more effectively.
- **Fostering Innovation and R&D through Public-Private Collaboration:** Creating **innovation hubs** in collaboration with **academic institutions** and **research bodies** can drive R&D for MSMEs.
  - Subsidizing access to cutting-edge technologies and offering **tax incentives** for MSMEs investing in R&D will encourage innovation.

- Additionally, facilitating **public-private partnerships (PPPs)** in R&D will ensure that MSMEs can leverage state-of-the-art technology to improve production efficiency and product quality.

- **Improving Legal and Intellectual Property Support:** Strengthening **IPR (Intellectual Property Rights) support** for MSMEs is critical to foster innovation.
  - Government agencies should provide **subsidized IPR registration** and **legal assistance** to MSMEs for protecting their intellectual assets.
  - Offering training on patent rights, trademarks, and copyrights will also empower MSMEs to protect their innovations and encourage more creative ventures in the sector.

Conclusion:

From the **missing middle to India's economic juggernaut**, India's MSME sector is poised to unlock unprecedented growth. By tackling challenges such as access to finance, skill gaps, and regulatory complexities, MSMEs can drive innovation and job creation at scale. Empowering these businesses with **digital tools, tailored credit schemes, and improved infrastructure** will enhance their global competitiveness. With a focus on **inclusivity and sustainability,** MSMEs can truly become the backbone of India's future prosperity.

Reforming Electoral Practices

This editorial is based on "Tighten the process: On the Election Commission of India, election processes" which was published in The Hindu on 10/06/2025.The article talks about the concerns over alleged voter roll discrepancies, and turnout irregularities, and limited access to CCTV footage in the 2024 Maharashtra Assembly elections emphasize the need for improved transparency in the electoral process.

Tag: GS Paper-2, Judgements & Cases, Judiciary, Representation of People's Act, Parliament

Elections are the bedrock of India's democratic polity, enabling citizens to choose their representatives and shape public governance. With over **96.88 crore electors registered**, India conducts the **largest democratic exercise** globally, governed by a **robust constitutional and legal framework**. However, the electoral process is increasingly strained by issues such as money power, criminalisation of politics, voter fraud, and campaign irregularities. Despite **landmark reforms** and judicial interventions, systemic challenges persist.

Which Key Provisions Regulate the Conduct of Elections in India?

- **Constitutional Empowerment of ECI: Article 324** empowers the Election Commission of India to supervise, direct, and control elections in India.
  - It establishes the institutional authority for conducting free and fair **Parliamentary** and **State** elections.
- **Electoral Roll Preparation:** The Representation of the People Act, 1950 governs the preparation and revision of electoral rolls.
  - It includes the appointment of **electoral officers** and management of **constituency-wise voter lists**.
- **Regulatory Role of RPA, 1951:** The Representation of the People Act, 1951 regulates the **pre-election process and conduct of elections**.
  - It lays down qualifications, disqualifications, and **election dispute procedures**, including offences and penalties.
- **Rules for Electoral Roll Management: The Registration of Electors Rules, 1960** operationalizes the 1950 Act concerning **roll corrections and deletions**.
  - This ensures procedural uniformity across states and strengthens voter database **accuracy and integrity**.
- **Delimitation:** The Delimitation Act, 2002 empowers commissions to redraw **parliamentary and assembly boundaries** post-Census.
  - It ensures fair and proportionate **representation** based on demographic changes.
- **Model Code of Conduct (MCC):** Though **not legally enforceable**, the MCC guides ethical election conduct, with many provisions backed by laws under the Bharatiya Nyaya Sanhita (BNS) and RPA 1951.
  - Introduced in 1960, it was strengthened over decades to ensure **electoral discipline and decorum**.

- **Judicial Oversight and Accountability:** The Supreme Court has upheld electoral rules and aided in the **progressive interpretation of election laws**.
  - Judicial intervention remains vital in ensuring the democratic **integrity** of the electoral process.
- **Digital Platform Integration:** The **ERONET (Electoral Roll Management) system** provides centralized digital platform management for electoral rolls across states.
  - This technological solution addresses earlier decentralization issues that caused duplicate EPIC number problems.

What are the Major Issues Related to the Electoral Process?

- **Limited Scope of VVPAT Matching:** Current VVPAT verification covers only five EVMs per Assembly segment irrespective of dispute levels.
  - In 2024, the Supreme Court rejected full voter verified paper audit trail (VVPAT) matching.
    - However, candidates can get **5% machines verified** by the engineers of the manufacturers.
  - Critics argue this undermines **public trust and election transparency**, demanding broader **cross-verification**.
- **Electoral Roll Manipulation Allegations:** Concerns regarding the manipulation of voter lists during election cycles continue to surface periodically.
  - However, the Election Commission explained that the duplication of voter IDs occurred due to the previous decentralized Electors Photo Identity Card (EPIC) system, which was later standardized with the **ERONET** platform.
- **Duplicate EPIC Numbers Across States:** Voters with identical EPIC numbers in different states raised fears of **multiple voting fraud**.
  - The EC responded by stating that **voters can vote only at assigned polling stations**.
- **Violation of MCC by Campaigners:** Star campaigners often use hate speech and communal rhetoric in violation of the MCC.
  - The lack of penal consequence enables repeated **campaign violations** without deterrence.
- **Unregulated Political Party Expenditure:** While candidates face spending caps, political parties have **no official limit on** election expenditure.
  - Estimates suggest **₹1.35 lakh crore** was spent in the 2024 general election by parties alone.
- **Criminalisation of Politics Remains Persistent:** In 2024, 46% of elected MPs had criminal cases, including serious offences like murder and rape.
  - This erodes **democratic legitimacy** and reflects the failure of candidate screening mechanisms.
- **Misuse of Technology and Fake News:** Digital platforms are increasingly exploited to spread misinformation and manipulate voter behaviour.
  - Despite regulations, enforcement against **deepfakes and false propaganda** remains weak and delayed.
- **Issue of Contesting Multiple Seats:** Sitting MPs and MLAs contesting multiple seats lead to costly and avoidable **bye-elections**.
  - This disrupts governance and reflects political expediency over **voter accountability**.
  - Also, resignations after winning multiple seats lead to frequent by-elections, resulting in voter fatigue and disinterest.
- **Growing Electoral Costs and Burden:** The EC spent nearly ₹6,931 crore in the 2024 general elections, excluding party and candidate expenditure.
  - High electoral costs strain public finances and **reduce campaign fairness**.
- **Weak Internal Democracy in Parties:** Most parties lack transparent internal elections or **leadership term limits**, weakening accountability.
  - Undemocratic party structures hinder **inclusive political participation and candidate diversity**.
- **Underrepresentation Through FPTP System:** Winning candidates often secure less than 50% votes, raising questions on **representative legitimacy**.
  - The FPTP system may not reflect **voter plurality** in highly diverse electorates.
- **Regional Disparities in Representation:** Concerns have been raised about delimitation favouring populous states over **southern or smaller states**.
  - This could potentially alter **federal balance and political equity**.

ELECTORAL REFORMS IN INDIA

ELECTORAL REFORMS ARE CHANGES MADE TO IMPROVE THE ELECTION PROCESS AND ENSURE FAIRNESS

Electoral Reforms Before 1996

- **Model Code of Conduct (1969):** Guidelines to regulate political parties and candidates prior to elections
- **61st Constitutional Amendment Act (1988):** Lowering of the voting age from 21 to 18 years
- **Electronic Voting Machines (EVMs) (1989):** Switched from individual colored ballot boxes to ballot papers, and later to EVMs
- **Booth Capturing (1989):** Provision for adjournment of poll or countermanding of elections in such cases
- **Elector's Photo Identity card (EPIC) (1993):** Electoral roll is the basis to issue EPIC to registered electors
- **ECI- A Multi-member Body (1993):** Election commissioners were appointed in addition to CEC

Electoral Reforms of 1996

- **Time-limit for By-elections:** Elections must occur within 6 months of any vacancy in a legislative house
- **Listing of Names of Candidates:** Contesting candidates categorized into 3 groups for listing
  - Recognised & registered-unrecognised political parties
  - Other (independent)
- **Disqualification for Insulting the National Honour Act, 1971:** Leads to election disqualification for 6 years upon:
  - Insulting the National Flag, Constitution of India or preventing the singing of National Anthem

Electoral Reforms After 1996

- **Vote Through Proxy (2003):** Service voters in Armed Forces & forces under Army Act can vote by proxy
- **Allocation of Time on Electronic Media (2003):** Equitable sharing of time on electronic media during elections to address the public
- **Introduction of Braille Signage Features in EVMs (2004):** To facilitate the visually impaired voters to cast their votes without an attendant

Electoral Reforms Since 2010

- **Voting Rights to Indian Citizens Living Abroad (2010)**
- **Online Enrollment in Electoral Roll (2013)**
- **Introduction of NOTA option (2014)**
- **VVPAT Voter Verified Paper Audit Trail (2013):** Introduction of VVPAT with EVMs to conduct free and fair elections
- **Photos of Candidates on EVMs and Ballot Papers (2015):** To prevent confusion in constituencies with namesake candidates
- **Introduction of Electoral bonds (2017 Budget):** An alternative to cash donations for political parties
  - Declared as unconstitutional by SC (2024)
- **Launch of Electronic EPIC (2021)**
- **Home Voting for People with Disabilities & Those Above 85 years of Age (2024)**

IMPORTANT COMMITTEES/ COMMISSION

Committees/ Commission	Year	Purpose
Tarkunde Committee	1974	By Jaya Prakash Narayan (JP) during the "Total Revolution" movement.
Dinesh Goswami Committee	1990	Electoral Reforms
Vohra Committee	1993	On the Nexus between Crime and Politics
Indrajit Gupta Committee	1998	State Funding of Elections
Second Administrative Reforms Commission of India	2007	Report on Ethics in Governance (Headed by Veerappa Moily)
Tankha Committee (Core Committee)	2010	To look into the whole gamut of the election laws & electoral reforms.

Drishti IAS

What Electoral Reforms are Essential to Strengthen Democracy?

- **Scientific VVPAT Matching Mechanism:** Regions should be created for sample-based VVPAT verification using a scientific approach.
  - If mismatches arise, complete **manual VVPAT counting** should be mandated for that region.
- **Introduction of Totaliser Machines:** To safeguard voter anonymity, **totaliser machines** (ECI's 2016 proposal) can mix votes from multiple booths.
  - This reduces booth-wise result analysis and deters **post-poll intimidation** or discrimination.
- **Eliminating Duplicate EPIC Numbers:** Linking Aadhaar to EPIC numbers can help remove **duplicate or fake voter entries**.
  - Privacy concerns must be addressed through **data protection safeguards and legislative oversight**.
- **Revoking Star Campaigner Privileges:** The EC should revoke **star campaigner** status for repeated MCC violations.
  - This would remove **expenditure exemptions** and increase compliance with ethical campaign norms.
- **Amending RPA for Expenditure Ceiling:** Amendments should cap political party spending, not just candidate-level expenditure.
  - This can check **unchecked campaign finance** and ensure level-playing field during elections.
  - One Nation, One Election can reduce electoral expenditure by streamlining the election process, cutting down on the repetitive costs associated with holding multiple elections at different times.
- **Mandatory Disclosure of Criminal Background:** The 2018 Supreme Court ruling mandates that criminal records be declared three times.
  - This must be strictly enforced with **ECI oversight and media circulation** to inform voters.
  - The **1993 Vohra Committee** highlighted the links between criminals, politicians, and bureaucrats, proposing a nodal agency to curb the criminal-political nexus and black money.
  - The **2nd Administrative Reforms Commission(ARC) on Ethics in Governance** recommended fast-track courts for criminal candidates.
  - The **Law Commission's 244th Report** recommended disqualifying candidates once charges are framed against them and increasing penalties for false affidavits, advocating stricter disqualification rules and stronger legal deterrents.
- **Fast-Tracking Political Crime Cases:** The Supreme Court (at multiple occasions) has directed **high courts** to establish special benches to monitor criminal cases against lawmakers and prioritize serious criminal cases involving politicians before elections.
  - This aims to enhance **public confidence** and deter criminals from entering politics through procedural delays.
- **Resignation Rule for Multiple Seats:** Sitting legislators must resign before filing nominations for a new seat.
  - This prevents **avoidable bye-elections** and reduces campaign resource wastage.
  - Candidates creating vacancies should cover part of the by-election costs, **discouraging opportunism** and promoting **fiscal responsibility**.
- **Regulating Candidate Switching and Parachuting:** Constitutional amendments can restrict switching between seats and constituencies.
  - Implementing **cooling-off periods** after elections would prevent legislators from quickly **switching constituencies**.
  - This preserves **local representation** and reduces erosion of public trust.
- **Internal Party Democracy Mandate:** Political parties must conduct internal elections and enforce term limits for leadership roles.
  - This enhances **political pluralism** and nurtures fresh and competent leadership.
  - The **2nd ARC on Ethics in Governance** recommended internal democracy in parties,

aligning with the broader goal of clean and efficient electoral governance.

- **Electoral Transparency:** Bringing political parties under the RTI Act will ensure transparency in funding, strengthening democratic oversight and boosting public confidence in **electoral finance**.
  - Additionally, implementing **income tax regulations** on political parties will help curb illicit funding and ensure accountability in political donations.
- **Strengthening Voter Education:** The SVEEP (Systematic Voters' Education and Electoral Participation) programme should be expanded to include ethical voting and fake news literacy.
  - This empowers voters to engage in **informed and participatory democracy**.
- **Regulating Digital Campaigning and Misinformation:** Social media codes should be strictly enforced against hate speech and deep fakes.
  - Collaboration with platforms is necessary for **pre-emptive moderation and content tracing**.
- **State Funding: TS Krishnamurthy (former Chief Election Commissioner of India)** recommended establishing a **National Election Fund** to streamline public funding of campaigns, reducing opaque private donations and enhancing transparency.
  - Similarly, the **Indrajit Gupta Committee (1998)** proposed partial state funding to ensure fair competition, emphasizing the need for a level playing field and financial equality in electoral contests.

Conclusion

Electoral reforms are indispensable to strengthen India's democratic legitimacy, citizen trust, and institutional integrity. By addressing systemic flaws, **embracing transparency, and empowering independent institutions**, India can ensure that its elections remain truly representative and fair. A committed, **multi-stakeholder approach** is essential to realise the promise of electoral justice.

Future Of India-EU Strategic Engagement

This editorial is based on "The rearming of Europe: India must tap opportunities for exports and joint research" which was published in The Indian Express on 16/06/2025. The article brings into picture the evolving India-EU strategic partnership, where Europe's defense push post-Ukraine aligns with India's growing defense exports, creating new avenues for cooperation.

Tag: GS Paper - 2,Important International Institutions, Government Policies & Interventions,International Treaties & Agreements,Effect of Policies & Politics of Countries on India's Interests

India and the European Union are witnessing a transformative phase in their strategic partnership, driven by high-level diplomatic exchanges and **Europe's urgent defense readiness goals following the Ukraine conflict**. The EU's ambitious Joint White Paper on European Defence targeting €800 billion in defense investment by 2030 presents unprecedented opportunities for India's surging defense exports, which recently reached a record $2.76 billion. This convergence of **India's growing defense prowess and Europe's strategic autonomy** aspirations positions both sides to reshape global cooperation dynamics.

How India-European Union Relations Evolved Over Time?

- **Early Diplomatic Engagement (1947-1990s):** India's relationship with European Economic Community (EEC) and the EU began with formal diplomatic recognition after India's independence in 1947.
  - During the Cold War era, **India's foreign policy was largely aligned with the** Non-Aligned Movement (NAM), and its relations with the CEE countries were primarily driven by shared interests in **sovereignty, decolonization, and global peace.**
  - India maintained balanced ties with both the Western bloc and the socialist states in Eastern Europe.

- **Post-Cold War Transition (1990s-2000s):** The end of the Cold War and the dissolution of the Soviet Union in the early 1990s marked a shift in global geopolitics, and **India began reorienting its foreign policy towards greater economic liberalization** and integration into the global economy.
  - In the 1990s, India began focusing more on economic diplomacy with CEE countries.
  - The shift was prompted by **India's efforts to diversify its trade and investment ties beyond traditional partners like the Soviet Union.**
  - While there was an interest in establishing economic partnerships, political relations remained secondary, as **India focused on its "Look East" policy and South-South cooperation.**
- **India-EU Strategic Partnership (2000s-Present):** The 2000s witnessed a significant transformation in India's engagement with the EU, especially following the establishment of the **India-EU Strategic Partnership in 2004.**
  - During this period, India's relationship with CEE countries became more regionally focused, with significant engagement in **areas like defense, energy, and education.**
    - Countries like **Poland, Hungary, and the Czech Republic** began to emerge as important trade and investment partners for India, particularly in manufacturing, technology, and energy.
- **Post-2010s: Strengthening Ties and Diversification:** In the 2010s, India's foreign policy shifted towards **greater diversification and multilateralism,** and its relationship with CEE countries and the EU became more integrated into a broader global strategy.
  - With the EU emerging as one of India's largest trading partners, India began to leverage its ties with individual CEE states to increase its economic footprint in Europe.
  - India increasingly engaged with the EU on pressing global issues such as **climate change, cyber security, counterterrorism, and sustainable development.** For example**, India and the EU launched a Clean Energy and Climate Partnership in 2016**, focusing on clean energy technologies, renewable energy investments, and climate adaptation measures.
- **Recent Developments and Future Prospects:** In recent years, the relationship between India and the EU has evolved into a **more strategic and multi-dimensional partnership.**
  - India's growing role in global governance, **particularly in multilateral forums such as the G20, the UN, and the World Trade Organization (WTO)**, has further cemented the EU's interest in collaborating with India.
  - India's defense and security cooperation with CEE countries has also grown, particularly as India diversifies its defense suppliers away from Russia.
    - The **EU's focus on a "geopolitical" strategy,** along with its interest in countering China's growing influence, has prompted India to strengthen its role as a partner in the EU's Indo-Pacific strategy.

What are the Key Forces Propelling the India-EU Strategic Partnership?

- **Geopolitical Shifts and Shared Strategic Interests:** The changing global order, marked by an **assertive China and an unpredictable US administration,** has motivated India and the EU to deepen their strategic partnership.
  - Both share concerns about the **geopolitical impact of China's rise and Russia's actions (though perceived differently).**
  - The **EU views China as a systemic rival**, and India, with its growing role in the Indo-Pacific, offers a **reliable partner to counterbalance China's influence.**
  - For instance, in 2023, **India joined the EU Indo-Pacific Oceans Initiative (IPOI) and the EU's Maritime Security Strategy,** further highlighting the shared strategic priorities.
    - This partnership underscores the growing importance of joint security frameworks between the two.

- **Digital Transition and Technological Cooperation:** India's rapid digital transformation has become a major catalyst for its relationship with the EU, as both seek to bolster technological sovereignty while promoting digital inclusion.
  - **The EU, with its emphasis on data protection and regulatory frameworks,** and **India, with its vast digital infrastructure like the India Stack,** find significant common ground in enhancing digital governance.
  - The **India-EU Trade and Technology Council (TTC) launched in 2022** is an example of a joint effort in managing the challenges of digital governance, AI, and cybersecurity.
  - With **50% of global digital transactions taking place through India's UPI system**, the EU sees India as a leader in fintech.
- **Climate Change and Green Transition Collaboration:** Both India and the EU are committed to fighting climate change, with a focus on **achieving net-zero emissions and supporting sustainable energy solutions.**
  - The **EU's ambitious Green Deal aligns well with India's objectives for sustainable development,** offering a platform for collaboration on clean energy, green technologies, and climate financing.
  - In 2021, the India-EU Clean Energy and Climate Partnership was strengthened with an emphasis on green hydrogen and energy-efficient solutions.
  - The **EU's commitment to helping India decarbonize its steel sector, through joint R&D**, exemplifies the shared focus on reducing emissions.
- **Security and Defence Cooperation:** The security landscape in the Indo-Pacific has become increasingly critical, with both India and the EU prioritizing maritime security and counterterrorism.
  - As global security dynamics shift, India has diversified its defence partnerships, with the EU playing a key role in providing advanced technology and military cooperation.
  - A notable development in 2023 was the **joint naval exercise in the Gulf of Guinea, following similar operations in the Gulf of Aden.**
  - With **India's defence exports rising to approximately USD 2.76 billion in FY 2024-25,** the EU is increasingly seen as a critical partner in defense technology and equipment co-production.
- **Growing Trade and Investment**: India and the European Union are both looking to bolster their economic ties.
  - The **EU is one of India's largest trading partners,** while India is an increasingly important market for European goods and services.
  - Trade agreements, **such as the proposed India-EU Free Trade Agreement (FTA),** are a focal point for enhancing these relations.
  - **India-European Free Trade Association** signed a Trade and Economic Partnership Agreement (TEPA) in March 2024, which signals significant progress.

What are the Key Areas of Friction Between India and the European Union?

- **Trade Barriers and Slow Progress on FTA:** The Free Trade Agreement **(FTA) negotiations between India and the EU have been stymied** by several trade barriers.
  - India faces non-tariff barriers (NTBs) imposed by the EU, particularly concerning **labor and environmental standards**.
  - Trade in goods between the EU and India has surged by almost 90% over the past decade, **India is still only the EU's ninth-largest trading partner, accounting for just 2.2% of the EU's total trade**, signaling an imbalance in trade flows that needs to be addressed through the FTA.
- **Environmental Standards vs Economic Growth:** EU's stringent environmental policies, such as the Carbon Border Adjustment Mechanism **(CBAM),** have the potential to hinder India's industrial growth.

- India's steel sector faces a major challenge with EU-imposed carbon tariffs.
- In 2023, the **EU's introduction of the Deforestation-Free Products Regulation** could impact an **estimated $1.3 billion worth of Indian exports, including items like palm oil and cocoa.**

- **Differing Approaches to the Global Conflict: India's neutral stance on the Russia-Ukraine conflict** has been a significant source of friction with the EU.
  - While th**e EU supports Ukraine's sovereignty,** India emphasizes diplomacy, refraining from sanctions against Russia.
  - The Indian Foreign Minister's statement, ***"Somewhere Europe has to grow out of the mindset that Europe's problems are the world's problems, but the world's problems are not Europe's problems,"*** reflects India's perspective on the need for a broader, more inclusive approach to global issues.
- **Intellectual Property and Data Governance Tensions:** India's digital sector faces considerable challenges due to the **EU's stringent intellectual property (IP) laws and data privacy regulations,** particularly the General Data Protection Regulation**.**
  - The EU's regulatory barriers have slowed Indian tech firms' entry into European markets.
  - Also, its **IP rules also affect Indian pharmaceutical exports,** especially in generic medicines, which make up a significant portion of India's pharmaceutical trade.
- **Diverging Global Governance Priorities:** India has been a strong advocate for the reform of global institutions such as the United Nations Security Council **(UNSC),** seeking a permanent seat for itself, while the EU, though supportive of some reforms, has not always aligned with India's specific reform agenda.
  - **India's growing global influence contrasts with the EU's position,** sometimes leading to differing visions for global governance.

What Measures Can India Adopt to Strengthen Ties with Europe?

- **Accelerate FTA Negotiations with Flexibility on Regulatory Standards:** India should push for a balanced and pragmatic Free Trade Agreement (FTA) with the EU by focusing on **flexibility in regulatory standards, particularly around non-tariff barriers, agriculture, and services.**
  - India must propose phased implementation of sustainability and labor-related norms, ensuring **gradual alignment with EU standards while maintaining its competitive edge.**
  - This will also help foster smoother market access for Indian products and services in the EU, contributing to long-term economic resilience and enhanced bilateral ties.
- **Focus on Technology Partnerships and Innovation Ecosystem:** India should accelerate collaboration with the EU in critical and emerging technologies, such as **artificial intelligence (AI), quantum computing, and cybersecurity.**
  - By building **a robust innovation ecosystem with the EU,** India can leverage its growing tech sector, strengthening digital infrastructure while contributing to global tech governance.
  - Establishing **joint research centers and innovation hubs in key areas will not only foster economic growth but also enhance India's technological sovereignty** and bolster EU-India strategic partnerships.
- **Promote Green Transition and Joint Climate Action Initiatives:** To strengthen ties, India should lead joint climate action with the EU by deepening cooperation in clean energy technologies, renewable energy investments, and climate resilience projects.
  - By aligning with th**e EU's Green Deal,** India can access cutting-edge green technology and funding mechanisms, **such as the Green Climate Fund, to advance its climate goals.**
  - This collaboration **would also contribute to the EU's efforts in achieving net-zero emissions** while enabling India to address its own developmental and sustainability priorities.

- **Develop a Comprehensive Migration and Mobility Framework:** India should negotiate a forward-looking migration and mobility agreement with the EU **that balances labor market needs with India's demographic strengths.**
  - By securing agreements for skilled Indian workers, professionals, and students, India can alleviate Europe's skill shortages while **enhancing its own remittance sources.**
  - A **structured framework for mutual recognition of qualifications**, ease of visa issuance, and enhanced mobility for temporary workers would strengthen economic cooperation and foster closer socio-cultural ties.
- **Consolidate Energy and Connectivity Initiatives with the EU:** India should deepen collaboration with the EU on energy infrastructure, particularly in renewable energy, smart grids, and **fast tracking regional connectivity projects like the India-Middle East-Europe Economic Corridor (IMEC).**
  - By working with the EU on energy security, including the **development of cross-border energy infrastructure and the promotion of green hydrogen,** India can address its energy needs while contributing to Europe's energy transition.
  - These efforts will also expand India's connectivity with Europe and reinforce its role as a strategic partner in energy security.
- **Foster Joint Defense Industrial Cooperation:** India should push for stronger defense industrial cooperation with the EU, focusing on co-production and technology transfers in critical sectors like aerospace, defense electronics, and cyber capabilities.
  - By creating a platform for defense R&D collaborations and streamlining joint defense procurement processes, India can ensure that its defense industry gains access to advanced technologies**, while also contributing to the EU's defense initiatives.**
  - This approach would **solidify India's role as a partner in the EU's defense strategy,** especially in the Indo-Pacific.
- **Deeper Collaboration on Security Frameworks:** India should **deepen its strategic autonomy by aligning more closely with the EU on defense and security** matters while safeguarding its independent foreign policy.
  - Strengthening **defense cooperation through joint military exercises, maritime security initiatives, and sharing intelligence** on common security threats would foster trust and deepen collaboration.
  - By establishing a **comprehensive security pact,** India could enhance its role as **a key partner in the EU's Indo-Pacific strategy**, balancing both geopolitical interests and a rules-based order.

Conclusion:

The **India-EU strategic partnership** is entering a pivotal phase, **driven by shared geopolitical interests, economic collaboration, and technological innovation.** As both sides navigate complex global challenges, their evolving cooperation holds the potential to reshape regional and global dynamics. By fostering deeper ties across **defense, trade, and climate action,** India and the EU are poised to craft a future of mutual prosperity and security.

West Asia Conflict & India'S Interests

This editorial is based on "Fallouts of Iran-Israel conflict: Disruptions in oil supplies, raised prices" which was published in The Indian Express on 17/06/2025. The article brings into picture the impact of Israeli strikes on Iran, triggering a 7% oil price surge and highlighting risks to the Strait of Hormuz. It underscores challenges for India in energy security, inflation control, and diplomatic ties with Israel and Iran, including the Chabahar port project.

Tag: GS Paper - 2, Bilateral Groupings & Agreements, Groupings & Agreements Involving India and/or Affecting India's Interests, Effect of Policies & Politics of Countries on India's Interests, International Treaties & Agreements

Recent Israeli strikes on Iran have triggered an escalation spiral, causing significant shocks to global energy markets, with oil prices jumping 7%. While Iran's oil production capacity stands at **3.3 million barrels per day,** existing sanctions have already reduced its exports to just 1.6 million barrels daily. However, the critical concern lies in the **potential closure of the** Strait of Hormuz, through which a fifth of global oil supply transits. The escalating West Asian conflict poses multifaceted challenges for India, from energy security and inflation management to the delicate diplomatic balancing act between Israel and Iran while protecting strategic interests like the Chabahar port project.

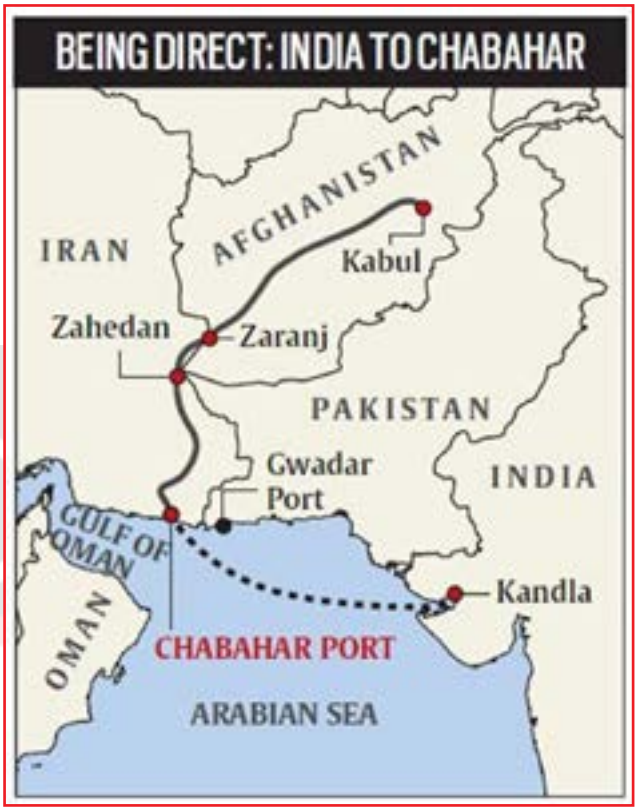
What are the Key Drivers of Conflict in West Asia?

- **Israeli-Palestinian Conflict:** The ongoing Israeli-Palestinian conflict remains the central driver of instability in the region, with profound **political, religious, and territorial disputes.**
  - Despite **international calls for a ceasefire (including recent United Nations General Assembly's permanent ceasefire call), Israeli military actions, especially in Gaza, have exacerbated tensions.**
    - This has led to broader regional involvement, with **Hezbollah and Hamas** escalating their attacks on Israel, deepening the crisis.
- **Iran-Israel Rivalry and Proxy Warfare:** The deepening rivalry between Israel and Iran, fueled by ideological differences, has exacerbated regional instability. Iran's support for **Hezbollah, Hamas, and other militia groups** challenges Israel's regional dominance.
  - For instance, **Iran's missile strike on Israel's military base in September 2024 (in retaliation for the assassination of Hezbollah leader)** demonstrated its growing warfare intent.
  - Iran's regional influence is evident as its proxies continue targeting U.S. and Israeli interests, escalating tensions across **Lebanon, Syria, and Yemen.**
- **Sectarian Divides and Proxy Conflicts:** The divide on the basis of religious line has become a significant source of instability, with countries like **Saudi Arabia and Iran backing opposing factions across the region.**
  - The Houthi rebels in Yemen, supported by Iran, continue to target Saudi and UAE interests, while **Saudi Arabia supports another faction backed forces in Syria and Iraq.**
  - The war in Yemen has claimed over 250,000 lives and continues to fuel instability, impacting the entire Gulf region's security.
- **U.S. and Western Influence vs. Growing Chinese Role:** The strategic rivalry between the **U.S. and China in West Asia** has created competing spheres of influence.
  - **U.S. support for Israel, coupled with its military presence in the Gulf against Iran** (due to historical conflict and most recently **Iran downed a U.S. Global Hawk drone in the Strait of Hormuz in 2019),** has led to heightened tensions with Iran.
  - On the other hand, **China's successful mediation of the Saudi-Iran peace deal in 2023** signals a shift in power dynamics.
    - China's diplomatic success contrasts with U.S. policies, which have often been seen as unilateral, further complicating the region's geopolitics.

- **Resource Competition and Energy Security:** The region's vast energy reserves remain a primary driver of conflict, with global powers vying for influence over oil-rich territories.
  - **Iran's crude oil production, standing at 3.4 million barrels per day in 2024,** represents 3% of global production, while any disruption could send oil prices soaring, impacting global economic stability.
- **Economic Instability and Rising Unemployment:** Economic hardship, exacerbated by sanctions and war, has fueled unrest in several West Asian countries.
  - For instance, **Lebanon's economic collapse, with inflation reaching 200%,** has made it a hotbed for protests.
  - Similarly, **youth unemployment in countries like Saudi Arabia and Iraq, which stands at 30-35%**, has led to increased militancy and radicalization.
  - Economic instability makes populations more vulnerable to extremist ideologies, heightening the overall conflict risk.
- **Nuclear Proliferation and Arms Race:** Iran's nuclear ambitions continue to be a flashpoint in the region.
  - Despite international efforts, **including the 2015 nuclear deal**, Iran has significantly expanded its nuclear capabilities, **enriching uranium to 60% purity by early 2024.**
  - The possibility of Iran acquiring nuclear weapons has prompted regional powers like **Saudi Arabia to reconsider their own nuclear programs,** triggering a potential arms race that could destabilize the region further.

What are the Implications of West Asian Conflict on India?

- **Diplomatic and Strategic Dilemmas:** India faces a complex diplomatic challenge due to its ties with both Israel and Iran.
  - **India's position as a non-aligned power or multi-aligned power** is tested by the **Israel-Palestine issue and the growing rivalry between Israel and Iran.**
  - The **2024 escalation, with Israel targeting Iranian assets,** has forced India to walk a tightrope, calling for restraint from both sides while maintaining strong ties with each.
  - eht ni ylralucitrap ,stseretni cigetarts s'aidnI luferac dnamed **,tcejorp trop rahabahC** .noitautis elitalov siht fo noitagivan



- **Energy Security Issue and Rising Oil Prices:** West Asian conflicts, particularly the tensions between Israel and Iran, have direct consequences on India's energy security.
  - **As India imports over 80% of its oil,** any disruption in oil supply from the region has a significant economic impact.
  - The escalating conflict, especially the **potential closure of the Strait of Hormuz,** threatens global oil supply lines.
  - **Brent crude oil prices surged by 9%** following Israeli airstrikes on Iranian targets, signaling increased volatility.

- **Economic Strain Due to Higher Freight and Shipping Costs:** The conflict has disrupted critical trade routes, leading to a rise in shipping costs and delays in global supply chains.
  - **The Red Sea, a vital route for Indian exports**, is now facing security threats, which could increase the cost of shipping goods.
  - A detour around the **Cape of Good Hope, an alternative route to the Red Sea,** could add 10-14 days to shipping times, further raising freight costs by 20%.
    - This will likely **inflate prices for Indian exports,** impacting sectors like textiles and electronics.

- **Impact on Trade with Israel and Iran:** India's trade with both Israel and Iran has been adversely affected by the conflict.
  - The economic turmoil has led to a **drop in Indian exports to both nations,** with **exports to Israel declining by 63.5% in the first half of 2024.**
  - Similarly**, trade with Iran also fell sharply.** As India maintains crucial trade relations with both, especially in defense and oil, this downturn represents a serious setback for its strategic economic ties.
- **Threats to Indian Expatriates and Remittances:** With millions of Indians working across the **Gulf and West Asia,** the region's instability poses a direct risk to the expatriate workforce.
  - India's overseas workers in countries like **Lebanon and Saudi Arabia** are vulnerable to escalating violence, which could lead to mass evacuations.
  - Any intensification of conflict here could disrupt their safety and income, which is **critical for India's remittances that account for around 3% of GDP.**
- **Inflationary Pressures and Economic Slowdown:** With oil prices on the rise, India faces inflationary pressures that could slow economic growth.
  - A $10 per barrel increase in global oil prices raises India's current account deficit by nearly **$10 billion.**
  - **India's inflation rate could spike further,** affecting food and fuel prices, which are critical to its large population.
    - As the global growth outlook weakens amid these tensions, India's growth prospects may be hindered, as reflected in the **World Bank's revised forecast of 2.3% for 2025(Global GDP growth).**
- **Geopolitical Shifts and China's Influence:** The growing Chinese influence in West Asia, including the Saudi-Iran peace deal brokered by Beijing, impacts India's strategic calculus.
  - As China increases its presence through economic and diplomatic channels, India is pressured to reassess its regional engagements.
  - **China's Belt and Road Initiative (BRI)** and its growing ties with Iran, including energy deals, create new geopolitical dynamics, which India must address to protect its interests in the region, particularly in areas like the **International North-South Transport Corridor (INSTC)**

What Measures can India Adopt to Secure its Interest in West Asia Amid Conflicts?

- **Strengthening Diplomatic Engagement with Regional Powers:** India must adopt a proactive diplomatic strategy, **enhancing dialogue with both Israel and Iran to safeguard its strategic and economic interests.**
  - India should engage in **direct dialogue with both Israel and Iran to safeguard its strategic and economic interests.**
    - **The Indian Foreign Minister** has recently discussed the ongoing regional situation with both nations, emphasizing the **need to avoid escalation, exercise restraint, and return to diplomacy.**
  - Increased diplomatic outreach to key **Gulf Cooperation Council (GCC) states**, like **Saudi Arabia and the UAE**, will help India preserve its economic interests while also playing a constructive role in reducing regional tensions.
- **Expanding Regional Security Cooperation and Counterterrorism Initiatives:** India should strengthen its counterterrorism partnerships in West Asia, particularly with countries like **Israel, Jordan, and Egypt.**
  - By enhancing intelligence-sharing frameworks and establishing joint security initiatives, India can mitigate the risks posed by extremist groups operating in the region.
- **Diversifying Energy Imports and Building Strategic Reserves:** To reduce dependency on any single source of oil and gas from West Asia, India must diversify its energy imports by exploring new suppliers from **Africa, Central Asia, and even Latin America.**
  - Establishing long-term energy agreements with **non-Gulf nations will provide a buffer against supply disruptions.**
  - Simultaneously, India should accelerate the development of **strategic petroleum reserves to provide insulation** against sudden price shocks or supply chain interruptions stemming from regional conflicts.
- **Enhancing Maritime Security and Protecting Trade Routes:** Given the growing instability in the Persian Gulf and the Strait of Hormuz, India should **bolster its naval presence and maritime security operations in these critical waters**.
  - Strengthening cooperation with global powers such as the **U.S., Russia, and Japan,** as well as key regional partners, will help secure critical shipping lanes vital for India's energy imports and international trade.
  - By expanding its maritime strategy, **India can ensure the free flow of commerce and energy,** while also asserting its presence in regional security matters.
- **Leveraging Economic Diplomacy to Maintain Regional Stability:** India must actively use economic diplomacy as a tool to safeguard its interests in West Asia.
  - Strengthening bilateral trade agreements, expanding investment partnerships, and advancing infrastructure projects **(such as Chabahar port)** will solidify India's economic footprint in the region.
  - By focusing on **mutually beneficial economic cooperation,** India can cultivate deeper ties with both regional powers and smaller states, ensuring that its **presence in the region is seen as a stabilizing force amid the ongoing conflicts.**
- **Promoting People-to-People Ties and Soft Power Diplomacy:** India should leverage its strong diaspora and people-to-people connections in West Asia to **build cultural and educational bridges with regional states.**
  - By increasing **academic exchanges, cultural diplomacy, and promoting Indian expertise in technology, healthcare, and education,** India can strengthen its soft power.
  - This approach will not only enhance India's influence but also provide an avenue for resolving conflicts through non-military means, positioning India as a global advocate for peace and cooperation.
- **Fostering Regional Economic Integration Through Connectivity Projects:** India should accelerate regional integration initiatives by pushing for expanded connectivity projects, such as the **International North-South Transport Corridor (INSTC)**, to enhance trade and transport links between West Asia, Central Asia, and India.

- These projects will not **only facilitate smoother and more secure trade routes but also promote regional stability** by fostering economic interdependence.
- By facilitating infrastructure development, India can play a pivotal role in shaping the region's economic future amidst the ongoing conflicts.

- **Strengthening Humanitarian Engagement and Crisis Response Mechanisms:** India should establish a comprehensive humanitarian response framework in cooperation with UN agencies to assist populations affected by conflict in West Asia.
  - By providing **medical aid, relief supplies, and reconstruction assistance**, India can enhance its image as a peacebuilder and contribute to regional stability.
  - **Engaging in proactive peacebuilding efforts** will allow India to be seen as a neutral actor committed to alleviating human suffering, thereby solidifying its diplomatic standing across the region.

Conclusion:

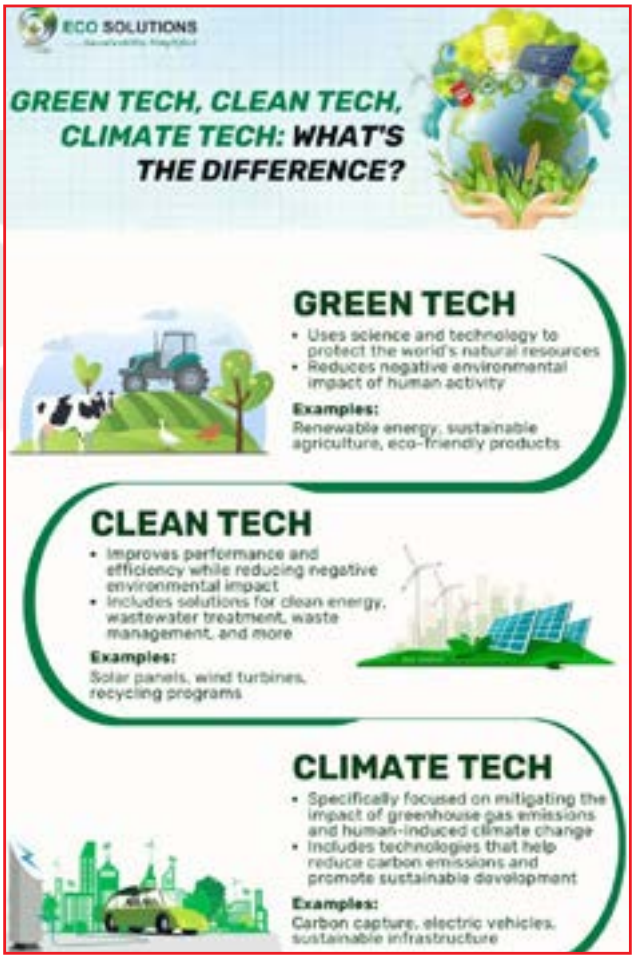
West Asia's complex conflicts present significant challenges for India, from **energy security to diplomatic balancing.** By adopting a proactive approach through **diplomatic engagement, security cooperation, and economic diplomacy,** India can safeguard its interests while promoting regional stability. Strengthening ties with **regional powers and diversifying energy sources will further enhance India's strategic position.** Ultimately, India's role as a stabilizing force in the region will be **crucial for its long-term security and economic prosperity.**

Clean-Tech Path to Economic Growth

This editorial is based on "Gaining clean-tech edge" which was published in The Hindu on 18/06/2025. The article brings into focus the potential for India to become a global clean-tech manufacturing leader by leveraging green technology and enhancing testing infrastructure and standards.

Tag: GS Paper - 3, Scientific Innovations & Discoveries, IT & Computers, Environmental Pollution & Degradation, Conservation of Resources, GS Paper - 2, Government Policies & Interventions

India stands at a crucial juncture to emerge as a **global clean-tech powerhouse,** with the **National Manufacturing Mission's** focus on **green technology** offering a strategic pathway to achieve this ambition.Robust testing infrastructure and enhanced standards development will be **essential for international competitiveness in clean-tech manufacturing**. If executed effectively, this clean manufacturing push could position India as a **global leader in clean-tech trade**, transforming both its industrial landscape and international standing.



What Role can Clean Technology Play in Advancing India's Economic Development?

- **Driving Economic Growth through Job Creation:** As India transitions to clean-tech industries, sectors

like **solar, wind, electric vehicles (EVs)**, and battery storage will create millions of jobs, crucial for India's young workforce.

- The energy transition alone could generate **5-6 million jobs by 2030, and 9-10 million by 2047.**
  - This shift is supported by India's focus on a sustainable economy, which sees the clean-tech sector as a job-rich growth engine, especially in manufacturing, R&D, and project execution.

- **Enhancing Energy Security and Reducing Dependency on Imports:** The push for clean technology **directly reduces India's reliance on imported fossil fuels**, promoting self-sufficiency in energy production.
  - By advancing the **domestic production of solar panels, wind turbines, and battery storage,** India can significantly cut down on energy imports, which currently burden the economy.
    - In 2023, **India's solar module capacity grew fourfold to meet domestic demand,** aligning with the PLI schemes for solar and battery production, reducing dependence on Chinese imports.
- **Catalyzing Technological Innovation and R&D Growth:** India's clean-tech revolution is spurring technological innovations, particularly in **energy storage, hydrogen, and battery technologies.**
  - The **National Manufacturing Mission and PLI schemes for electric vehicles** and solar components emphasize R&D to keep India competitive globally.
    - These innovations not only enhance manufacturing but also lead to breakthroughs that can position India as a global leader in clean technologies, creating a robust ecosystem of start-ups, universities, and corporate partnerships.
  - The **Bharat Cleantech Manufacturing Platform launched in 2025** aims to boost R&D collaboration in green technologies, facilitating the **commercialization of advanced energy storage and solar technologies.**
- **Strengthening India's Position in Global Clean Energy Supply Chains:** India's focus on clean-tech manufacturing is transforming it into a global hub for renewable energy equipment production.
  - By leveraging cost advantages in labor and raw materials like **steel, copper, and aluminum**, India can position itself as a strategic partner in global supply chains, tapping into markets with increasing demand for sustainable products.
  - The **"China+1" strategy, where nations look for alternatives to China-based supply chains**, presents a window for India to boost exports of clean-tech products.
    - India's clean-tech exports, **particularly solar PV modules, surged to 5 GW in 2023,** expanding market share in the US and Europe, signaling India's rise as a manufacturing base for green energy equipment.
- **Fostering a Circular Economy and Waste Recycling Industry:** Clean-tech in India is not just about renewable energy but also about creating sustainable solutions for waste management and recycling.
  - Emphasizing **circularity, the clean-tech industry can reduce environmental impact by reclaiming valuable materials** from end-of-life products like solar panels and batteries.
  - With initiatives like the **National Critical Mineral Mission,** India can tap into recycling to address critical mineral shortages, essential for batteries and solar technologies.
- **Accelerating Urban Sustainability and Green Infrastructure Development:** Clean technologies will play a pivotal role in shaping **India's urban future, addressing energy demands, and mitigating pollution.**
  - By adopting **green building materials, electric vehicles, and sustainable construction methods**, India can lead the way in building eco-friendly cities.
  - India is making significant strides in green building practices, driven by government policies, green building rating systems like

Leadership in Energy & Environmental Design and **Green Rating for Integrated Habitat Assessment**, and increasing awareness of the need for sustainable development.

- **Reducing Environmental and Health Impacts:** The transition to clean technology significantly improves public health by reducing pollution and carbon emissions, crucial for a country like India, **where air pollution causes over 1.2 million deaths annually.**
  - Clean-tech innovations in **energy, transportation, and waste management** can lower carbon footprints while improving the quality of life for millions.
  - The **EV sales surge in India is a key step in cutting vehicular emissions,** which contribute to around **30% of the nation's air pollution.**

What are the Key Issues Associated with Clean-Tech in India?

- **Dependency on Imported Raw Materials:** India's clean-tech sector remains highly dependent on **imports, particularly for critical materials like lithium for batteries, silicon for solar panels, and rare earth elements for wind turbines**.
  - This dependency **creates vulnerabilities in terms of price volatility and supply chain disruptions,** which could affect the scalability of India's clean-tech goals.
    - Despite efforts to bolster domestic manufacturing**, India still imports 80% of its solar components and 75-85% of batteries,** limiting self-sufficiency.
  - Also, recently **China has imposed export restrictions on seven rare earth elements and magnets** that pose supply chain risks for India.
- **Technological Gaps and Innovation Challenges:** India faces significant challenges in developing indigenous technologies in clean-tech, particularly in advanced sectors like **green hydrogen and high-efficiency solar panels**.
  - While the country has made strides in manufacturing**, it lags behind in critical innovations** that would enable long-term sustainability and competitiveness.
    - For example, **India's electrolyzer technology for hydrogen production remains underdeveloped,** delaying progress towards green hydrogen goals.
- **Insufficient Infrastructure for Clean-Tech Integration:** While India's clean-tech sector is growing rapidly, the lack of adequate infrastructure**—particularly for grid integration and energy storage—remains a major roadblock.**
  - To manage intermittent renewable energy sources like solar and wind, India needs to **develop robust storage solutions and smart grid technologies.**
    - As of now, **India's grid is underdeveloped in terms of handling large-scale renewables integration,** risking inefficiencies and wastage.
  - **India's renewable energy capacity reached 209 GW in 2024**, yet the inadequate energy storage systems hinder the optimal use of this capacity. To fully harness it, **India will require 336 GWh of storage by 2030.**
- **High Capital Expenditure and Financing Issues:** The capital-intensive nature of clean-tech manufacturing requires significant investment, which has been a significant **barrier for many businesses, especially small and medium enterprises (SMEs).**
  - Despite initiatives like the PLI scheme, funding constraints remain a persistent issue, particularly for emerging technologies like **green hydrogen and electric vehicle (EV) infrastructure**. This financing gap makes it challenging to scale up production and attract global investors.
  - In FY24**, India secured $2.4 billion in clean-tech deals**, yet it still faces an estimated **$12.4 trillion investment need to achieve net-zero emissions by 2070,** highlighting the funding shortfall.
- **Lack of Skilled Workforce for Clean-Tech Manufacturing:** India's clean-tech sector is hindered by a shortage of skilled labor, particularly in advanced manufacturing processes like **solar panel production, EV battery assembly, and carbon capture technologies.**

- While the National Manufacturing Mission addresses some of these concerns, it **still faces challenges in scaling skilled labor pools.**
- The renewable industry alone **faces a skill gap of around 1.2 million,** with **demand expected to rise by 26%** creating a need for 1.7 million skilled workers by 2027

- **Environmental Impact of Clean-Tech Waste Management:** While clean-tech aims to reduce emissions and promote sustainability, the end-of-life management of products like solar panels, wind turbines, and EV batteries poses a significant environmental challenge.
  - According to **CEEW, India is expected to generate 600 kilotonnes of solar waste by 2030**, but without robust recycling systems, this waste could exacerbate environmental degradation.
  - The **government's focus on circularity is still in its early stages,** and inadequate waste management could undermine the long-term sustainability of the clean-tech sector.
- **Limited Market Demand for Clean-Tech Products:** Although there is growing interest in clean technologies, the **domestic demand for products like electric vehicles, solar panels, and battery storage systems remains insufficient to drive large-scale manufacturing.**
  - The **success of the National Manufacturing Mission depends on creating sustained domestic demand,** which currently faces challenges due to high upfront costs and limited consumer awareness.

What Measures can India Adopt to Accelerate Development of Clean Technology?

- **Strengthen Public-Private Partnerships (PPPs) in Clean-Tech R&D:** India should focus on creating a robust framework for collaboration between the **government, private sector, and research institutions to accelerate clean-tech innovations.**
  - Public-private partnerships can drive investment in **high-risk R&D, reduce commercialization timelines,** and bring cutting-edge solutions to market faster.
  - By incentivizing private companies to invest in R&D through **tax benefits or matching funding,** India can create a dynamic ecosystem for next-generation technologies **like green hydrogen, advanced batteries, and carbon capture.**
  - Development of **Alkaline Seawater Electrolyzer to Generate Hydrogen By IIT-Madras** is a significant step in the right direction.
- **Expand and Strengthen the Circular Economy Framework:** India must prioritize the development of a circular economy that focuses on reducing waste, reusing materials, and **recycling clean-tech products such as solar panels, wind turbines, and EV batteries.**
  - Establishing comprehensive recycling and reverse logistics systems will reduce the environmental footprint of clean-tech products while maximizing resource recovery.
  - The government can create **mandatory recycling quotas for manufacturers and incentivize businesses to design for disassembly and material recovery,** making clean-tech more sustainable in the long run.
- **Revamp Skill Development for Clean-Tech Industries:** To support the growth of the clean-tech sector, India must urgently invest in upskilling and reskilling its workforce, particularly in high-tech manufacturing and maintenance fields.
  - Setting up **specialized vocational training programs**, industry-specific certifications, and university partnerships will help bridge the skills gap in sectors **like solar manufacturing, battery technology, and electric vehicle servicing.**
  - Aligning these training programs with industry needs will ensure the creation of a skilled workforce that can power the clean-tech revolution.
- **Create an Integrated Clean-Tech Financing Mechanism:** India needs to develop a **dedicated clean-tech financing mechanism** to address the funding gap in clean technology startups and large-scale manufacturing projects.

- A **combination of government-backed loans, venture capital, and green bonds** can help de-risk investments in emerging technologies.
- The creation of a **Green Bank or Clean-Tech Investment Fund** could mobilize capital specifically for **clean-tech ventures,** supporting long-term growth and innovation while lowering the financial barriers for startups.

- **Implement Green Procurement Policies at Government and Corporate Levels:** The **government and large corporations must adopt green procurement policies** that prioritize clean-tech products and services in their purchasing decisions.
  - Supporting the **scaling of domestic clean-tech startups and providing them with preferential access to government contracts** will incentivize further R&D and strengthen India's competitive edge in global markets.
  - These policies would not only accelerate the adoption of green technologies but also **create stable market conditions for manufacturers**, helping to scale production and reduce costs.
- **Foster Innovation Ecosystems in Tier-2 and Tier-3 Cities:** To promote clean-tech development across the country, India should **incentivize innovation ecosystems in smaller cities and rural areas**, where manufacturing costs are lower and untapped potential exists.
  - By setting up **clean-tech incubators, providing financial support to local startups, and connecting them to national and global markets,** India can harness the creative potential of regional talent.
  - This decentralization of innovation will encourage inclusive growth and create regional hubs for clean-tech manufacturing.
- **Strengthen International Collaboration for Clean-Tech Export:** India should forge strategic alliances with leading clean-tech markets such as the **EU, the US, and Japan to strengthen its position** as a global clean-tech supplier.
  - This can be achieved by **establishing free trade agreements that include clean-tech components and technologies,** ensuring Indian products gain easier access to international markets.
  - In addition, **fostering collaborations for joint ventures, knowledge exchange, and infrastructure development** will allow India to leverage global expertise and technology to accelerate its clean-tech ambitions.
- **Foster Energy Storage and Smart Grid Innovations:** To effectively integrate renewable energy sources, India must prioritize the **development and deployment of advanced energy storage systems and smart grid technologies**.
  - Energy storage solutions such as grid-scale batteries, **pumped hydro storage, and thermal energy storage** will address the intermittency issues of renewable energy sources like solar and wind.
  - Investing in smart grid infrastructure that optimizes energy distribution, reduces losses, and enhances grid resilience will be crucial in maintaining a stable and efficient energy system.
- **Establish a National Clean-Tech Certification System:** India should introduce a **national clean-tech certification system to standardize and regulate the quality of clean-tech products and services.**
  - This certification can ensure that products meet rigorous environmental and performance standards, giving consumers confidence in their purchase decisions.
  - By creating a trusted certification process, **India can differentiate itself in global markets and help Indian companies gain access to international markets** with strict environmental regulations, such as the **EU's Ecodesign standards.**
- **Enhance Research in Low-Carbon Construction and Green Materials:** With the construction sector contributing significantly to emissions, India must accelerate research into low-carbon building materials and energy-efficient construction methods.

- Government support for the development of green materials, such as **bioplastics, hemp-based concrete, and bamboo**, could lead to more sustainable urbanization.
- Alongside material innovation, **promoting energy-efficient building designs, retrofitting programs**, and green building certifications will foster sustainable development in India's rapidly growing urban landscape.

Conclusion:

India's clean-tech transformation presents an unprecedented opportunity to drive sustainable economic growth while contributing significantly to the achievement of **SDGs like Affordable and Clean Energy (SDG 7) and Decent Work and Economic Growth (SDG 8).** By focusing on infrastructure development, skill enhancement, and fostering a circular economy, India can create a **self-sustaining and globally competitive clean-tech sector.**

India'S Road to Gender Parity

This editorial is based on "Unfinished business of gender parity in India" which was published in Hindustan Times on 19/06/2025. The article brings into focus the ongoing challenges of gender parity in India. The World Economic Forum's 2025 report ranks India 131st out of 148 countries, underscoring the need for more concerted efforts.

Tag: GS Paper - 2, Issues Related to Women, Inclusive Growth

India's pursuit of gender parity has made progress, but the road ahead remains steep. Women's education levels are improving, yet **political representation remains stagnant at a mere 14% in Parliament.** The economic disparity is stark, with **women contributing under 20% to GDP, earning far less than men.** The World Economic Forum's Global Gender Gap Report 2025 paints a dismal picture, ranking India **131st out of 148 countries**, lagging behind its BRICS counterparts and South Asian neighbours. To achieve true gender equality, India must focus more on **tangible, inclusive progress across all sectors.**

What are the Key Strides of India in Achieving Gender Parity?

- **Progress in Women's Education:** India has made remarkable strides in achieving gender parity in education.
  - Female gross enrolment ratio at the elementary level is **94.32%, slightly higher than 89.28% for boys.** Similarly, at the secondary level, girls have an enrolment ratio of **81.32%, compared to 78% for boys.**
  - The literacy rate of women in India has increased by 68%- up from 9% at the time of Independence to **77% at present** signals a strong commitment to closing the gender education gap.
- **Economic Empowerment through Financial Inclusion:** Initiatives like the Pradhan Mantri Jan Dhan Yojana (PMJDY) have been pivotal in increasing women's financial inclusion.
  - As of January 2025, **56% of PMJDY accounts are held by women**, granting them better access to banking, savings, and credit.
  - This **financial independence has provided women, particularly in rural areas**, with the ability to make critical financial decisions and engage in entrepreneurial ventures.
  - The Direct Benefit Transfer (DBT) system has also empowered women by ensuring that government subsidies (like **Ladli Behna Yojana in MP**)and welfare funds directly reach them, bypassing intermediaries.
- **Legal Reforms for Women's Rights and Safety:** India has introduced several crucial legal reforms aimed at enhancing women's safety and empowerment.
  - The Criminal Law (Amendment) Act, 2013, strengthened punishments for sexual assault and harassment, reflecting a **zero-tolerance approach to violence against women.**
  - Moreover, the **introduction of 26 weeks of paid maternity leave in 2017** was a significant stride, promoting better work-life balance for women and enabling them to stay in the workforce without fear of losing their jobs.

- These legal steps reflect a deeper commitment to ensuring women's safety and participation in public life.

- **Rising Women in Leadership Roles:** Women in India are breaking barriers in leadership across sectors, with figures like **Charu Sinha, the first woman to head four sectors of the CRPF**, and **Justice Nagarathna**, to become India's first female Chief Justice of India.
  - **Colonel Sofiya Qureshi** co-led the briefing on Operation Sindoor alongside **Wing Commander Vyomika Singh**, marking another significant milestone for women in the military.
  - Also, in the corporate world, nearly 97% of NSE-listed companies have appointed at least one woman director by March 2025.
- **Political Empowerment through Reservations:** India has seen increased female participation in politics, particularly at the grassroots level.
  - The 73rd and 74th Constitutional Amendments reserved one-third of seats for women in Panchayats and local governance bodies, leading to more than 40% of local governance positions being held by women.
  - The Women's Reservation Act of 2023, which reserves one-third of the seats in Parliament and state assemblies, is a significant stride toward enhancing women's representation in national politics.
- **Health and Wellness Improvements:** India has made considerable strides in improving women's health outcomes, particularly maternal health.
  - The National Health Mission and programs like **Janani Shishu Suraksha Karyakram** (JSSK) have helped reduce maternal mortality rates by over 50% in the last decade.
  - The **Ayushman Bharat Scheme** has expanded healthcare access, with millions of women benefiting from free health checkups and treatments.
    - Women account for **nearly 49% of beneficiaries of health insurance scheme AB-PMJAY,** ensuring better healthcare access, particularly in rural areas.
- **Increased Female Workforce Participation in Rural India:** India's flagship employment program, MGNREGA, has played a significant role in boosting female participation in the labor force, particularly in rural areas.
  - Over **57.47% of MGNREGA workers** are women (as of 2022-23) benefiting from the program's equal wage provisions.
  - These wages provide women with independent income, increasing their autonomy.
    - The program's impact is also visible in states like **Rajasthan**, where rural women have seen significant economic empowerment.
- **Promotion of Women's Entrepreneurship:** Government-backed schemes like Stand Up India and MUDRA (Micro Units Development and Refinance Agency) have been instrumental in encouraging women's entrepreneurship.
  - In 2021, **68% of loans** under the Stand Up India scheme went to women, reflecting a rising trend of women engaging in business.
  - Moreover, Self-Help Groups **(SHGs)** have been pivotal in providing rural women with access to savings, credit, and financial literacy.
    - **SHGs serve as both a financial and social network,** supporting women in starting and growing their businesses while promoting financial independence **blending well with the Lakhpati Didi Scheme.**

What are the Key Issues Hindering Gender Parity in India?

- **Political Underrepresentation:** India's political landscape continues to marginalize women, **with only 13.8% female representation in Parliament, a decline from 14.7% in 2023.**
  - Despite the passing of the **Women's Reservation Act in 2023**, political will and structural barriers delay its **full implementation until 2029.**
  - This stagnation undermines efforts to achieve meaningful female participation in governance.

- For instance, **only 5.6% of ministerial roles are held by women**, highlighting the underrepresentation at decision-making levels.

- **Low Female Labor Force Participation:** Despite recent progress, women's labor force participation in India still remains low at around **41.7%**.
  - Despite a **rise in female employment over the years, societal norms, lack of child care, and wage gaps** push women to the informal sector, where social security and protections are minimal.
  - Also, research by Oxfam India in 2020 estimated the **economic value of unpaid work** performed by women in India at around **₹19 lakh crore.**
    - A McKinsey report estimates that closing the gender employment gap could add **$770 billion to India's GDP by 2025,** yet progress is sluggish.
- **Cultural Barriers and Patriarchal Norms:** Deeply ingrained patriarchal attitudes severely restrict women's freedom in education, employment, and social mobility.
  - These cultural barriers limit women's choices in key areas like career progression and leadership roles (**glass ceiling and glass cliff**), especially in rural India.
  - A recent survey about Financial Awareness Among Women reveals that **59% do not independently take decisions on their finances,** further curtailing their independence.
    - This systemic bias has made India one of the lowest-ranked in South Asia in gender equality, according to the 2025 Global Gender Gap Index, **with only 64.1% gender parity.**
- **Gender Pay Gap:** The gender pay gap in India remains significant. Even when women do enter the workforce, their earnings are consistently lower than their male counterparts in similar roles, particularly in high-skilled sectors.
  - For instance, the gender pay gap in urban India is reflected in data showing that **women earn 30-40% less than men for comparable roles**.
  - This disparity extends to informal sectors, where women often earn less than their male counterparts for the same work, such as in agriculture and domestic work.
- **Educational Attainment vs. Employment Opportunities:** While women's educational attainment has improved significantly, the leap from education to economic participation is obstructed by **a lack of relevant job opportunities.**
  - For instance, **despite the high proportion of** female STEM graduates, women account for less than a third of the STEM workforce in India at **27% (ORF).**
  - This paradox reveals how the education system, despite its successes, has failed to translate into meaningful employment opportunities, largely due to cultural and infrastructural gaps.
- **Inadequate Maternity Benefits and Childcare Support:** Although India has made strides in offering 26 weeks of paid maternity leave, the lack of adequate childcare infrastructure remains a key barrier for women's workforce participation.
  - The **absence of affordable, accessible childcare services in both urban and rural areas** forces many women to either leave the workforce or accept lower-paying, part-time jobs.
  - For example, **73% of Indian women leave their jobs after giving birth** (The Better India) while balancing full-time employment.
    - This significantly lowers their potential for career growth and economic independence, further entrenching gender inequality.
- **Limited Usage to Financial Services:** Although initiatives like the Pradhan Mantri Jan Dhan Yojana have increased female account ownership, the usage of these accounts remains limited, with **32% of women's accounts being inactive (World Bank's Global Findex Survey 2021).**
  - Financial inclusion is crucial for economic empowerment, as women tend to save more and reinvest in family well-being.

What Measures can India Adopt to Accelerate Progress Towards Gender Parity?

- **Implement Comprehensive Skill Development Programs for Women:** To ensure women's active participation in the formal economy, India should implement widespread skill development programs focused on sectors with high-growth potential such as **technology, renewable energy, and digital services.**
  - These programs should emphasize practical skills, entrepreneurial training, and digital literacy, **empowering women to secure higher-paying, skilled jobs.**
  - A strong focus on upskilling rural women, in particular, can bridge the **urban-rural divide and help integrate women into emerging job markets**. Special emphasis should be placed on **non-traditional sectors to break occupational segregation.**
- **Enhance and Enforce Gender-Sensitive Labor Laws**: India must strengthen the enforcement of labor laws that promote gender equality, particularly those addressing **equal pay, workplace harassment, and paid family leave.**
  - There should be a national framework ensuring all workplaces comply with policies on flexible working hours and child care support, promoting an inclusive environment for women's advancement.
  - **Regular audits of companies t**o assess their compliance with gender equality norms and the adoption of punitive measures for non-compliance would encourage better practices.
  - This would create a **systemic change in the workplace,** ensuring women's long-term participation in the formal economy.
- **Strengthen Political Empowerment through Local Leadership Initiatives:** Expanding on the success of reservations in local governance, India can create targeted programs to mentor and train women for higher political leadership roles.
  - This could include **capacity-building initiatives for women politicians at the Panchayat, municipal, and state levels,** equipping them with public administration, governance, and leadership skills.
  - In this context, **web series like *Panchayat*** have played a crucial role in raising awareness and highlighting important issues.
  - By fostering a **generation of women leaders with practical experience**, India can gradually increase female representation in higher political offices, enhancing **their influence in policymaking at national and state levels**.
- **Promote Gender-Responsive Budgeting and Policy Making:** India should institutionalize **gender-responsive budgeting (initiated in 2005) across all levels of government,** ensuring that **gender considerations are integrated into every policy, program, and budget allocation.**
  - This would involve conducting gender impact assessments before rolling out any major policy or welfare initiative, ensuring that women's needs are prioritized.
  - Financial resources should be allocated specifically for schemes that empower **women in areas such as education, health, and employment,** ensuring a more equitable distribution of public funds.
  - This approach ensures that gender equality becomes a core focus of all national and state-level policymaking.

- **Increase Support for Women Entrepreneurs through Tailored Financial Services:** To encourage women's entrepreneurship, India needs to create a specialized financial ecosystem that offers women **easy access to capital, micro-loans, and venture funding.**
  - Banks and financial institutions should be incentivized to lower interest rates and **relax collateral requirements for women entrepreneurs,** making it easier for them to establish and grow their businesses.
  - A national database of women entrepreneurs should be created to track and offer tailored support services, such as mentorship, networking opportunities, and targeted business development programs.
- **Reform the Educational Curriculum to Challenge Gender Norms:** To change societal attitudes and challenge gender stereotypes, India should **integrate gender equality into the school and higher education curriculum.**
  - This would involve not only promoting the achievements of women but also **educating both boys and girls on concepts like gender equality, respect, and shared responsibility.**
  - A focus on challenging traditional gender roles in subject choices **(such as encouraging girls to pursue STEM and boys to explore caregiving professions)** will help break down deep-rooted societal barriers.
    - This educational shift will shape a new generation that is more open to gender parity in all spheres of life.
- **Implement Robust Data Collection and Gender Disaggregation**: India must ensure that gender-disaggregated data is systematically collected across all sectors and used to drive evidence-based policymaking.
  - This would include **tracking gender gaps in areas like employment, healthcare, and education** to measure progress and identify areas needing intervention.
  - Creating a **national registry for women's economic participation and leadership roles** would help policymakers allocate resources and interventions effectively.
    - A data-driven approach would enable India to monitor progress in real-time and make necessary adjustments to policies and strategies.
- **Strengthen Support Systems for Domestic Workers and Informal Laborers:** Since a large proportion of women work in the informal economy, India must develop stronger **legal protections and social safety nets for domestic workers** and informal laborers.
  - This includes establishing **labor unions, providing access to healthcare, and enforcing fair wages and working conditions.**
  - The **implementation of minimum wage laws for domestic workers** and the provision of childcare facilities can make this sector more sustainable and beneficial for women**, lifting them out of economic dependence and into more secure working conditions.**
- **Introduce Gender Impact Bonds for Women-Centric Initiatives**: To scale up investments in women-centric projects, India can introduce Gender Impact Bonds (GIBs) that attract private capital for social impact initiatives aimed at closing gender gaps.
  - These bonds would fund initiatives such as women's education in underserved areas, entrepreneurial ecosystems for women, and women's health services.
  - **Investors would earn returns tied to the success of gender-specific outcomes,** such as increased female literacy rates or improved female workforce participation, creating a sustainable funding mechanism for gender equality.

Conclusion:

"Gender equality is not a women's issue, it's a human issue. It affects us all." India has made **commendable strides toward gender parity, but the journey is far from complete.** As the nation continues to close gaps in

education, economic participation, and leadership, a concerted focus on breaking cultural barriers, ensuring equal opportunities, and implementing inclusive policies is essential. True gender equality will only be achieved when **both men and women are given the same platforms to succeed.**

Building A Credible Carbon Market in India

This editorial is based on "India needs to build a credible carbon market, minus an offset mechanism" which was published in The Business Standard on 18/06/2025. The article brings into picture the challenges facing India's Carbon Credit Trading Scheme, set to begin in 2026, highlighting risks from voluntary offsets and emphasizing the need for mandatory participation and strong monitoring for credibility.

Tag: GS Paper - 3, Conservation, Renewable Energy, Government Policies & Interventions, Achievements of Indians in Science & Technology

India's Carbon Credit Trading Scheme (CCTS), set to begin trading in 2026, represents a pivotal step toward achieving the country's climate commitments, but its success hinges on overcoming fundamental design flaws. The **inclusion of voluntary offset mechanisms risks compromising data integrity** and scheme credibility, echoing past failures of programs like the Clean Development Mechanism. For India to develop a truly credible carbon market, it must expand mandatory participation across all high-emission sectors, and establish robust monitoring and enforcement mechanisms from the outset.

What are the Key Factors Influencing the Growth of the Carbon Market in India?

- **Commitment to Global Climate Goals**: India's development of a carbon market is primarily driven by its commitment to global climate goals under the Paris Agreement.
  - The country aims to **reduce its greenhouse gas (GHG) emission intensity by 45% by 2030 from 2005 levels**, which necessitates robust mechanisms like carbon markets.
    - This goal aligns with **India's target of achieving net-zero emissions by 2070,** requiring significant emission reductions across sectors.
  - The introduction of the **Carbon Credit Trading Scheme (CCTS) in 2023 (expected to become operational by 2026)** is a pivotal step towards meeting these ambitious targets, creating a **market-based mechanism to cap emissions and promote green technologies.**
- **Influence of International Trade and Carbon Border Adjustment Mechanism (CBAM):** The looming implementation of the European Union's Carbon Border Adjustment Mechanism (CBAM) has driven India to expedite the development of a national carbon market.
  - This CBAM mechanism will **impose tariffs on carbon-intensive imports,** making Indian exports less competitive if they do not meet international carbon standards.
  - Indian industries, **particularly in high-emission sectors like steel and cement, are under the influence** to adopt low-carbon technologies.
    - The steel sector, **responsible for 12% of India's total CO_2 emissions,** faces these challenges directly, driving the need for carbon credit trading to comply with the international carbon framework.
- **Promoting Cleaner Technologies and Green Investments:** A significant driver for India's carbon market is the **promotion of cleaner technologies and the incentivization of green investments.**
  - By setting emission intensity targets for key sectors, the government encourages industries to adopt energy-efficient and low-carbon technologies.
  - The Energy Conservation (Amendment) Act of 2022 laid the legislative foundation for the CCTS, enabling carbon credits to be issued for overachieving emission reductions.

- Companies like **Reliance Industries, investing in green hydrogen and renewable energy,** exemplify this shift, positioning India to lead in sustainable industrial practices and attracting global green investments.

- **Economic Opportunities and Financial Incentives for Industry:** The carbon market creates financial incentives for industries to reduce emissions by offering the potential to **earn and sell carbon credits.**
  - This market-based approach ensures that **businesses can offset the costs of decarbonisation by monetizing their emission reductions.**
  - Assuming that the global average price is $4 per credit, India's carbon market is valued at **$1.2 billion**, opening avenues for financial growth in renewable energy and sustainable projects.
- **Sector-Specific Emissions and Industrial Accountability:** India's carbon market development is driven by the need to address sector-specific emissions, especially from energy-intensive industries such as **cement, steel, and chemicals.**
  - The government's targeted approach to fix emission intensity norms for individual sectors ensures that **emissions reductions are tailored to the challenges faced by each industry.**
  - For instance, **cement, which accounts for 6% of industrial CO_2 emissions, faces a modest 3.4% reduction** target over two years under CCTS, reflecting the sector's significant but manageable impact.
  - Such sectoral focus ensures that the carbon market will address the most pressing emissions while also encouraging incremental improvements across industries.
- **Increased Domestic and International Stakeholder Engagement:** The push for a carbon market is also driven by increasing stakeholder engagement from domestic industries and international bodies.
  - Stakeholders like the International Finance Corporation **(IFC)** and major Indian corporations are pushing for the establishment of a **transparent, efficient carbon market that enhances India's competitiveness in global trade.**
  - As of 2023, more than **1,400** carbon credit **projects were registered under global certification programs like Verra,** with a significant portion in India, signaling strong domestic and international interest in India's emerging carbon market.

What are the Key Issues Associated with Development of Carbon Market in India?

- **Limited Scope and Exclusion of Major Emitters:** While the CCTS has targeted energy-intensive sectors like **cement, aluminium, and textiles,** the steel and thermal power sectors remain outside its scope.
  - **Steel, which contributes around 12% of India's total CO_2 emissions,** has been excluded from CCTS despite being a top emitter.
  - Similarly, as per TERI, the power sector in India contributes ~50% of the fuel-related emissions**,** and is also missing from the carbon market framework, undermining the scale of emissions reduction needed.
- **Weak Emission Reduction Targets:** Critics argue that the emission reduction targets set for some sectors under the CCTS appear weak and lack sufficient ambition to meet long-term climate goals.
  - For example, the **cement sector has relatively modest targets of 3.4% reduction over two years**, which seem insufficient given the urgency of decarbonising India's industrial base.
  - While these targets may be politically feasible, they risk delaying the substantial emission cuts necessary for India's net-zero commitment.
- **Inadequate Financial Support and Compliance Burden on MSMEs:** Small and medium enterprises (MSMEs) face significant barriers in participating in the carbon market due to **high compliance costs, inadequate financial support, and lack of technical capacity.**

- These sectors, which are crucial for India's economy, often struggle to meet the stringent regulatory demands of carbon credit trading.
- Research by the **Indian Carbon Market (ICM)** suggests that MSMEs could face compliance costs as high as **5-20%,** making it prohibitively expensive to engage with carbon markets.
  - Without targeted support**, MSMEs may be excluded from the market,** undermining its inclusivity and hindering the country's overall decarbonisation efforts.

- **Complexity of Measuring, Reporting, and Verification (MRV) Systems:** The credibility of carbon credits depends on robust monitoring, reporting, and verification (MRV) systems, which remain a significant challenge in India's carbon market.
  - The **country's existing MRV infrastructure, largely based on older regulatory frameworks**, lacks the sophistication needed for accurate and transparent emission tracking.
    - This could undermine investor confidence and create loopholes for non-compliance.
  - The absence of consistent and verifiable reporting standards, **as seen in past energy efficiency schemes,** could lead to discrepancies in carbon credit allocation and hinder the market's credibility.
- **Fragmentation with Existing Schemes Like PAT:** India's carbon market development faces the issue of fragmentation due to the overlap with existing schemes like the **Perform, Achieve, and Trade (PAT) program**.
  - The PAT scheme, which already mandates energy efficiency improvements in high-emission sectors, **risks duplicating efforts and confusing industries about compliance requirements.**
  - A lack of integration between these frameworks could lead to inefficiencies and missed opportunities for a unified approach to decarbonisation.
- **Voluntary Participation and Offset Mechanism Risks:** The inclusion of voluntary participation in the offset mechanism of the CCTS poses significant risks to market integrity.
  - **Allowing non-obligated entities to trade carbon credits** may lead to inflated credit supply and data manipulation, compromising the scheme's overall credibility.
  - Past experiences with voluntary carbon markets, such as the **Clean Development Mechanism (CDM),** highlight issues like **double-counting and poor verification.**
- **Inconsistent Price Signals and Market Volatility:** The lack of **clear price signals and market volatility** remains a major issue for India's carbon market.
  - An effective carbon market requires a stable price for carbon credits to encourage long-term investments in emission reduction technologies.
    - However, the **price of carbon credits in India remains uncertain**, with fluctuations likely due to inconsistent emission targets and the introduction of financial players in the market.
  - International experiences, such as the **volatility seen in the European Union Emissions Trading System (EU ETS)**, serve as a cautionary tale.
- **Lack of Sector-Specific Incentives for Green Technology Adoption:** While the carbon market aims to drive emission reductions, the lack of sector-specific incentives for adopting green technologies is a major challenge.
  - **Industrial sectors**, such as cement and steel, face high initial costs for transitioning to cleaner technologies, but the carbon market does not offer direct subsidies or incentives for these investments.
    - Without such incentives, **industries may hesitate to invest in costly decarbonisation technologies**.
  - Additionally, the **CCTS framework does not sufficiently address the financing gaps for clean technology adoption,** which could undermine the long-term sustainability of the market.

What Measures can India Adopt to Enhance and Strengthen its Carbon Market?

- **Promote Green Financing and Investment in Low-Carbon Technologies:** A dedicated green financing mechanism should be created to funnel investment into low-carbon technologies and infrastructure.
  - This could include the **issuance of green bonds, tax incentives for green startups, and partnerships** with international climate funds to reduce the capital burden for clean energy projects.
    - By **lowering the financial barriers**, India can encourage the private sector to adopt innovations in renewable energy, energy efficiency, and sustainable practices.
- **Establish Clear Long-Term Carbon Targets with Sectoral Roadmaps:** India needs to establish **clear, binding long-term carbon emission reduction targets,** supported by specific sectoral roadmaps.
  - These roadmaps would outline the technologies, investments, and steps required for industries to meet their emissions goals over the next two to three decades.
  - This will **give businesses the certainty to plan ahead and invest in decarbonization,** as well as create a measurable and structured pathway to achieving India's climate commitments.
- **Strengthen Monitoring, Reporting, and Verification (MRV) Systems:** To enhance the credibility of carbon credits, India should implement a robust, digital MRV system that tracks emissions with high precision.
  - A **transparent, standardized reporting process** coupled with a network of independent verifiers would ensure the integrity of carbon credits.
  - This system should be **supported by cutting-edge technologies, such as AI and blockchain,** to guarantee transparency, traceability, and efficiency in verifying carbon offsets and ensuring compliance.
- **Create Carbon Market Education and Capacity-Building Programs:** The successful implementation of a carbon market requires widespread awareness and expertise among stakeholders, including businesses, regulators, and the public.
  - India should establish dedicated programs to **educate and train businesses, especially MSMEs,** on how to engage with carbon markets effectively.
  - This would include **workshops, certification programs, and the development of technical advisory services** to ensure smooth market participation and maximize the potential of carbon credit trading.
- **Introduce Market Stability Mechanisms:** To ensure the long-term sustainability of the carbon market, India should introduce **market stability mechanisms such as price floors, flexibility in carbon credit banking, and stabilization reserves.**
  - These measures would **mitigate the risks of volatile carbon prices**, which could discourage investment and participation.
  - Such mechanisms would balance market fluctuations, ensuring that carbon prices remain predictable and industry players can confidently make long-term investments in low-carbon technologies.
- **Expanding the Scope of Carbon Credit Trading:** India can expand the scope of its carbon credit trading by including all major emitting sectors, **particularly those currently excluded, like steel and thermal power.**
  - By incorporating these sectors, the carbon market will have a much larger base of participants, enhancing its liquidity and effectiveness in reducing national emissions.
    - This would ensure that the **carbon market has the capacity to influence the most significant contributors** to greenhouse gas emissions.
- **Facilitate Cross-Border Carbon Trading Mechanisms:** India can engage in cross-border carbon trading with countries in the region and beyond, creating a more interconnected and liquid global carbon market.

- By linking with **international carbon markets, such as the EU ETS, India can attract foreign investments** and ensure that domestic businesses can offset emissions by purchasing cheaper credits from countries with more cost-effective decarbonization pathways.
  - This will also **help Indian industries stay competitive in global markets** with stricter climate regulations.
- **Encourage Carbon Capture and Utilization (CCU) Innovations:** India should actively promote innovations in carbon capture and utilization (CCU) as part of its carbon market strategy.
  - CCU technologies can **convert captured CO2 into useful products, such as chemicals or building materials,** creating new economic opportunities while reducing emissions.
  - Incentives for research and development, along with pilot projects, can pave the way for scaling up these technologies, which can play a crucial role in achieving net-zero emissions.
- **Develop a Comprehensive Carbon Offset Framework:** India should develop a comprehensive framework for carbon offsets that guarantees high-quality carbon credit generation from voluntary actions, such as **reforestation, sustainable agriculture, and renewable energy projects.**
  - By setting clear standards and **ensuring strict certification processes**, the country can create a thriving voluntary carbon market.
  - This would attract investment into green projects, generating additional carbon credits that can be traded within both domestic and international markets.

Conclusion:

India's Carbon Credit Trading Scheme (CCTS) plays a pivotal role in advancing the country's climate goals, aligning closely with the United Nations Sustainable Development Goals (SDGs), particularly **SDG 13 (Climate Action) and SDG 9 (Industry, Innovation, and Infrastructure).** To strengthen the market, India must ensure broader participation from all high-emission sectors, establish robust monitoring and verification systems, and create market stability mechanisms.

Building India'S Ecological Resilience

This editorial is based on "Revamped Green India Mission: A matter of vulnerable ecosystems and livelihoods" which was published in The Indian Express on 19/06/2025. The article brings into focus the revised Green India Mission, which shifts from plantation efforts to comprehensive ecological restoration in vulnerable areas like the Western Ghats and Himalayas. Its success depends on balancing ecological security with sustainable livelihoods for local communities.

Tag: GS Paper - 3, Conservation, Environmental Pollution & Degradation, GS Paper - 2, Important International Institutions, Government Policies & Interventions

India's revised Green India Mission represents a critical **shift from plantation-focused approaches to comprehensive ecological restoration,** targeting vulnerable landscapes like the **Western Ghats, Aravalli range, and Himalayas**. These biodiversity hotspots face mounting pressures from deforestation, illegal mining, unregulated development, and climate-induced disasters, as starkly demonstrated by the **Wayanad landslide**. The success of the revamped mission will ultimately depend on **creating sustainable livelihood opportunities for local communities while strengthening** ecological security—a balance that has eluded previous conservation initiatives.

What are the Current Mechanisms of Environmental Governance in India?

- **Ministry of Environment, Forests, and Climate Change (MoEFCC):** The **MoEFCC** is the principal government body responsible for formulating policies and ensuring the enforcement of environmental laws.
  - The National Action Plan on Climate Change (NAPCC) and other key initiatives like the **Swachh Bharat Mission** fall under the MoEFCC's jurisdiction.
- **National Green Tribunal (NGT):** The **NGT** is a specialized body for the fast and effective disposal of cases relating to environmental protection and conservation of forests and wildlife.

- Established in 2010, the **NGT operates as a quasi-judicial forum to handle environmental disputes** and has the power to provide relief and compensation to those affected by environmental damage.

- **Central Pollution Control Board (CPCB) and State Pollution Control Boards (SPCBs):** The **CPCB** is the national authority for regulating pollution control measures in India.
  - It works in tandem with **SPCBs**, which are responsible for monitoring environmental pollution at the state level.
  - **These boards set pollution standards, conduct regular inspections, and enforce compliance** with laws related to air, water, and noise pollution.
    - They play a crucial role in ensuring industries, municipalities, and other entities adhere to environmental norms.
- **Environmental Impact Assessment (EIA) Process:** The EIA Notification 2006, administered by MoEFCC, is a critical mechanism in India's environmental governance.
  - It mandates that **any major industrial project or infrastructure development, which may significantly affect the environment,** undergoes an assessment process before approval.
    - However, the system has faced criticism for weak enforcement and lax monitoring in some cases.
- **Forest Advisory Committee (FAC) and Forest Conservation Act (FCA) Implementation:** The **FAC**, operating under the MoEFCC, is tasked with recommending the approval or rejection of proposals for the diversion of forest land for non-forest purposes.
  - Under the Forest Conservation Act (1980), the government controls the diversion of forest land for industrial, infrastructure, or mining purposes.
- **Wildlife Protection Act (1972) and the National Board for Wildlife (NBWL):** The Wildlife Protection Act (1972) provides the legal framework for the protection of wildlife and their habitats in India.
  - It empowers the government to establish **Protected Areas (PAs)** such as national parks and wildlife sanctuaries.
  - The **NBWL** is responsible for overseeing the management of these areas and recommending policies to safeguard wildlife.
- **Climate Change Mitigation and Adaptation Mechanisms:** India has institutionalized **climate change governance** through various mechanisms.
  - The National Adaptation Fund for Climate Change (NAFCC) and the **National Action Plan on Climate Change (NAPCC)** form the core framework for India's climate adaptation strategy.
  - Additionally, state governments are encouraged to create **State Action Plans on Climate Change (SAPCC)** to ensure region-specific climate resilience strategies.

What are the Key Environmental Threats India is Facing?

- **Air Pollution and Public Health Crisis:** India's air quality continues to deteriorate, affecting public health and exacerbating climate change.
  - Poor air quality leads to premature deaths, with respiratory and cardiovascular diseases on the rise. The **IQAir 2023 report** ranks **Delhi** as the **world's most polluted capital**, with PM2.5 levels exceeding WHO guidelines by 10 times.
    - In **2021**, air pollution caused **1.26 million deaths**, highlighting the urgency of stringent measures for air quality control.
- **Water Scarcity and Pollution:** Water stress in India has reached alarming levels due to over-extraction, pollution, and poor management.
  - Nearly **600 million people** face **severe water stress**. By the end of March 2025, the water levels in **India's 161 major reservoirs fell below 40% of their capacity,** with 65 of these reservoirs having less than 50% of their capacity remaining.
  - The **2025 State of India's Environment** report revealed that **70% of India's water resources are contaminated**, compounding the water crisis and threatening food and health security.

- **Deforestation and Biodiversity Loss:** India's rapid deforestation continues to impact biodiversity and ecosystem services.
  - The country lost **1.49 million hectares** of forest between 2013-2023, contributing to habitat destruction and climate change.
  - Recent reports highlighted that **natural forests** are 40 times more effective than plantations in sequestering carbon, but **95% of the lost forests were natural,** underscoring the devastating loss of biodiversity and carbon sequestration capacity.
- **Climate Change and Extreme Weather Events:** India is increasingly vulnerable to extreme weather events like **floods**, **heatwaves**, **and cyclones, exacerbating socio-economic vulnerabilities**.
  - In 2024, India experienced extreme weather events on 322 out of 366 days and **2.09 million hectares** of crops were damaged.
  - The **2021 UNICEF report** estimated that **17 out of 20 Indians** are vulnerable to **hydromet disasters**, highlighting the need for better adaptation strategies.
  - India's coastal ecosystems, including the **Lakshadweep** and **Andaman Islands**, are home to critical coral reef systems that are deteriorating due to **climate change** and **pollution**.
    - For instance, in Andaman, the **bleaching is up to 83.6% and has happened due to the impact of the El Nino event.**
- **Diversion of Forest Land for Non-Forest Purposes:** Unchecked infrastructure development is degrading critical ecosystems and contributing to land-use changes.
  - The **Forest Conservation Amendment Act 2023,** for example, redefined forests to facilitate easier diversion for development, undermining **Forest (Conservation) Act, 1980** protections and Supreme Court's judgement in **Godavarman Case.**
    - The diversion of **29,000 hectares** of forest land in 2023 alone for highways and mining further strains India's ecological balance.
  - The **Parsa East & Kanta Basan** coal mine project, which involved cutting **15,000 trees** in **Chhattisgarh, exemplifies the ongoing conflict between development and conservation,** leading to a degradation of wildlife habitats and increased human-animal conflict.
- **Waste Management and Pollution:** The mismanagement of waste is a significant issue, with India generating **62 million tonnes** of waste annually, but only **20%** being processed.
  - In **2022-23**, **4.14 million tonnes** of plastic waste were recorded, despite a partial ban, underlining the failure in waste disposal systems.
    - The **rise in e-waste by 73%% over 5 years further complicates the pollution crisis,** especially in urban slums where waste is often processed without safety measures.
- **Human-Wildlife Conflict:** As forests shrink due to infrastructure projects, **human-wildlife conflict** is on the rise.
  - For instance, **elephant attacks** claimed 6,015 human lives in the twelve years between 2012-13 and 2023-24.
  - These incidents underscore the urgent need for better land-use planning and wildlife corridor conservation to mitigate conflict and ensure both human and animal welfare.
- **Soil Degradation and Desertification:** Soil degradation, exacerbated by deforestation and overuse of chemical fertilizers, is turning fertile lands into deserts, impacting agriculture.
  - The **Aravalli range**'s degradation has brought the **Thar Desert** closer to the **National Capital Region**, worsening air pollution.
  - **60% of India's 160 million hectares of arable land is considered 'distressed soil',** threatening food security and economic stability for millions of farmers **(WEF).**
- **Invasive Species and Ecosystem Disruption:** The introduction of **invasive species** is threatening native biodiversity across India.

- In **2023**, studies from the Indian Council of Agricultural Research found that **invasive species** are outcompeting local plants and reducing forest regeneration, leading to the degradation of forest ecosystems and the extinction of endemic species.
- **Lantana camara** and **Eucalyptus trees**, for instance, have replaced native flora, reducing biodiversity and disrupting ecosystems.

What Measures India Can Adopt to Enhance Environmental Conservation and Sustainability?

- **Strengthen and Enforce Environmental Laws:** India needs to overhaul and strictly enforce its existing environmental laws.
  - This includes revisiting amendments that have diluted protections, such as the **Forest Conservation Amendment Act 2023**, and reintroducing rigorous safeguards for forests, wildlife, and biodiversity.
  - By improving the accountability of regulatory bodies, the country can ensure effective legal enforcement to **curb illegal mining, deforestation, and pollution, while promoting sustainable development.**
- **Promote Circular Economy Practices:** A shift towards a **circular economy** can significantly reduce waste, enhance resource efficiency, and support sustainability.
  - By incentivizing **recycling**, **upcycling**, and the use of **biodegradable materials**, India can reduce its dependency on landfills and foster sustainable production systems.
  - This includes revamping policies around **plastic waste management**, encouraging industries to adopt closed-loop systems, and strengthening the recycling infrastructure to handle **e-waste, plastics, and other non-biodegradable materials.**
- **Decentralize Water Management and Improve Conservation:** To address India's water crisis, decentralizing water management is essential.
  - This involves empowering local communities to manage water resources through **rainwater harvesting** and **water use efficiency** programs.
  - Additionally, protecting and restoring **watersheds**, **wetlands**, and **natural aquifers** can help increase water retention and availability.
    - States should **promote local water bodies and lakes to act as community-driven hubs** for water conservation, reducing over-reliance on unsustainable groundwater extraction.
- **Encourage Sustainable Agricultural Practices:** India must transition to **sustainable farming** that reduces dependency on chemical fertilizers and pesticides.
  - This can be achieved through the promotion of **organic farming**, **agroforestry**, and the use of **bio-based pesticides**.
    - Introducing **crop diversification** and enhancing soil health through **green manure** and **composting** will help restore soil fertility and reduce environmental degradation.
  - Additionally, incentivizing farmers to adopt **precision farming technologies** can minimize resource use and increase productivity sustainably.
- **Invest in Renewable Energy and Energy Efficiency:** To reduce reliance on fossil fuels, India must significantly invest in **renewable energy sources** such as **solar**, **wind**, and **hydropower**.
  - This includes increasing the share of **green energy** in national grids and improving **energy storage** solutions.
  - Along with increasing renewable capacity, policies must incentivize **energy efficiency measures** in industries, buildings, and urban spaces, encouraging the adoption of **LED lighting**, **smart grids**, and energy-efficient appliances across sectors.
- **Restore and Protect Critical Ecosystems:** Focus must be placed on the **restoration of degraded ecosystems** like the **Aravalli Range**, **Western Ghats**, and **Himalayas**, which are vital to India's ecological security.

- This includes reforestation and afforestation programs that emphasize native species, soil conservation techniques, and improved management of **protected areas**.
- By prioritizing **biodiversity corridors** and ensuring buffer zones around critical habitats, India can **mitigate the effects of habitat fragmentation, protect endangered species**, and strengthen ecosystem resilience against climate change.

- **Foster Green Urbanization and Sustainable Cities:** India needs to adopt **sustainable urban planning** models that incorporate **green infrastructure** like **urban forests**, **green rooftops**, and **rain gardens** to manage stormwater and reduce the urban heat island effect.
  - Emphasizing **sustainable transport** systems such as **public transit**, **bicycle lanes**, and **electric vehicles (EVs)** will reduce carbon footprints in cities.
  - Additionally, integrating **circular economy principles** into urban waste management, such as **composting** and **waste-to-energy** technologies, can reduce landfill waste and improve air quality.
- **Integrate Climate Change Adaptation into National Planning:** Climate change adaptation must be a core element of India's **national development framework**.
  - This includes mainstreaming **climate-resilient infrastructure** in sectors like agriculture, water resources, and urban development.
  - Adapting to climate change requires innovative solutions like **climate-smart agriculture**, **flood-proofing** cities, and **improving disaster response systems** to reduce vulnerability in high-risk areas.
  - Incorporating **climate risk assessments** into urban planning and disaster preparedness will ensure better adaptation to extreme weather events.
- **Promote Eco-Tourism and Conservation Education:** India should leverage its rich natural heritage by promoting **eco-tourism** models that contribute to conservation while benefiting local communities.
  - This can be achieved by establishing **sustainable tourism practices** that limit environmental degradation and support **local conservation efforts**.
  - Moreover, incorporating **environmental education** into the school curriculum and promoting **public awareness campaigns** will help create a more eco-conscious society, empowering citizens to actively engage in sustainability efforts.
- **Enhance Governance and Accountability in Environmental Management:** Effective environmental governance requires the integration of **transparent decision-making processes** and **data-driven accountability mechanisms**.
  - Strengthening the role of **environmental watchdogs**, such as the **National Board for Wildlife** and the **Forest Advisory Committee**, will ensure that environmental clearances are granted only after comprehensive assessments.
  - Additionally, establishing robust **monitoring and evaluation frameworks** for key environmental policies will promote long-term sustainability and the efficient use of resources.

Conclusion:

India's path to environmental sustainability hinges on a balanced approach that **integrates robust governance, sustainable practices, and inclusive growth**. By prioritizing the restoration of ecosystems, fostering circular economies, and ensuring equitable livelihoods for local communities, India can drive a future where **3Ps**: **profit, people, and planet coexist harmoniously.** A holistic and actionable environmental strategy will ensure long-term resilience and shared prosperity for all.

Growth-Employment Disconnect in India

This editorial is based on "Getting to a new level in India's online gaming sector" which was published in The Hindu on 24/06/2025. The article brings into picture the growing disconnect between India's economic growth and job creation, as inflation drops but unemployment

rises. Despite sectoral improvements, the economy's expansion fails to address the employment crisis.

Tag: GS Paper - 3, Employment, Growth & Development, Skill Development, Human Resource, GS Paper -2, Government Policies & Interventions

While India's inflation dropped to a comfortable **2.8% in May 2025, unemployment simultaneously rose from 5.1% to 5.8%**, exposing a troubling disconnect in economic priorities. The agricultural sector's improved performance relative to other sectors helped control food inflation, but this sectoral **rebalancing has not translated into broader employment** generation. To address this, India needs to **complement its economic growth with a stronger focus on employment generation**, ensuring that the benefits of growth are more widely shared and that job creation becomes a central pillar of future policy.

What are the Key Strides of India in Curbing Unemployment?

- **Key Skill Development Initiatives:** India has made significant strides in upskilling its workforce through initiatives like **Skill India** and **Pradhan Mantri Kaushal Vikas Yojana (PMKVY)**.
  - These programs aim to provide sector-specific skills to millions, thereby increasing employability, especially among youth and women.
  - The Pradhan Mantri Kaushal Vikas Yojana (PMKVY) has trained **over 13.7 million candidates**, highlighting the scale of effort to reduce unemployment.
- **Make in India and PLI Initiative:** The **Make in India program** and **Production-Linked Incentive Scheme** has been a cornerstone in creating job opportunities by promoting domestic manufacturing and attracting foreign investment.
  - This initiative has helped revitalize the manufacturing sector, generating millions of jobs in areas like electronics, textiles, and automobiles.
  - For instance, **employment in the manufacturing sector increased from 57 million in 2017-18 to 62.4 million in 2019-20**, reflecting the positive impact of this initiative.
- **Promotion of Digital Literacy and Infrastructure:** Through the Digital India campaign, the Indian government has focused on **enhancing digital literacy and infrastructure, especially in rural areas.**
  - This initiative aims to bridge the digital divide, enabling citizens to access online education, job opportunities, and government services.
  - As part of this push, the **Pradhan Mantri Gramin Digital Akshara Abhiyan** aims **to make six crore rural citizens digitally literate**, thereby empowering them to participate in the modern economy.
- **Public-Private Partnerships for Job Creation:** India has increasingly turned to public-private partnerships (PPPs) to generate employment in **high-potential sectors like infrastructure, renewable energy, and healthcare.**
  - These collaborations facilitate the creation of sustainable jobs while also attracting private investment.
    - The **National Infrastructure Pipeline (NIP), with an investment target of Rs. 111 lakh crore,** aims to create millions of jobs across multiple sectors.
- **Targeted Job Creation Schemes for Youth:** In the **Union Budget 2024-25,** the Indian government introduced targeted schemes to address youth unemployment, allocating **Rs. 2 lakh crore for skill development and job creation over five years**.
  - These initiatives include incentives for first-time employees, support for job creation in manufacturing, and schemes to improve job quality and working conditions.
  - By focusing on youth employment, the government aims to provide better opportunities for the emerging workforce.
- **Evolving Labour Market Reforms:** India has undertaken significant labor reforms aimed at improving employment conditions, simplifying labor laws, and promoting formalization of the workforce.

- The **Code on Wages, Industrial Relations Code, and Social Security Code aim to enhance job security,** ensure fair wages, and promote social security for informal sector workers.
  - These reforms aim to transition more workers into formal employment, improving job quality.

Note: Despite key recent strides in employment generation, the **disconnect between economic expansion and job creation remains a significant challenge** for the country.

What are the Factors Contributing to the Disconnect between Growth and Employment Generation in India?

- **Shift Toward Capital-Intensive Growth Model:** The Indian economy's shift towards capital-intensive sectors, especially in manufacturing and services, is limiting job creation.
  - As **capital deepens, it often replaces labor,** reducing the need for workers. For instance, while **India's capital stock grew by 74% between 2014-23, employment only rose by 36%**, leading to a higher capital-labor ratio.
    - This mismatch highlights that growth isn't generating commensurate jobs, especially in labor-intensive sectors.
- **Increased Informalization of the Workforce:** The growth in India's informal sector is **not conducive to stable, formal employment creation.**
  - A significant portion of India's workforce remains in informal, low-wage, and insecure jobs.
  - Despite GDP growth, informal employment continues to rise, absorbing workers with limited benefits and job security.
  - The informal sector **now constitutes around 80-90% of India's workforce**. This sector's expansion reflects job creation but fails to improve quality of work or wages for many.
    - Also, as per **Economic Survey 2023-24, 57.3 per cent of the total workforce is self-employed,** and 18.3% is working as unpaid workers in household enterprises.
- **Mismatch Between Skill Development and Market Needs:** India's skill development initiatives, although vast, often do not align with the evolving demands of the labor market.
  - The **skills imparted through programs like Skill India and PMKVY frequently fail to equip workers** for the higher-end job market, especially in the digital and industrial sectors.
  - Despite efforts, the **unemployment rate rose to 5.8%**, pointing to skill mismatches and an insufficiently skilled workforce.
    - The **Pradhan Mantri Kaushal Vikas Yojana (PMKVY)** has trained 13.7 million candidates, but **only 18% or 2.4 million were successfully placed in jobs**
- **Slow Growth in the Manufacturing Sector:** Manufacturing, historically a key job generator, has not experienced the level of expansion needed to absorb India's growing labor force.
  - The **focus on services and technology-led growth** has shifted attention away from manufacturing, which typically creates more jobs.
  - Despite the Make in India initiative, the manufacturing sector **employed 62.4 million people in 2019-20**, a modest increase from 57 million in 2017-18. This slow growth reflects an inability to create large-scale employment in the sector.
  - Also, the MSE sector holds great potential for job creation, but it needs more stable policy support to ensure long-term success.
    - **About 25-30% of newly established MSEs fail within five years**, indicating the challenges faced by this vital sector.
- **Agricultural Dependency and Limited Diversification:** A large segment of India's workforce remains dependent on agriculture, which is highly seasonal and does not provide sustainable employment.
  - According to the PLFS 2022-23**, 45.76% of India's workforce is in agriculture,** but this sector is unable to generate enough stable employment due to its low productivity and seasonal nature.

- **High Expectations for Government Jobs:** A large number of individuals in India still hold a strong preference for government jobs, viewing them as secure and stable career options.
  - This aspiration **sometimes creates a gap between the types of employment available in the market and the expectations of the workforce.**
  - While the private sector has expanded, the number of government jobs has not kept pace, which can lead some individuals to focus their efforts on pursuing these roles, potentially missing out on other opportunities in the broader economy.

What Measures can India Adopt to Complement Growth with Employment Generation?

- **Fostering Labor-Intensive Manufacturing:** To complement growth with employment, India must pivot **towards labor-intensive manufacturing sectors like textiles, apparel, and food processing.**
  - This strategy involves **scaling up small and medium enterprises (SMEs) and micro, small, and medium enterprises (MSEs),** providing them with tax incentives, subsidies, and access to low-cost labor.
  - Such sectors are **more likely to generate mass employment due to their reliance on human capital**.
    - By targeting these sectors, India can create substantial employment opportunities, reduce dependency on imports, and bolster self-reliant, export-driven growth.
- **Promoting Rural Entrepreneurship:** A key measure is promoting entrepreneurship in rural India, which will stimulate local job creation and reduce migration to urban centers.
  - By **simplifying access to credit, improving market linkages, and facilitating entrepreneurship training,** rural communities can generate sustainable business models.
  - Government support, coupled with an enhanced rural infrastructure network—**such as roads, electricity, and internet connectivity**—will drive rural economic diversification, ensuring that growth is geographically inclusive.
- **Enhancing Public-Private Partnerships in Education:** In today's rapidly evolving job market, India must **bridge the gap between education and employment through dynamic public-private partnerships (PPPs).**
  - By involving industries in curriculum design and offering joint training programs, India can align educational output with labor market demands.
  - These collaborations will help develop a skilled workforce tailored to emerging industries like **AI, automation, and data analytics, enabling better job placement for graduates.**
- **Developing Green Jobs and Sustainable Industries:** India must prioritize **green jobs** in sectors such as renewable energy, sustainable agriculture, and electric mobility to drive **sustainable development**.
  - With global attention on climate change, India has the potential to emerge as a leader in the green economy by focusing on industries that provide high job yields while promoting environmental sustainability, such as **solar power**, **wind energy**, and **waste-to-energy projects**.
- **Industry-Specific Job Creation Policies:** India should implement **sectoral job creation strategies** tailored to high-growth sectors like **healthcare**, **technology**, and **construction**.
  - Policies should focus on targeted incentives for businesses in these sectors to hire locally, upskill employees, and create **resilient job markets**.
  - Offering **tax relief** and **subsidized training programs** can significantly enhance labor absorption in these sectors.
- **Accelerate Implementation of Labor Codes for Flexibility and Inclusivity:** India must accelerate the implementation of its **labor codes** to ensure they are more inclusive and adaptable to the needs of today's evolving job market.

- Also, greater flexibility in **gig employment**, **contractual labor**, and **informal work** can provide legal protections such as **social security**, **healthcare benefits**, and **pension schemes**.
- Simplifying the labor code to promote ease of doing business, while protecting **worker rights, will encourage formalization of employment,** making it more attractive for employers to create quality, well-paying jobs.

- **Public Infrastructure Investment to Stimulate Employment:** India can kickstart job creation by ramping up **public infrastructure investments** in key sectors like transportation, healthcare, and urban development.
  - The focus should be on **high-employment infrastructure projects** that generate jobs for both **skilled** and **unskilled workers**.
  - Additionally, improving **logistics infrastructure**—such as roads, ports, and airports—will lower operational costs, making businesses more competitive and facilitating further job creation across industries.
- **Facilitating the Transition from Agriculture to Non-Agricultural Jobs:** India must ease the **transition** of workers from agriculture to non-agricultural sectors, such as manufacturing, services, and **agro-processing**.
  - Providing **upskilling** programs tailored to sectors like **construction**, **textiles**, and **renewable energy** will help workers shift to more productive, higher-paying jobs.
  - Focused **training centers** for **rural youth**, along with financial and infrastructural support for **agri-based SMEs**, can create jobs that align with market needs while improving **agricultural productivity**.
- **Tax Incentives for Job-Creating Businesses:** The Indian government can introduce **tax incentives** for businesses that focus on **job creation**, particularly in labor-intensive sectors like **construction**, **agro-processing**, and **manufacturing**.
  - Offering **corporate tax breaks**, **low-interest loans**, and **grants** for **SMEs** that focus on creating jobs will incentivize business expansion and employment generation.
  - **This approach would not only increase formal sector jobs but also stimulate growth in underdeveloped regions,** balancing the employment landscape.

Conclusion:

India's economic growth must be better aligned with job creation to ensure that prosperity benefits the entire population. While strides have been made in skill development, manufacturing, and infrastructure, challenges like the **shift toward capital-intensive growth and the rising informal workforce persist.** To complement growth, India needs to focus on labor-intensive sectors, promote rural entrepreneurship, and **invest in sustainable industries, creating opportunities for all.**

Promoting Public-Private Synergy in India'S Space Sector

This editorial is based on "Space race: Is competition among Indian startups ready for lift-off?" which was published in The Livemint on 25/06/2025. The article brings into picture the evolving landscape of India's space sector, where ISRO's collaboration with HAL and private startups like Skyroot and Agnikul fosters innovation.

Tag: GS Paper - 3, Space Technology, Achievements of Indians in Science & Technology

India's space sector is witnessing a **transformative phase, driven by enhanced participation of private entities.** The Indian Space Research Organisation (ISRO) **has strategically outsourced satellite launcher manufacturing** to Hindustan Aeronautics Ltd (HAL), enabling a focus on advanced technologies like reusable rockets and orbital security. This move complements the efforts of private startups such as **Skyroot Aerospace, Agnikul Cosmos, and Pixxel**. As India aims to become a global space hub, the synergy between public institutions and private enterprises is pivotal in **propelling the nation's space ambitions forward.**

How is the Private Sector Contributing to the Expansion of India's Space Industry?

- **Private Sector Participation through IN-SPACe:** The establishment of the Indian National Space Promotion and Authorization Center (IN-SPACe) **in 2020** was a landmark shift, enabling increased participation from private players in India's space sector.
  - By fostering collaboration between ISRO and non-governmental entities (NGEs), IN-SPACe has significantly enhanced the private sector's involvement in satellite launches and space-based services.
  - For instance, **Skyroot Aerospace, a private player, became the first to launch a suborbital rocket, Vikram-S, in 2022**. .
- **Space Startups and Innovation Surge:** India's space startup ecosystem has witnessed explosive growth, with startups like **Agnikul Cosmos, and Dhruva Space** leading the way in launch vehicle technology, satellite manufacturing, and in-space services.
  - **Agnikul's mobile launchpad Dhanush** exemplifies the technological leap. **Startups received $68 million in investments in 2021 alone,** marking a 196% year-on-year increase.
- **Enhanced Public-Private Partnership:** Public-private collaborations have been further boosted through partnerships between **ISRO and industry giants like Hindustan Aeronautics Ltd (HAL), Godrej Aerospace, and L&T** for manufacturing critical space infrastructure.
  - These companies play a vital role in building components for launch vehicles, spacecraft, and satellite subsystems, enhancing India's self-reliance in space technology.
  - For example, **HAL's partnership with ISRO** has been instrumental in **manufacturing PSLV rocket components for over 60 successful launches.**
- **Development of New Launch Vehicles and Infrastructure:** The Indian space sector's collaboration with the private sector has led to innovations in launch vehicles, such as the development of **Small Satellite Launch Vehicles (SSLV) and Reusable Launch Vehicles (RLV).**
  - The **establishment of space parks across the country** will also serve as hubs for small satellite manufacturing and launch services, fostering further private sector involvement.
  - In **2023, SSLV technology saw successful tests,** marking a step toward providing affordable, on-demand launch services for small satellites, essential for commercial applications.
- **International Collaborations and Commercialization:** The opening of the space sector to private players has enhanced India's position in the global space market.
  - With international collaborations through initiatives like the launch of foreign satellites, ISRO's commercial arm **NewSpace India Ltd (NSIL) has helped export India's satellite launch services**.
    - In 2023, **ISRO launched 42 satellites for foreign countries,** contributing to India's growing footprint in global space commercialization.
- **Space-Based Applications and Societal Impact:** Space-based applications, especially in communication, remote sensing, and Earth observation, have seen significant contributions from both ISRO and private sector players.
  - These technologies are driving **digital inclusion, improving agriculture, and enhancing disaster management.**
  - The launch of satellite constellations and Earth Observation satellites by both ISRO and private entities is transforming sectors like agriculture, telecommunications, and urban planning.
    - **Satellite services are expected to contribute 36% of the space economy by 2025**, with remote sensing registering one of the highest growth rates in India's space sector.
- **Technological Advancements and Green Propulsion:** India's space industry is also at the forefront of developing sustainable space technologies, such as green propulsion systems for rockets.

- Startups like **Bellatrix Aerospace are pioneering these technologies,** aiming to reduce the environmental impact of space missions.
  - This aligns with global trends of adopting eco-friendly technologies in space exploration and satellite launch systems.
- **Bellatrix Aerospace has already signed deals for propulsion systems with companies in the UK and France**, showcasing India's innovation in space sustainability.

What are the Key Concerns Associated with the Integration of Private Entities into India's Space Sector?

- **Regulatory and Policy Challenges:** One of the key concerns surrounding the integration of private entities into India's space sector is the **absence of a comprehensive, clear regulatory framework.**
  - While **IN-SPACe has been established to facilitate private participation, there is still a need for transparent policies** that address key areas like space debris management, intellectual property rights, and liability issues in space missions.
  - According to the **Economic Survey 2023-24, over 300 applications were submitted by private entities to IN-SPACe,** signaling a desire for clearer guidelines.
    - However, **only 51 MoUs have been signed,** suggesting hesitance due to regulatory concerns.
- **Intellectual Property (IP) Concerns:** Private companies often develop proprietary technologies for space applications, but the **existing collaborations with ISRO limit their ownership rights.**
  - This restriction may **discourage private players from making significant investments in innovation**, as they risk losing control over their technologies, limiting long-term growth.
  - Critics have highlighted the concern that **ISRO's current model limits private companies to manufacturing roles, with limited IP ownership.** This issue is delaying greater private sector involvement, according to several startup founders.
- **Financial Sustainability and Investment Gaps:** Private players in India's space sector face significant financial challenges, including limited access to risk capital and high upfront investment costs.
  - Despite the **government's Rs. 1000 crore Venture Capital Fund,** space startups continue to struggle with raising the necessary funds, particularly in **early-stage developments where the financial risks are highest.**
  - The market's slow acceptance of risk makes it harder for space companies to secure sustainable investment.
    - According to an analysis by Space Capital, investment in the space industry dropped from a **peak of $47 billion in 2021 to $20 billion in 2022.**
- **National Security and Strategic Concerns:** Space technologies have dual-use capabilities**—both civilian and military**—which raise national security concerns when private companies become involved.
  - India's space activities are closely linked to national defense, with satellites like **GSAT-7 serving military purposes.**
  - The risk of **sensitive data or technologies falling into the wrong hands** increases with private sector participation.
    - Thus, ensuring that private entities do not compromise national security interests is a key issue for India.
- **Technological Gaps and Expertise Constraints:** Many private entities in India's space sector lack the deep technological expertise that ISRO has built over decades.
  - While **startups are innovating in areas like launch vehicles and small satellites,** there remains a significant gap in advanced technologies such as **in-orbit refueling, propulsion systems, and space science instrumentation.**

- These gaps restrict the ability of private players to scale up and diversify their space missions.
- For instance, **Agnikul and Skyroot are pioneering low-cost rockets** but lack capabilities for large-scale missions.

- **Fragmented Industry and Lack of Ecosystem:** India's space industry is still dominated by isolated segments, with over **200 space startups focusing on different components like satellite subsystems, propulsion, and launch vehicles.**
  - This fragmentation leads to inefficiencies, as coordination between different players, especially public and private entities, remains a challenge.
  - Integration challenges persist, slowing down the commercialization of space services.
- **Workforce Skill Deficiency:** The rapid expansion of India's private space sector faces a major hurdle in the form of a skilled workforce.
  - The **complexity of space technology** requires expertise across various domains, including aerospace engineering, propulsion, and satellite communication.
  - However, **India's education and training infrastructure in space technology remains insufficient to meet the growing demand** for highly skilled professionals.

How can India Promote Active Public-Private Partnership in the Space Sector?

- **Streamlining Regulatory Framework for Private Players:** India should expedite the development of a clear and comprehensive regulatory framework that addresses key concerns like **satellite licensing, space debris management, and intellectual property rights.**
  - Establishing a streamlined, **single-window approval process for private companies will reduce delays** and foster a more efficient working relationship between public and private entities.
  - Clearer guidelines on **liability and safety standards,** along with incentivizing adherence to international regulations, would instill confidence and reduce operational uncertainties for private players.
- **Creating a Unified Space Innovation Ecosystem:** The government can facilitate the creation of space innovation hubs, where startups**, established space companies, and academic institutions collaborate in a cohesive ecosystem.**
  - These hubs should provide shared infrastructure, such as **testing facilities, manufacturing plants, and research labs**, supported by both public and private sector funding.
  - Additionally, these hubs can foster knowledge transfer from ISRO to private entities, enabling them to build cutting-edge space technologies while maintaining synergies between the two sectors.
- **Incentivizing Space Technology Innovation with Financial Support:** To encourage private sector innovation in space technologies, India should establish dedicated funding schemes tailored to **high-risk, high-reward space projects.**
  - This includes low-interest loans, grants, and tax **incentives for startups and MSMEs developing next-gen propulsion systems, reusable rockets,** and advanced satellite technologies.
  - Establishing public-private joint R&D funds that match industry contributions will further motivate private players to invest in groundbreaking technologies.
- **Leveraging Government Contracts to Stimulate Private Growth:** The government can play a proactive role by offering long-term, guaranteed contracts for private companies involved in **satellite manufacturing, space-based services, and launch vehicles.**
  - These contracts should be tied to public-sector requirements in areas like **communication, weather monitoring, and defense.**

- By becoming the **primary customer for space services**, the government can provide private companies with consistent revenue streams, **thus encouraging them to expand operations, innovate, and scale up their businesses.**

- **Developing a Specialized Space Workforce:** To support the growth of public-private partnerships, India must invest in developing a highly skilled workforce that **can bridge the gap between academic research, industry demands, and space missions.**
  - Establishing specialized educational institutions, training programs, and industry-academia partnerships will **equip engineers, scientists, and technicians with the skills** necessary for advanced space technologies.
  - By fostering a workforce that is equally adept in both the public and private sectors, India can ensure a steady stream of talent to support future space endeavors.
- **Incentivizing Private Investment in Space Infrastructure:** The government should incentivize private investment in space infrastructure by offering public-private partnership (PPP) models for developing **spaceports, satellite testing facilities, and research centers.**
  - This can be achieved through **Public-Private Partnership (PPP) funding mechanisms,** where private entities invest in infrastructure development with the assurance of **shared ownership, operational rights, or revenue-sharing models.**
  - This will create a sustainable infrastructure base that supports both private sector growth and the government's space missions.
- **Establishing a Clear IP and Technology Transfer Policy:** India should implement a robust intellectual property (IP) and technology transfer policy that enables private companies to **retain ownership of innovations they develop in collaboration with public sector entities like ISRO.**
  - Such a policy will incentivize private players to invest in R&D while ensuring they benefit commercially from the technologies they develop.
  - This approach will **encourage more partnerships by aligning the interests of both sectors** and enabling private entities to leverage IP for commercial purposes, thus boosting innovation.
- **Promoting Export of Indian Space Technologies:** To enhance global competitiveness, India should foster the export of space technologies developed by private entities.
  - This can be achieved by **facilitating partnerships between Indian private players and foreign governments** or corporations for satellite launches, Earth observation services, or space-based communication systems.
  - Public-private partnerships can help create platforms to showcase India's space capabilities internationally and **attract foreign investment,** thereby boosting the global presence of India's private space industry.

Conclusion:

India's space sector is poised for significant growth through **enhanced public-private partnerships.** By streamlining regulations in line with the Outer Space Treaty (1967) **and the** Space Debris Mitigation Guidelines (2007), India can foster innovation and ensure international compliance. Prioritizing workforce development and intellectual property rights will help integrate India more effectively into the global space economy while safeguarding national interests.

Crafting India'S Educational Future

This editorial is based on "Education crisis: Don't let fads disrupt the fundamentals of learning" which was published in The Livemint on 25/06/2025. The article brings into picture the idea that educational success in India relies more on consistent adherence to core principles like teacher quality and curriculum standards than on prosperity. It emphasizes the need for long-term, scalable reforms over short-term solutions.

Tag: GS Paper - 2, Education, Welfare Schemes, Issues Related to Children, Human Resource, Skill Development, Government Policies & Interventions

Educational outcomes across Indian states show that prosperity alone does not determine success in schooling. Rather, it is the **consistent commitment to the fundamentals of education—regardless of administrative shifts**—that plays a pivotal role in shaping results. This suggests that sustained focus on core principles, such as **teacher quality, curriculum standards, and effective policy implementation,** is more critical than financial resources. As we delve deeper into India's educational landscape, it becomes clear that reforms must center on long-term consistency rather than short-term fixes, with a focus on creating robust, scalable systems for learning.

What are the Key Positive Developments in the Indian Education System?

- **Expansion of Digital Learning Infrastructure:** The rapid growth of digital learning has significantly improved access to education.
  - With the pandemic accelerating this shift, initiatives like PM eVidya and SWAYAM and SWAYAM Prabha have enabled millions to access online courses.
    - This digital revolution facilitates lifelong learning, but it also highlights the need for digital equity.
  - In 2023, India reported **over 400 million internet users** in rural areas, expanding access to online education.
- **Increased Focus on Skill Development and Vocational Education:** The shift towards integrating vocational education from early stages reflects the country's commitment to aligning education with job market demands.
  - By eliminating rigid boundaries between academic and vocational streams, the National Education Policy, 2020 emphasizes **experiential learning** and **hands-on skills**.
  - This aims to reduce the skills gap and improve employability, addressing both the urban-rural divide and youth unemployment.
  - The introduction of **skill-based courses from grade 6** and the push for a 50% **graduate enrollment ratio by 2035** indicate India's evolving educational priorities.
- **Improvements in Teacher Training and Pedagogical Reforms:** The focus on **teacher training** under the **NEP 2020** and NISHTHA programs is a crucial development.
  - **NEP 2020 mandates a 4-year integrated Bachelor of Education (B.Ed.) degree,** combining subject knowledge with pedagogical training.
  - These reforms aim to standardize and elevate teaching quality across the nation. The integration of **modern pedagogical techniques** into teacher training ensures better outcomes, moving away from rote memorization toward critical thinking.
  - **NISHTHA** has trained over **42 lakh teachers** as of 2024, enhancing their skills in **student-centered learning**.
- **Introduction of Foundational Literacy and Numeracy (FLN):** The FLN Mission is a game-changer, focusing on literacy and numeracy for children by Grade 3.
  - It prioritizes foundational education as the bedrock for all future learning, tackling learning deficits at the earliest stages.
  - By addressing gaps in basic education, it aims to enhance **cognitive and social development** among young learners.
  - 2025 is going to be a defining year for FLN in India as the NIPUN Bharat Mission aims to achieve universal foundational literacy and numeracy in primary schools by the end of this year.
- **Increase in Public Investment and Infrastructure Upgrades:** The government's renewed focus on increasing investment in education, with a commitment to raise spending to **6% of GDP**, is a significant positive change.
  - Infrastructure improvements under schemes like **Samagra Shiksha Abhiyan (SSA)** and PM SHRI Schools are critical for fostering better educational environments.

- More funding is also aimed at **upgrading digital facilities**, enhancing both access and quality.

- **Focus on Multilingual Education and Regional Language Integration:** India's emphasis on multilingualism under the **NEP 2023** aligns with its cultural diversity.
  - The policy advocates teaching in **mother tongues** up to Grade 5, improving comprehension and learning outcomes for millions of children.
    - This shift not **only fosters inclusion but also respects linguistic diversity,** aiding in the retention of regional languages.
  - **Digital platforms** now offer **regional language courses**, benefiting over **25 million students** in non-Hindi speaking areas like South India.
- **Internationalization of Education and Global Collaborations:** India's **NEP 2020** encourages the internationalization of education, allowing partnerships with foreign universities for **exchange programs** and joint degrees.
  - Indian colleges are forming global partnerships to offer joint degrees, exchange programs, and internships, enhancing students' international exposure.
  - The University Grants Commission (UGC) has issued Regulations on Academic Collaboration between Indian and Foreign Higher Educational Institutions to offer Twinning, Joint Degree and Dual Degree Programmes
- **Reform in Higher Education Governance and Autonomy:** The restructuring of higher education governance, with the proposal for the creation of the Higher Education Commission of India (HECI), is a positive reform.
  - By granting autonomy to colleges and universities, this move encourages **innovation** and **academic excellence**.
  - It aims to reduce the centralization of power, providing institutions with greater freedom in their operations and curricula.
  - The new **accreditation reforms** also saw an increase in university rankings on the **QS World University Rankings**.

What are the Key Persistent Issues in the Indian Education System?

- **Unequal Access to Quality Education:** The persistent **urban-rural divide** in access to quality education continues to hamper India's educational progress.
  - Despite various initiatives, rural areas still face significant challenges in **terms of infrastructure, qualified teachers, and resources.**
  - This disparity leads to unequal educational outcomes, particularly for marginalized communities.
  - Only 18.47% of rural schools in India have internet access, compared to 47.29% in urban areas (Education Ministry).
    - Additionally, **rural areas still account for 37% of dropout rates (as of 2020-21)**, with infrastructure gaps exacerbating these issues.
- **Overemphasis on Rote Learning and Standardized Testing:** India's education system remains heavily reliant on **rote learning** and **standardized testing**, neglecting the development of critical thinking and creativity.
  - This limits **students' ability to innovate and solve problems in real-world situations.** The system continues to prioritize exam scores over holistic development, contributing to student burnout.
  - The 18th Annual Status of Education Report (ASER) 2023, which covers the 14–18-year age group, points at a significant education gap.
    - For instance, around **25% of youth cannot read a Class II-level text fluently in their regional language,** and only 57.3% can read sentences in English.
- **Teacher Shortages and Inadequate Teacher Training:** Despite reforms, teacher quality remains a major issue, with inadequate **teacher training** and **shortages** across the country.
  - The lack of **professional development** opportunities for educators exacerbates the quality gap. Teachers often face overcrowded classrooms, hindering effective teaching and student engagement.

- NITI Aayog's 2023 report highlighted over one million teacher vacancies in the country, with rural areas facing acute shortage.
  - The **NISHTHA program**, though training millions, still faces challenges in **providing continuous, updated training**.

- **Poor Infrastructure and Resource Allocation:** While there has been investment in educational infrastructure, many schools still lack basic amenities like **clean drinking water, toilets, and libraries, particularly in rural areas.**
  - This poor infrastructure hampers students' overall learning experience, affecting their attendance and academic performance.
  - Around **23% of rural schools** have unusable toilets and 11.5% have no separate toilets for girls **(13th ASER Report).**
  - The **web series 'Panchayat'** effectively highlights the dire conditions of government schools in rural areas, where students often avoid using the washrooms altogether.

- **High Dropout Rates and Low Retention in Secondary Education:** High dropout rates remain a significant issue, especially in the **secondary education** phase.
  - Socioeconomic factors, poor infrastructure, and a lack of engagement in learning contribute to students leaving school before completing their education. This limits India's ability to build a skilled workforce.
  - The Union Minister of Education stated that the class 10 dropout rate in 2021-22 was a worrying 20.6%., with **financial constraints** and **family responsibilities** as key factors.
  - Programs like **Samagra Shiksha Abhiyan (SSA)** aim to curb this, but **dropout rates** are still higher in **rural areas**.

- **Gender Disparity in Education:** Although progress has been made, gender inequality in education remains a significant challenge.
  - Girls, particularly in rural and disadvantaged areas, face barriers like **early marriage**, **socio-cultural norms**, and a lack of **safe infrastructure**, which hinder their educational participation and retention.
  - Despite initiatives like Beti Bachao Beti Padhao, recent study states that most dropout girls were aged between **15 and 18 years (76%).**

- **Lack of Career Guidance and Skill Development:** A major challenge in India's education system is the **lack of career guidance** and **skills-based education**.
  - The traditional emphasis on academic subjects often leaves students unprepared for the rapidly changing job market.
  - There is a gap between what students learn and what employers need in terms of practical skills.
  - The **India Skill Report 2023** reveals improvement in overall employability among young people is just **50.3%** .

- **Private vs. Public School Divide:** The growing divide between **private** and **public schools** in India is another persistent issue.
  - In higher education, **67.51% of 1,385 universities** and 37.81% of 60,127 colleges in India are private, with skyrocketing fees structures.
  - The **privatization of education** has led to a situation where access to quality education is largely determined by a student's socioeconomic status. This further exacerbates **educational inequalities**.

- **Insufficient Focus on Mental Health and Well-being:** The increasing **academic pressure**, particularly for students in competitive exams, continues to exacerbate mental health issues like **anxiety**, **depression**, and **suicidal tendencies**.
  - Despite a growing awareness, the education system lacks adequate **mental health support** and a holistic approach to student well-being.
  - According to the National Crime Records Bureau (NCRB), **over 13,000 students** in India committed suicide in **2023**, with **academic pressure** cited as a leading cause.

What Measures can be Adopted to Enhance the Effectiveness of the Indian Education System?

- **Holistic and Interdisciplinary Curriculum Reform:** The curriculum should be reformed to foster **interdisciplinary learning** and critical thinking, breaking down traditional silos between subjects **as directed in NEP 2020.**
  - Encouraging **project-based, real-world applications** of academic knowledge will enhance problem-solving skills, creativity, and collaboration among students.
  - The aim is to shift from rote learning to fostering **analytical and adaptive skills** essential for the future workforce, encompassing both academic and vocational training.

- **Expansion of Vocational Education and Apprenticeship Programs:** Scaling up vocational education through **industry partnerships** will provide students with hands-on experience and job-ready skills from an early stage.
  - Expanding apprenticeship programs in high-demand sectors like **manufacturing, IT, and healthcare** will bridge the skills gap, reduce unemployment, and integrate practical learning into the education system.
  - By doing so, students will gain real-world insights and certification, making them employable immediately after completion.
- **Integration of Technology in Teacher Training:** The quality of teaching can be greatly enhanced by integrating **technology-driven, continuous professional development** for educators.
  - Implementing digital platforms for real-time feedback, **micro-credentialing**, and **interactive learning modules** will allow teachers to stay current with pedagogical advances and technology trends.
  - This can be coupled with **AI-driven learning tools** to personalize teacher training and cater to individual needs, enhancing teaching effectiveness.
- **Active Community and Parental Engagement:** A collaborative approach involving **parents, teachers, and community members** will enhance the relevance of education and ensure holistic student development.
  - Schools can organize **community learning initiatives**, regular **parent-teacher consultations**, and **volunteer programs** that align local needs with educational goals.
  - This will also help build stronger support systems for students, particularly those from marginalized or underprivileged backgrounds.
- **Promoting Entrepreneurial Thinking and Innovation:** Embedding **entrepreneurial skills** and **innovative thinking** into the curriculum from a young age will prepare students to adapt to dynamic job markets.
  - By offering **courses in design thinking, startup culture, and problem-solving**, students will learn to identify opportunities, take calculated risks, and develop a growth mindset.
  - **Innovation hubs** within schools and colleges can further foster entrepreneurial spirits and equip students with practical business skills.
- **Improved Infrastructure for Inclusive Education:** Investing in **accessible school infrastructure** will ensure that students with disabilities or special needs can learn effectively.
  - Implementing **universal design principles** in schools, including ramps, special teaching tools, and **assistive technologies**, will make education truly inclusive. Moreover, hiring specialized staff, such as **special educators** and therapists, will provide targeted support to students requiring additional help.
- **Streamlining and Strengthening Exam Systems:** While exams are necessary for assessment, the system can be revamped to prioritize **continuous, formative assessments** that track students' progress over time **(PARAKH Method).**
  - Moving away from **high-stakes examinations** and adopting **competency-based testing** will reduce pressure and allow students to showcase their understanding through diverse methods such as projects, presentations, and peer reviews.
    - This shift will align assessment with learning, encouraging deeper engagement and understanding.
- **Sustainability and Environmental Education Integration:** Incorporating **sustainability** and **environmental awareness** into the curriculum will prepare students to tackle pressing global challenges such as climate change.
  - Schools should introduce **hands-on environmental projects**, eco-clubs, and sustainability-focused lessons across subjects.
  - This not only equips students with knowledge but also instills a sense of responsibility toward the planet, contributing to the creation of environmentally conscious citizens.

- **Enhanced Public-Private Collaboration for Educational Innovation:** Fostering stronger **public-private partnerships** can help address resource and infrastructure gaps in the education system.
  - By leveraging the expertise of private players in **technology, curriculum design**, and **teacher training**, public schools can access the resources they lack.
  - These partnerships could also facilitate the introduction of **cutting-edge tools** and educational methodologies, ensuring that education remains relevant in a rapidly changing global landscape.
- **Focus on Rural and Remote Area Education:** Specialized initiatives targeting **rural and remote areas** will ensure that education reaches even the most underserved communities.
  - This includes **mobile learning units**, **community-run schools**, and **digital education centers** that bring schooling directly to children's doorsteps.
  - Additionally, incentivizing **teachers to work in remote areas** with better pay and accommodation will increase retention rates and ensure quality education in these regions. od
- **Strengthening Mental Health and Well-being Support Systems:** Establishing **comprehensive mental health support structures** within educational institutions is crucial to alleviate the stress and pressure faced by students.
  - Introducing **mandatory counseling services**, promoting **emotional intelligence** education, and creating safe spaces for students to discuss academic or personal challenges will foster a healthier learning environment.
  - Additionally, **mindfulness and stress management programs** can be incorporated into the curriculum to prevent burnout and mental health issues.

Conclusion:

In alignment with **SDG 4 (Quality Education) and Article 21A of the Indian Constitution,**, reforms should focus on **inclusive, equitable, and accessible education**. Sustainable, long-term investments in **infrastructure, teacher training, and mental health support are essential to building a robust educational system.** Emphasis on technological integration and skill-based learning will ensure that India's education system not only meets current needs but also **prepares future generations for an increasingly complex world.**

Exploring Space, Advancing Life on Earth

This editorial is based on "Axiom-4 mission: Ax-4 docking successful, Shubhanshu Shukla sets foot on International Space Station" which was published in The Hindu on 27/06/2025. This article brings into picture the historic achievement of Group Captain Shubhanshu Shukla, who became the first Indian to enter the International Space Station as part of Axiom Mission 4.

Tag: GS Paper - 3, Space Technology, Achievements of Indians in Science & Technology

Captain Shubhanshu Shukla made history by becoming the **first Indian astronaut to enter the International Space Station as part of Axiom Mission 4.** This mission serves as crucial preparation for India's upcoming Gaganyaan program, the country's first independent human spaceflight mission planned for **2026.** Over the next two weeks, Shukla and his crew will conduct scientific experiments, including **eight designed by ISRO, that could yield innovations with direct applications in everyday life.** This historic achievement represents not just national pride, but a **gateway to space-based research that promises to transform healthcare, agriculture, materials science, and technology for ordinary citizens.**

How can Axiom-4 Experiments Enhance India's Space Research and Application?

- **Sprout Growth in Microgravity:** This experiment explores how spaceflight impacts the **germination and growth** of crop seeds, which is essential for creating sustainable food sources for astronauts on long missions.
  - It will contribute to understanding how to produce food in space efficiently.

- The findings could have **broad applications in urban farming** and **indoor agriculture**, promoting **sustainable food production** in cities and helping urban populations grow their own food, reducing dependency on external supplies.

- **Cyanobacteria for Life Support:** Cyanobacteria are crucial for developing **life support systems** on spacecraft due to their ability to photosynthesize.
  - This experiment will study their growth and biochemical activity in space, aiding in the creation of closed-loop systems for oxygen and food production in space.
  - The knowledge gained from this experiment could improve **environmental control systems** on Earth, particularly in **sustainable building designs**, **water purification**, and **air quality management** in isolated or urban areas.
- **Space Microalgae Growth:** Microalgae are potential resources for food, fuel, and life support.
  - This experiment will study how microgravity affects the growth and metabolism of microalgae, which could be used in **bioregenerative life support systems** for space missions.
  - Microalgae are already used on Earth for **biofuels, waste management, and nutritional supplements**.
    - The research could lead to **greener energy sources** and **sustainable food alternatives** that could revolutionize the way we think about **food production** and **renewable energy**.
- **Muscle Loss in Space (Myogenesis):** This study aims to understand muscle dysfunction in microgravity, which leads to **muscle atrophy** in astronauts.
  - By identifying the molecular pathways involved, it could help develop therapies to prevent muscle loss during long missions.
  - The findings could enhance **muscle atrophy treatments** for patients on Earth, especially for the elderly and those dealing with **muscular dystrophies** or **prolonged immobility**, thus improving health outcomes on Earth.
- **Voyager Display Interaction in Space:** This experiment will study how **microgravity affects cognitive and physical tasks** related to using electronic displays, aiming to improve the design and interaction of spacecraft technology
  - The research could improve **user experience and productivity** in **smart devices, gaming systems, and healthcare applications**, leading to **better ergonomic designs** for everyday tech, minimizing stress and enhancing efficiency.
- **Survival of Tardigrades in Space:** Tardigrades are known for their resilience to extreme environments. Studying their survival, revival, and reproduction in space will help identify **molecular mechanisms of resilience** in extreme conditions.
  - Understanding these mechanisms could advance **biotechnology** and **medical research** on Earth, leading to breakthroughs in **biomedical preservation**, **extreme environmental tolerance**, and potentially **advancements in regenerative medicine**.

What Key Technologies have Emerged from Space Exploration Advancements?

- **Healthcare Innovations:** Space research has significantly advanced healthcare, particularly through the development of remote patient monitoring systems.
  - These innovations originated from NASA's need to monitor astronauts' health during long-duration space missions.
  - For instance, **NASA's development of telemedicine systems** has led to widespread use on Earth, **with ISRO's telemedicine program connecting rural India to urban hospitals,** offering real-time diagnoses and treatments.
  - Also**, NASA's research on nutrient-enriched algae** for astronauts led to **improvements in baby formula,** enhancing it with DHA and ARA, nutrients found in breast milk.

- These innovations have provided a vital nutrient boost for infant formula, improving babies' development.

- **Communication Systems:** Satellite communication technologies developed for space exploration have revolutionized global communication, facilitating faster and more reliable connections.
  - Initially **intended for space missions,** these systems have become integral to global connectivity.
  - A prime example is **GPS technology, which evolved from military satellite navigation systems** and is now indispensable in everyday applications like navigation and logistics.
    - The global GPS market was valued at USD 94.25 billion in 2022.
  - **NavIC, India's indigenous satellite navigation system,** is poised to significantly transform sectors like transportation, logistics, and agriculture by providing accurate positioning and timing services
  - **NASA developed the technology used in video conferencing** to enhance communication for astronauts, which now powers tools like **Zoom, Teams, and Google Meet.**
- **Food Preservation:** Space research has driven innovations in food preservation, **particularly freeze-drying and vacuum sealing,** which were initially developed for astronauts' space missions.
  - These technologies have significantly extended the shelf life of food, reducing waste and improving food security.
  - Freeze-dried fruits, vacuum-sealed meals, and space-inspired packaging technologies now feature prominently in consumer markets, offering convenience and reducing food waste.
  - **Space-grown food like the "Veggie" experiment aboard the ISS** has helped boost space agriculture research**.**
- **Consumer Electronics: Miniaturization of electronic components,** initially driven by the need for compact and lightweight systems in spacecraft, has led to significant innovations in consumer electronics.
  - Space missions require small yet powerful electronics, pushing the limits of miniaturization.
  - These technologies have found their way into **smartphones, wearables, and other personal electronics,** resulting in lighter, more efficient devices.
  - **Example**: **Camera Phones – The CMOS image sensor,** initially developed by **NASA for space exploration, i**s now a cornerstone in modern smartphone cameras, transforming how we capture images.
    - Also, **NASA's need for portable tools led to the creation of the first cordless vacuum cleaner, the Dustbuster,** in partnership with Black & Decker. It was developed to assist astronauts in collecting samples on the moon.
- Space research inspired the refinement of portable vacuum technology, leading to household applications for cleaning.
- **Water Purification Systems:** NASA's development of advanced water filtration systems for space missions has been applied to improve water purification technologies on Earth.
  - These innovations have been essential for **providing clean drinking water in remote or disaster-stricken areas.**
  - NASA's water purification technology, **specifically the Microbial Check Valve (MCV),** has been deployed in disaster relief efforts**, including the 2010 Haiti earthquake**
- **Energy Solutions and Battery Innovations:** Space research has accelerated the development of high-efficiency batteries, particularly for use in spacecraft where weight and power efficiency are critical.
  - These innovations have been applied to electric vehicles and renewable energy storage systems.
  - For instance, **NASA's state-of-the-art solid-state battery research** has created power systems that weigh **30-40% less than regular batteries and store three times more energy,** offering more efficient, longer-lasting power solutions.

- **Solar panels were originally developed for space applications**, with NASA advancing the first solar cell technology in 1958.
  - Today, the most advanced solar panels are made using carbon nanotubes, which enhance efficiency by capturing more natural light and reducing reflected light.
  - India is also actively exploring solar energy as an alternative renewable source — **a key example being its leadership role in the International Solar Alliance (ISA).**
- **Medical Imaging:** The need for advanced imaging technologies in space missions has led to breakthroughs in medical imaging on Earth.
  - Technologies originally developed to study astronauts' internal health are now commonplace in medical diagnostics.
  - **Compact ultrasound machines, developed for use in space**, are now used in emergency rooms and ambulances, providing quick, on-site diagnostic capabilities.
  - The portable ultrasound market is expected to reach $3.8 billion by 2030, with space-inspired technologies contributing significantly to this growth
- **Disaster Management and Response:** Space technologies have greatly enhanced disaster management efforts through the use of satellites for monitoring and forecasting **natural disasters like floods, hurricanes, and wildfires.**
  - These satellites provide real-time data for timely disaster response.
  - **ISRO's Disaster Management Support (DMS) program** has utilized satellite data to track disasters and provide critical information to aid rescue and recovery operations.
- **Innovations in Comfort and Support Materials:** Technological advancements in comfort and support materials, originally developed for specialized applications like **space exploration, have significantly impacted consumer products.**
  - Materials such as **memory foam (used in mattresses), initially created by NASA to cushion astronauts during high-G-force launches,** have revolutionized industries ranging from bedding to footwear.
  - **NASA's work on Apollo spacesuits** led to the development of cushioned insoles like **Nike Air**, which provide extra lift and shock absorption for athletes.
    - In 1968, shoe companies like Puma and Reebok began to use **Velcro** in footwear (that is credited to **NASA**).
  - These innovations have enhanced comfort**, improved health outcomes (by alleviating pressure points)**, and contributed to the development of products designed for better everyday use.

How India can Further Capitalise Upcoming Space Missions for Wider Applications?

- **Leveraging Earth Observation for Sustainable Development: NISAR**, a **joint project with NASA**, will be the first **dual-frequency synthetic aperture radar** satellite, designed for **advanced remote sensing**.
  - The **high-resolution Earth observation data** from NISAR can significantly enhance **disaster management** capabilities, from real-time flood monitoring to **forest fire detection**.
    - It can also enhance **agriculture productivity by providing detailed, real-time data on soil moisture, crop health, and more.**
  - The **radar imagery** will also provide **accurate crop health monitoring** and **water resource management**, contributing to **precision farming**, **urban planning**, and **environmental conservation**.
- **Enhancing Healthcare and Biotechnology:** Gaganyaan's **human spaceflight** program will not only send astronauts into space but also help ISRO develop advanced **life support systems** and **health-monitoring technologies**.
  - The technologies developed for **human health monitoring** in space, such as **biomedical sensors**, **telemedicine systems**, and **remote diagnostics**, can be translated into improving **healthcare access** in remote and underserved areas on Earth.

- Additionally, **biotechnology innovations** for astronauts' **muscle regeneration** and **bone health** can be applied to **treating aging-related conditions** and **muscular diseases** on Earth, thereby enhancing medical care for the elderly and patients with long-term mobility issues.

- **Advancing Renewable Energy Solutions and Climate Change Mitigation:** The Venus Orbiter Mission will study Venus's atmosphere, which is known for its extreme greenhouse effects.
  - The data from Venus's extreme weather systems could provide insights into **climate modeling** and **carbon emissions** on Earth.
  - Understanding Venus's **greenhouse gas-driven climate** can help **improve climate change mitigation strategies** on Earth.
  - Space-based technologies, such as **NOAA's Earth and Space Observing Digital Twins,** play a key role in climate change mitigation.
    - By leveraging satellite data and AI, they improve early warning systems, helping to reduce climate-related impacts and support timely interventions.
  - This could also contribute to **renewable energy** technologies, such as **solar energy optimization**, and provide deeper insights into **weather patterns**, helping to better manage agriculture, water resources, and energy consumption in the face of climate change.
- **Improving Navigation and Communication Technologies**: The Mars Orbiter Mission 2 aims to enhance interplanetary communication and navigation.
  - The **advanced communication systems** and **navigation technologies** developed for Mars will find immediate applications in **global positioning systems (GPS)**, **satellite communication**, and **navigation technologies** on Earth.
  - These advancements will improve **navigation accuracy** for **autonomous vehicles** and **drones** in sectors like **logistics, agriculture, and transportation**, ensuring **safer, more efficient travel** and **delivery systems**.
    - Additionally, **communication innovations** will enhance **5G network capabilities** and **rural connectivity**, improving internet access in underserved areas.
- **Harnessing Lunar Exploration for Resource Management:** The Lunar Polar Exploration Mission, in collaboration with **JAXA**, will explore the Moon's south pole, a region rich in water ice and minerals.
  - Discovering and extracting water and resources from the Moon could lead to **advanced resource management technologies** for Earth.
  - This mission can contribute to **earth-based water purification**, **mineral extraction technologies**, and **sustainable resource management**.
  - Moreover, technologies developed for **lunar habitation** can be adapted for **off-grid living** and **sustainable urban infrastructure**, especially in areas facing resource scarcity and environmental stress.
- **Establishing Space Stations for Advanced Research:** India's space station will be a hub for scientific research, **microgravity experiments**, and the development of **life support systems** for human space exploration.
  - Moreover, the space station could serve as a **testing ground** for **new technologies** that can benefit industries such as **medicine, energy, and material sciences**, leading to **breakthroughs** in **advanced healthcare technologies** and **sustainable living solutions**.
- **Revolutionizing Earth Observation and Data-Driven Decision Making: Chandrayaan-4** will be a **lunar sample-return mission**, aiming to collect and return Moon samples for analysis.
  - By understanding the **lunar soil composition** and the **Moon's geological processes**, ISRO can refine **Earth-based resource management**, particularly for **mineral exploration** and **geological studies**.

- This research could also improve **space weather prediction systems**, ensuring better preparation for solar flares and other cosmic events that impact Earth's **communication and power systems**.

Conclusion:

"Space exploration is not just about reaching new heights, it's about harnessing the unknown to elevate life on Earth." India's space exploration missions, including the **Gaganyaan program, NISAR and Chandrayaan 3**, hold transformative potential for global advancements in healthcare, technology, and environmental sustainability. These innovations will not only elevate India's standing in space research but also drive solutions for challenges on Earth.

Tribes: Rooted in Culture, Rising in Strength

This editorial is based on "Centre's outreach to tribal people can be starting point for bottom-up development. But it won't be easy" which was published in The Indian Express on 26/06/2025. The article brings into picture the government's outreach to one lakh tribal villages through schemes like PM JANMAN and DAJGUA, while also highlighting persistent implementation challenges for the 75 Particularly Vulnerable Tribal Groups.

Tag: GS Paper - 2, Issues Related to SCs & STs, Government Policies & Interventions

The Ministry of Tribal Affairs recently launched an ambitious outreach programme targeting one lakh tribal villages to ensure doorstep delivery of welfare schemes including **and** Dharti Aaba Janjatiya Gram Utkarsh Abhiyan. While the government has introduced multiple initiatives to bridge the developmental gap for tribal populations, particularly the **75** Particularly Vulnerable Tribal Groups**,** significant challenges persist in implementation. This latest campaign represents both an opportunity and a test of how this effort can effectively address the deep-rooted issues facing India's tribal populations.

How do Tribes Contribute to India's Cultural Heritage and Socioeconomic Progress?

- **Cultural Sentinels of India's Civilizational Identity:** Tribes preserve India's intangible cultural heritage through their **oral traditions, folk art, spiritual practices, and ecological worldviews.**
  - They serve as living links to India's prehistoric past and plural ethos. Their distinct lifestyles showcase India's cultural continuity amid change.
  - India officially recognizes **705 tribes**, each with unique linguistic and artistic traditions (Census 2011).
  - **Example**: The **Gonds, one of the largest tribes, are globally known for Gond paintings — symbolic of nature-spirit fusion.**
- **Original Inhabitants and Natural Custodians of Land:** Tribal groups are rooted in India's geography, often in forests and highlands, forming a civilizational bond between land and people.
  - Their **territorial affinity defines indigenous sovereignty and natural stewardship.**
  - **Example**: The **Dangs of Gujarat** resisted British entry to protect forests**.** In **Hasdeo Aranya, the Gond and Oraon** tribes are among the indigenous communities who have been resisting coal mining for a decade
- **Symbols of Resistance and Self-Rule in Indian History:** Adivasis have long resisted external domination — from colonial rule to resource exploitation — asserting indigenous models of self-governance. Their struggle is central to India's anti-colonial and decentralization narratives.
  - **Example**: **Birsa Munda's** Ulgulan movement **challenged British land laws**; **Janjatiya Gaurav Divas** commemorates this spirit. Tribals were involved in over 80 anti-colonial uprisings, including the Bhil, Kol and Santhal rebellions.
- **Ethical Counterpoint to Modern Consumerism:** Tribal societies function on values of collectivism, non-accumulation, and harmony with nature — **offering a powerful ethical contrast to extractive development.** Their worldview represents alternative modernities India can learn from.

- **Example**: **Galo of Arunachal Pradesh** worships nature spirits and lives sustainably.

- **Pillars of National Integration in Strategic Borderlands:** Tribes inhabiting remote and border regions strengthen India's territorial integrity and cultural unity. Their presence in sensitive zones affirms India's sovereign identity and fosters grassroots national belonging.
  - **Example**: The **Konyak Naga tribe,** predominantly located in the Mon district of Nagaland near the Indo-Myanmar border, plays a significant role in the region's stability.
- **Shapers of India's Local Knowledge Systems:** India's indigenous medical systems, agricultural methods, ecological knowledge, and storytelling traditions have deep tribal roots. They enrich local epistemologies and diversify India's intellectual heritage.
  - **Example**: **Bondas of Odisha** still use traditional herbs and rituals for healing; tribal knowledge informs India's biodiversity registers.
- **Architects of Communitarian Social Models**: Tribes exhibit egalitarian social relations with collective land ownership, decision-making through tribal councils, and decentralized leadership — reflecting India's indigenous democratic ethos.
  - **Example**: Khasi tribes in Meghalaya follow matrilineal succession and community consensus. **PESA Act (1996)** constitutionalized such indigenous governance in Scheduled Areas.
- **Defenders of Pluralism and Tolerance:** Tribal worldviews allow **co-existence of animism, nature-worship, and polytheism** — reinforcing India's syncretic identity. Their inclusive spiritual ethos strengthens India's secular fabric.
  - **Example**: **The Rabari tribe follows a syncretic blend of Hinduism and animistic beliefs**.

What are the Key Issues Associated with Tribes in India?

- **Land Alienation and Resource Displacement:** Tribes continue to lose their ancestral lands to infrastructure, mining, and conservation projects, often without proper rehabilitation which can be interpreted from age-old demand to reclaim **Jal, Jangal, Jameen.**
  - **Land is central to tribal identity, culture, and survival**. Legal safeguards like Forest Rights Act (FRA), are under-implemented and frequently diluted. Such displacement leads to food insecurity, livelihood erosion, and cultural uprooting.
  - Over **38% of all claims over land made under the Forest Rights Act (FRA),** 2006 till November 2022, have been rejected.
- **Lack of PESA Implementation and Weak Local Governance:** Despite the PESA Act (1996), Gram Sabhas **in Scheduled Areas lack de facto powers** over natural resources and social justice.
  - Bureaucratic overreach and state reluctance undermine tribal self-rule. Most states have passed diluted rules without empowering communities. This results in developmental decisions that clash with tribal values and needs.
  - **Only 10 PESA states have notified rules,** but community control over forests, land, and markets remains tokenistic.
- **Educational Backwardness and Cultural Disconnect: High dropout rates stem from lack of mother-tongue instruction,** cultural alienation, and irrelevant curricula.
  - Schools in tribal belts often suffer from teacher absenteeism and poor infrastructure.
  - Tribal knowledge systems are ignored, making learning disengaging.
  - **1/3rd** Eklavya Model residential schools are non-functional due to incomplete building construction.
  - Government data reveals Eklavya Schools are also **falling short of the 5% PVTG quota, with dropout rates on the rise.**
- **Health Deprivation and Systemic Gaps:** Tribes face poor healthcare access, undernutrition, and high child mortality due to geography, poverty, and discrimination.
  - Government health programs often miss tribal areas or are irregular. Traditional healing is undervalued, and mistrust of state health systems persists. This results in intergenerational health poverty.

- For instance, in Gujarat, the **Dhodia, Dubla, Gamit, and Naika tribes** have a high prevalence of sickle cell disease.
- According to the **Comprehensive National Nutrition Survey (2016–2018)**, about **40% of under 5 tribal children in India were stunted** (though witnessed improvement recently).

- **Economic Marginalization and Informal Dependency:** Adivasis largely depend on minor forest produce and casual labour, with little value addition or financial resilience.
  - They remain **excluded from organized markets and formal finance.** Exploitation by middlemen and lack of price awareness reduce income potential. Their economic life is still barter-like in many places.
  - For instance, a 2023 survey from Jharkhand shows over **46% of tribal households fall below the poverty line**, with **around 50% of young women and 42% of young men migrating for work** due to lack of local opportunities
- **Identity Erosion and Cultural Fragmentation:** Tribal languages, belief systems, and rituals are vanishing under mainstream pressure and cultural dilution.
  - Forced integration has blurred tribal distinctiveness. Missionary activity and religious polarisation have also divided homogenous groups. Cultural alienation erodes pride, memory, and cohesion.
  - Around 197 languages are in various stages of endangerment in our country, more than any other country in the world.
    - For instance, **Mahali language in eastern India, Koro in Arunachal Pradesh, Sidi in Gujarat and Dimasa in Assam** are facing extinction.
- **Conflict-Zone Victimization and Legal Injustice:** In insurgency-hit areas, tribals face human rights violations from both state forces and militants. Critics argue that some of them are wrongly labelled Maoists, with little access to legal aid or rehabilitation.
  - The then Prime Minister Manmohan Singh termed the **Naxal violence 'greatest internal security threat.'**
  - Due to this many tribes live under surveillance and militarization. This deepens historical alienation and leads to cycles of violence.
    - For instance **Bastar (Chhattisgarh)**, hundreds of tribals face charges under Unlawful Activities (Prevention) Act, 1967 (UAPA), many without trial.
- **Market Isolation of Tribal Products:** Tribal artisans and producers face weak market access, branding challenges, and unfair pricing.
  - Despite cultural richness, tribal goods are undervalued or sold through exploitative channels. Government support is often scattered and non-scalable. Their economic potential remains untapped.
  - **Only 11.83 lakh tribal beneficiaries** reached via Van Dhan Kendras despite 3,958 centers.

What Measures can India Adopt to Enhance Tribal Empowerment in India?

- **Operationalize Tribal-Centric Governance:** There is a need to further empower **Gram Sabhas in Scheduled Areas with actual administrative, judicial, and financial control** over local resources (that is diluted by the recent **Forest Conservation Amendment Act**).
  - **Transfer planning, budgetary allocation, and dispute resolution** powers to tribal institutions to ensure bottom-up governance.
  - Tribal autonomy must be **institutionalized through capacity-building of local leadership.** This shift can enable **culturally sensitive governance and reduce bureaucratic alienation**. Strict auditing and social accountability tools must accompany devolution.
- **Institutionalize Tribal Languages in Education and Administration:** Integrate tribal languages into early-grade education through **localized textbooks, teacher training, and digital content in mother tongues.**
  - This fosters cultural continuity and improves learning outcomes. **Government communication and public services in tribal regions should include tribal scripts and dialects.**
    - Language inclusion must be treated as a **constitutional right,** not merely a cultural add-on.

- **Establish Tribal Cultural and Intellectual Property Rights Framework:** Create legal mechanisms to protect tribal knowledge, art forms, seeds, and healing practices from commercial exploitation.
  - Recognize tribal communities as **collective right-holders over their intellectual and cultural property.** This helps counter cultural commodification and ensures benefit-sharing from market use.
  - An autonomous **Tribal Heritage Authority** should be formed for registration, **legal aid, and enforcement**. Legal protection of intangible heritage is vital for identity-based empowerment.
- **Design Tribal-Specific Entrepreneurship and Value Chain Models:** Encourage forest-based and craft-based microenterprises through tailored skilling, decentralized incubation hubs, and tribal cooperatives.
  - Establish **tribal-centric value chains that ensure fair prices and market access** while respecting traditional practices.
  - **Branding, design support, and e-commerce facilitation** should be embedded in the model.
  - Tribal youth should be trained in sustainable entrepreneurship aligned with their ecological realities. The government must promote **"tribal enterprise zones"** as economic enclaves of dignity.
- **Reorient Health Systems with Indigenous and Community-Led Approaches:** Bridge traditional and modern medicine by integrating tribal healers into primary healthcare through training and certification.
  - Establish **mobile health units staffed by locals, respecting tribal gender norms and cultural beliefs.**
  - Health systems should incorporate tribal diet, seasonal cycles, and natural healing traditions.
  - **Community Health Committees** must monitor local delivery and ensure trust-based care. Tribal health cannot be decontextualized from its socio-cultural matrix.
- **Frame an Indigenous Education Policy with Decolonized Curriculum:** Develop tribal-specific curriculum that incorporates indigenous **history, ecology, folklore, and governance systems.**
  - Shift pedagogy toward experiential and oral methods suitable for community contexts. Tribal scholars must be involved in designing and reviewing textbooks.
  - **Residential schooling models should be reformed to prevent uprooting children from cultural environments**. Education must become an instrument of empowerment, not assimilation.
- **Institutionalize Climate-Resilient Tribal Livelihood Models:** Invest in regenerative agriculture, community-led afforestation, and traditional water harvesting practices rooted in tribal ecological knowledge.
  - Ensure access to **carbon credit markets through community forest rights.** Promote decentralized renewable energy models owned and maintained by tribal groups.
  - **Tribal livelihoods must shift from fragile subsistence to ecological resilience.** Recognize them as climate stewards in national climate adaptation plans.
- **Ensure Participatory Digital Inclusion in Tribal Areas:** Bridge the digital divide through culturally contextualized digital literacy programs using audio-visual, multilingual content.
  - Set up tribal-run digital resource centers offering services like telemedicine, e-learning, and e-commerce.
  - Digital infrastructure should follow the **"tech-for-culture" principle, not "tech-over-culture."** Tribal digital rights should be integrated into India's digital governance framework.
- **Decentralize Monitoring through Tribal Social Accountability Mechanisms:** Create autonomous tribal audit groups that assess local implementation of welfare schemes using **participatory tools like social audits, grievance mapping, and crowd-sourced feedback.**
  - Embed tribal knowledge systems in defining success indicators of schemes. Data systems must disaggregate outcomes across tribe-specific contexts.
  - Monitoring should **shift from top-down compliance to bottom-up ownership.** Public finance must be tied to performance-based, community-certified feedback.

- **Redefine Development Indicators with Tribal Worldview:** Move beyond growth-linked indicators to tribal-centric development metrics like access to forests, ritual freedom, food sovereignty, and ecological balance.
  - Integrate these into **SDG localization in Scheduled Areas**. Development models must account for cultural wealth and ecological balance.
  - Recognizing alternate measures of well-being ensures contextual relevance. This epistemological shift is essential for respectful policy-making.

Xaxa Committee Recommendations for Tribal Welfare in India

- Strengthen **implementation of the Forest Rights Act (FRA), 2006**, and protect against displacement due to development projects. Ensure prior informed consent of tribal communities for land acquisition.
- Promote **mother-tongue education at the primary level,** recruit more tribal teachers, and establish residential schools closer to habitations with better infrastructure and culturally sensitive content.
- Enhance access to quality healthcare in tribal areas through mobile clinics, community health workers, and integration of traditional tribal healing practices with public health systems.
- **Support tribal livelihoods by improving access to forest produce markets,** promoting agroforestry, and extending credit and skill development schemes tailored to tribal needs.
- Establish a dedicated National Commission on Tribal Development to monitor schemes, collect disaggregated data, and recommend course corrections.

Other Key Committees on Tribal Welfare:

- **Elwin Committee (1959)**: Assessed tribal development blocks and advocated cultural preservation.
- **Dhebar Commission (1960)**: It acknowledged the issue of land alienation in tribal areas, where tribal populations were losing their ancestral lands due to various factors, including government acquisition for development projects.
  - It also outlined specific criteria for designating a region as a **'Scheduled Area' under the Fifth Schedule of the Constitution.**
- **Lokur Committee (1965)**: Proposed five criteria to identify STs for better inclusivity.
  - These criteria include indications of **primitive traits, distinctive culture, geographical isolation, shyness of contact** with the larger community, and backwardness
- **Bhuria Committee (1991)**: Recommended democratic decentralization, led to the PESA Act.
- **Mungekar Committee (2005)**: Focused on governance issues in tribal areas.
- **Bandopadhyay Committee (2006)**: Addressed development in Left-Wing Extremist-affected tribal regions.

Conclusion:

"The test of our progress is not whether we add more to the abundance of those who have much, but whether we provide enough for those who have too little," said Franklin D. Roosevelt—a truth that resonates deeply in the context of India's tribal communities. These communities are **not peripheral groups to be uplifted through assimilation**, but core architects of the **nation's cultural, ecological, and ethical foundations.**

Drishti Mains Questions

1. “India’s healthcare system is witnessing rapid digitalization and private sector expansion, yet equitable access and financial protection remain elusive for millions.” Discuss.
2. Examine the challenges faced by India’s critical mineral supply chain and suggest comprehensive measures to achieve self-reliance in this sector.
3. Examine the key drivers and challenges of India’s manufacturing sector. Suggest measures to enhance its productivity and global competitiveness
4. Examine the challenges in plastic waste management in India. How can India effectively implement a circular economy approach to address these challenges and promote sustainability?
5. Biodiversity is not just a natural heritage but an economic asset for sustainable development. Examine the role of biodiversity in India’s economic growth and resilience, while highlighting the emerging threats to its conservation.
6. India’s neglect of secondary education has created a critical skill-employability mismatch. Comment.
7. Judicial accountability is a cornerstone of democratic governance, but it must be balanced with judicial independence. Examine the current mechanisms for judicial accountability in India. What reforms are needed to ensure a more transparent, effective, and accountable judiciary?
8. Despite substantial public investment and a wide array of schemes, Indian agriculture continues to face structural bottlenecks. Discuss.
9. India’s pharmaceutical sector has emerged as a global leader in the supply of affordable medicines, yet it faces structural and strategic challenges in sustaining long-term growth
10. Inclusive growth is central to achieving sustainable and equitable development. Analyze the key elements of inclusive growth in India, the challenges that hinder its realization, and the measures required to promote an inclusive economy for all sections of society
11. Discuss the role of Micro, Small, and Medium Enterprises (MSMEs) in driving India’s economic growth and employment generation. What are the key challenges faced by MSMEs, and how can the government’s policies be enhanced to address these challenges and foster sustainable growth in the sector?
12. Critically evaluate the need for electoral reforms in India. In your opinion, which reforms are most urgent for deepening democratic accountability?
13. Examine the key drivers and areas of friction in India-EU relations. How can India strengthen its partnership with the European Union in the current global context?
14. “Discuss the key drivers of conflict in West Asia and analyze their implications for India’s strategic, economic, and energy security interests.”

Drishti Mains Questions

15. India is at a crucial juncture to emerge as a global clean-tech manufacturing powerhouse, with its focus on green technology through initiatives like the National Manufacturing Mission. Discuss the potential role of clean-tech in advancing India's economic development.
16. India has made significant progress in achieving gender parity in various sectors, yet substantial challenges remain in realizing true equality. Examine the key strides made by India towards gender equality, the obstacles still hindering progress
17. Examine the potential of India's Carbon Credit Trading Scheme (CCTS) in achieving the country's climate goals. Discuss the key challenges in its design and implementation, and suggest measures to enhance its effectiveness.
18. Examine the current mechanisms of environmental governance in India and their effectiveness in addressing key environmental threats. How can these mechanisms be strengthened to ensure sustainable development?
19. What are the underlying factors contributing to the disconnect between economic growth and employment generation in India, and what measures can be implemented to address this challenge?
20. Examine the role of the private sector in the expansion of India's space industry. Discuss the challenges associated with increasing private participation, and suggest measures to promote effective public-private partnerships in the sector
21. While financial resources play a role, long-term consistency in core educational principles is key to improving outcomes in India's education system. Critically analyze the effectiveness of current reforms and suggest measures to address the persistent challenges.
22. What are the key applications and benefits of the Axiom Mission 4 experiments for advancements in space research and practical innovations on Earth?
23. "Despite numerous policy interventions, tribal empowerment in India remains constrained by structural gaps in recognition, representation, and autonomy."